

## A Performance Support Tool for Novice Reading Facilitators

by Brenda Bannan-Ritland, Emily Egerton, Jen Page, and Michael Behrmann

**D**uring the last decade, electronic performance support systems (EPSS) have provided valuable solutions to many human performance problems (Gery, 1995; Laffey, 1995). While this specific performance technology has been successful in corporate and other work contexts, it has great potential to support national educational initiatives that have a performance focus. Through creative partnerships and vision, an instructional technology graduate program, the Helen A. Kellar Institute at George Mason University (GMU), and the Parent Educational Advocacy Training Center (PEATC) are currently employing performance support technology to address one of the most important educational goals for all children—literacy—with particular focus on those with disabilities. Literacy Access Online (LAO) incorporates a web-based EPSS called the Literacy Explorer. This software tool, designed by graduate students as part of their masters and doctoral coursework in instructional technology, addresses the unique needs of struggling readers and their often-novice literacy facilitators. Literacy or reading facilitators (defined as parents, siblings, guardians, peer or adult volunteers, teacher assistants, or any additional lay

or professional persons involved with helping a child learn how to read) can use this tool to support elementary and middle school students with disabilities (grades 4–8) in the reading process. (The terms *reading facilitator*, *literacy facilitator*, and *facilitator* are used interchangeably in this article.)

### Unique Partnership

The LAO project began as a Steppingstones to Technology Innovation for Students with Disabilities grant from the U.S. Department of Education. Several faculty at the Helen A. Kellar Institute at GMU and representatives from PEATC collaborated to combat the problem of a lack of support for parents and reading or literacy facilitators who work with children with disabilities. The grant proposed an innovative web-based resource for parents and literacy facilitators to access information and training on literacy techniques and computer accessibility options for children who may have a broad variety of disabilities.

One of the most unique caveats of the grant was that masters and doctoral students would design the proposed web-based resource as a core part of their

coursework in the instructional technology immersion program at GMU. Through the immersion program, graduate students participate full time in an authentic instructional design project learning the instructional design process by *doing* design. Supported by faculty in instructional design and assistive technology, two doctoral students and 10 masters students comprised the first GMU design teams to develop the beginning phases of the project over two semesters.

In the project, students interacted with clients and subject matter experts (SME) to define the problem using a performance-centered needs analysis approach. Next, the group selected EPSS as the most appropriate delivery medium for the proposed solution and designed and developed a web-based prototype for usability and formative evaluations. In this process, students gained realistic experience interacting with literacy experts, reading specialists and parents while working on a valuable project that will ultimately provide a new means of support for literacy facilitators and children with disabilities.

## Performance Problem and Analysis

As Rossett (1992) indicates, finding and disseminating information about the cause of a performance problem—as well as the optimal and actual performance related to the task—is crucial to appropriately implementing human performance technology. GMU graduate students conducted a thorough needs analysis examining the issues of literacy and Internet accessibility, supervised by faculty, to begin a systematic process of design and development. The analysis reviewed related literature and national statistics on reading requirements of children in grades 4–8 as well as current practice of reading strategies and availability and accessibility of technology for those with disabilities. In addition, various SMEs in the areas of literacy instruction, accessibility, and reading techniques were consulted. To better determine the overall need, both expert and novice literacy facilitators were also observed and interviewed.

### Performance Problem

The goal of literacy for all children, including those with disabilities, is a current national focus. With an estimated 40% of all children in the third grade reading below grade level (NAEP, 1996), difficulty in reading is prominent for many children, but the problem is particularly acute among students with disabilities. Some national initiatives are attempting to address some of the problems that children with disabilities face; however, most of the efforts are with children below grade three. Furthermore, reading special-

ists often do not work with special education students, and instructors in charge of these children often do not possess specialized training or skills in reading techniques and strategies. Support at home for children with disabilities is also variable. Typically, parents have limited skills in reading strategy techniques and computer accessibility issues, making it more difficult to encourage their children's reading success. These children often do not receive the same opportunity to interact with technology.

### Results of Needs Analysis

Information from the 1998 reading assessment conducted by the National Assessments of Educational Progress confirmed that there is a definite deficit in reading levels of children in grades 4 and 8 across the United States. Although there is not much specific research regarding reading skills of students with disabilities, it is apparent from the lack of available resources that they are in great need for literacy skills support.

Although children with disabilities have a definite need for support, the facilitators who work with them are also working at a disadvantage. They most often work independently of schools with little or no training or proficiency in teaching reading strategies. Support for these individuals is limited by a significant lack of research-based information and tools available for their use (Koppenhaver et al., 1993). LAO project interviews and observations of both expert and novice literacy facilitators confirmed this assumption and revealed a significant lack of knowledge concerning the best practices of literacy instruction among teachers and parents who work with children with disabilities in the northern Virginia area.

### Defining the Performer or Target Audience

The performance analysis conducted with literacy facilitators clearly determined the target audience or performers involved in the task. Interestingly, in this specific task of facilitating the reading process, the GMU design team concluded that the literacy facilitator—not the child with a disability—has a greater need for support and resources. The analysis revealed that if the facilitator got better support, the child could receive better guidance and significantly benefit from improved reading sessions. However, it was also noted that during actual reading sessions, the facilitator and student worked closely together as an interactive dyad. After much debate and discussion, the GMU design team determined that participants would address the facilitator-child interaction, focusing primarily on the literacy facilitator's needs in enhancing the child's reading skills and incor-

porating specific support for the child's disabilities at a later point in the design process.

## **Determination of EPSS as a Design Approach**

The GMU design team's comprehensive analysis revealed numerous environmental obstacles including a lack of tools, skills, knowledge, and strategies for the literacy facilitators (Rossett, 1992). Given the importance of supporting the facilitators who lack knowledge and tools to properly conduct a reading session with children dependent on assistance, these dedicated individuals qualified as people who "need support on the job" (Brown, 1996, pp.1–6). However, that support required a more comprehensive approach than could be provided by a typical website containing shallow sources of information. Therefore, it was determined through systematic analysis that an appropriate design approach would involve a web-based EPSS.

The attributes of the performance situation matched well with the requirements of a performance support intervention, which include features such as: a lack of prior knowledge or training; required sequence, depth and repetition of information that varied for the individual; different responses and strategies being necessary for each performer; and an environment where both masters and apprentices can communicate dynamically and anticipate the needs of the learners (Gery, 1991).

## **Project Goals and Content Selection**

After realigning the goals of the project with the results of analysis and selection of an appropriate delivery mechanism, the team revised the goal of the project to encompass the development of a web-based performance support environment. Such an environment would provide guidance in the best practices in literacy acquisition as well as support, resources, and interactive modules for the novice facilitator to implement at the time of need. Because there were so many areas of support to be developed, the design team chose to concentrate on a prototype that demonstrated guidance through a predetermined reading selection and turned their attention to selecting the reading strategy that could be implemented into the web-based performance support system.

### **Determination of Reading Strategy Content**

Given the scope and varying philosophies involved in reading instruction literature, implementing best practices in reading instruction into an EPSS environment is an ambitious goal. Fortunately, faculty members specializing in the

area of literacy were available for consultation on the project. Additionally, one student design team member was trained as a reading specialist and also helped to guide the section of content to be addressed in the system. After multiple interviews and conversations with the specialists in reading and literacy, guided reading (Pinnell & Fountas, 1998) was used as a basis for a reading approach that could be customized and adapted for online strategy implementation into EPSS. Although not implemented directly in the EPSS, guided reading provided a starting point that contained reasonable balance between the various approaches to reading (e.g. Word attack, Comprehension, or Phonics) while focusing on strategy for instruction delivered in a meaningful context that is relevant to the child.

## **Guided Reading as a Strategy**

Guided reading is an integrative approach to reading instruction that builds on children's knowledge to facilitate the decoding process. More than a simple strategy, the guided reading process encourages students to think metacognitively about how they read and what strategies they will use when they encounter difficulty. Proponents recommended that this approach be taught in relation to literature that is relevant to the interests of the child.

The guided reading process recognizes that students' use of decoding strategies falls into three categories, also referred to as cueing systems. Throughout reading, students will decode words semantically (thinking about what makes sense), syntactically (thinking about what sounds right), and graphophonetically (thinking about what looks right). While proficient readers seem to have an intrinsic understanding of these cueing systems, students who struggle with reading need to be taught these skills as well as ways to consider which strategies are appropriate.

The literacy facilitator uses direct feedback to reinforce these strategies throughout the reading process. Because the process involves interplay of prompting, praising, and skill, as well as strategy instruction, literacy facilitators should be highly trained in the field of reading instruction. Furthermore, their expertise must be adaptive and flexible. That is, they must have the ability to monitor their current level of understanding and recognize when it is not adequate (Bransford et al., 1999).

## **Formative Evaluation of Process and Facilitators**

The guided reading process was streamlined, adapted, and customized for an online environment. The process was

tested with facilitators who had no training in reading strategies and children with disabilities at the Kellar Institute's computer camps. In this context, these strategies were successfully taught and implemented in face-to-face, one-on-one reading activities with several facilitators and children. Of interest during this testing was that literacy facilitators did very little preparation, even when provided with the information in advance. It was clear from the formative evaluation sessions that most parents and reading tutors did not have the time to read through resources or review a tutorial before a reading session with a child. These conclusions further supported the selection of "just-in-time" access to reading strategy information and guidance for the facilitator during the reading session as well as confirmed that those with no training could lead children through an adapted Guided Reading process.

## Defining the EPSS

The GMU design team followed Brown's model of EPSS design and development (1996). This model delineates the steps of define, design, develop, and deliver as an approach to the development of an EPSS solution. Closely related to needs analysis but more focused on the delivery technology, the "define" stage provides a foundation for a more successful design phase that follows by concentrating on the performers and their task.

### Task Analysis and Process Flow Chart

A task analysis or breakdown of the performer's task was conducted with a reading specialist and child, using guided read-

ing. This breakdown revealed that a facilitation session was much more than simply reading a story once. In addition to reading a story, the session should involve a series of story introduction and postreading activities that support the child in developing independent reading skills. To capture the facilitation process, the team created a process flow chart that not only documented the existing process, but also modified the process to meet the needs of the novice facilitator reading in the online environment. Figure 1 shows a sample section of the flow chart that represents the prereading activity and reading sections of a guided reading session. Creating the process flow helped to adapt the structure of this task to an online environment as well as to identify points where the facilitator needed specific support using reading strategies and making decisions.

The team also identified data related to the student's performance and general capabilities to be gathered in a database during a reading session to help tutors make decisions about reading activities.

### Identification of Performer Tasks

The design team used the process flow chart as a starting point for defining the specifics of the facilitator's and child's reading session and related facilitator tasks. The team identified the tasks that required support and broke each into component parts using Brown's task breakdown sheet (1996, p. 7). Figure 2 shows the breakdown of the tutor task, "praising the student" to be done during the reading session. The team added an additional column, titled "Design Issue," to capture design ideas for how the task could be supported on line.

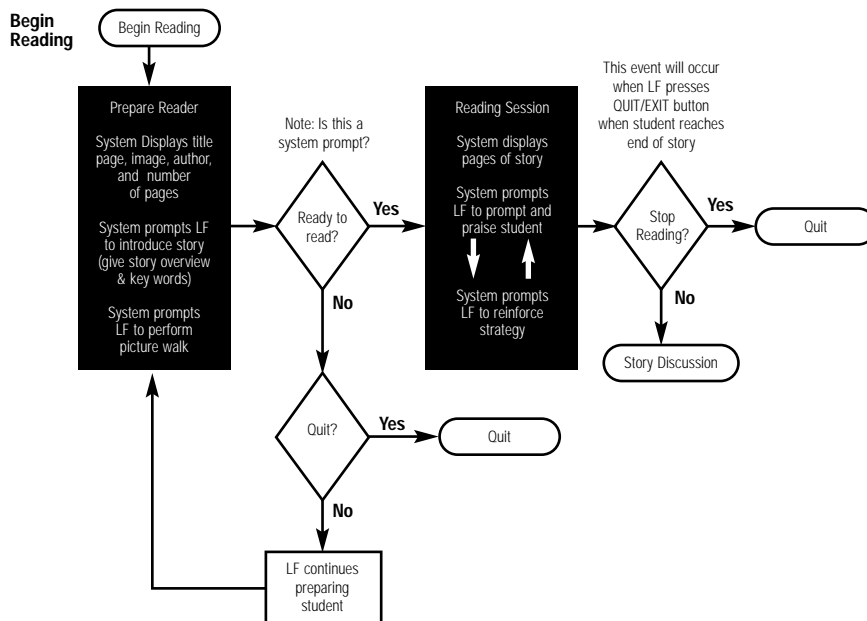


Figure 1. Prereading Activity and Reading Sections of Flow Chart.

The design team analyzed the tasks requiring EPSS support but selected only certain tasks for development during the semester-long project phase. The team based decisions about which tasks to support on the criticality of the basic reading process and the technical requirements to implement that support. The goal was to select support tools for development that would complete an entire reading session and could be used to create an HTML prototype.

### Design of the Literacy Explorer

The design process was based on integrating information from the analysis, define phases, and the modified process of guided reading. The task breakdown sheet, along with the process flow chart, was completed on all

Task	Work Required	Result	Resources and Techniques	EPSS Support	Design Issue
1 <sup>st</sup> Reading-Facilitator Praises Student	<ol style="list-style-type: none"> <li>1. LF recognizes good reading</li> <li>2. LF recognizes good independent use of tools &amp; strategies</li> <li>3. LF recognizes good behavior</li> <li>4. Selects correct praise</li> <li>5. Praises student</li> </ol>	<ol style="list-style-type: none"> <li>1. Student receives positive encouragement</li> <li>2. Motivation</li> <li>3. Strengths of student are recognized</li> <li>4. Metacognitive learning process reinforced for LF and student</li> <li>5. LF recognizes strategies for this student</li> <li>6. Student encouraged to use strategies, transfer</li> <li>7. Lower frustration level</li> </ol>	<ol style="list-style-type: none"> <li>1. Good guidelines for <ul style="list-style-type: none"> <li>• Use of tools</li> <li>• Use of strategies</li> <li>• Good reading</li> <li>• Good behavior</li> </ul> </li> <li>2. Matrix -- compare general problems and appropriate effective praise <ol style="list-style-type: none"> <li>1. Individualized praise recorded student specific</li> <li>2. LF action</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>1. Link to guidelines, icon driven</li> <li>2. Trigger individual praise record</li> <li>3. Periodic praise reminder automatic</li> <li>4. Matrix link</li> <li>5. End of session reinforcement of praise for good LF praising of student</li> <li>6. Timing</li> </ol>	<ol style="list-style-type: none"> <li>1. Rollover: praise reminder as next button is hit</li> </ol>

Figure 2. Breakdown of "Praising the Student" Task.

tasks involved, provided the framework needed to move into the design phase of the initial prototype. Much of the design work was initially focused on interface development of the online EPSS. Of special consideration were the implications of designing for an interactive dyad of both facilitator and child. In an online EPSS environment, the student and tutor would be reading from the same computer screen and attempting to provide support for the facilitator while not distracting the student was a definite challenge. 0

### Interface Design

Team designers created a web-based template for the reading session, using a neutral color that indicated screen space geared for facilitator support. This area surrounded a larger, more colorful screen area in the center dedicated for display of reading material for the child. The intent of the interface design was to focus the child on the central area of the

screen and provide less distracting surroundings for facilitator prompting and guidance. This design was based on the implications of having the facilitator and child dyad viewing the same computer screen. Whenever possible, icons were chosen for facilitator cues to avoid competing with the student text. The basic template was modified to match the facilitator support needed for each step of the reading process. The team then chose a camping metaphor to complement the interface design and make the website more inviting for children. A sample screen illustrating the simplicity of design of these elements is included in Figure 3.

### Storyboarding Design Elements

Once an interface template was created, the team then created storyboards specifying the contents of each screen. The storyboards provide documentation of reading content for the child on each screen, facilitator support, and reference

back to the specific EPSS task breakdown and the database model. This documentation will help communicate these ideas to a second team that will tackle the next phase of design and development.

### Three Forms of Support

The specific support for the literacy or reading facilitators was delineated into three separate forms: process, reading strategy, and decisionmaking support. Process support is the assistance provided to the facilitator in implementing the modified guided reading process in its entirety and guides the reading facilitator through necessary pre- and post-

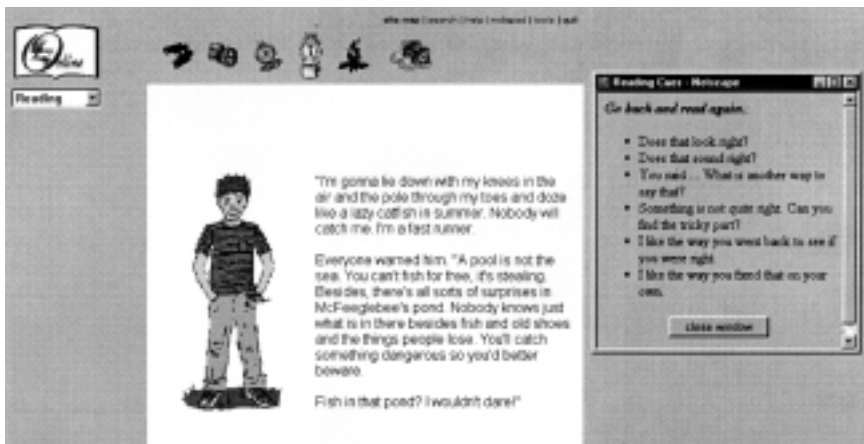


Figure 3. Simple Screen Design.

reading activities. Reading strategy support is also designed into the system, helping facilitators apply consistent reading strategies based on the guided reading approach at appropriate times during a reading session. The decisionmaking support involves assisting the facilitator assess the child's performance and to recognize his or her strengths and weaknesses in order to select activities that will provide practice in areas that need improvement. The decisionmaking support will be designed and implemented in the next phase of the project.

## Implemented Features of the Literacy Explorer

### Overall Features

Specific features that implement supportive mechanisms for the reading facilitator and align with Gery's (1991) attributes of EPSS design are listed in Figure 4.

Some of these features have been designed and documented in detail but are not yet implemented into the web-based prototype. The most significant performance support features currently include providing the facilitator with specific guidance implementing an adapted guided reading process as he or she is reading online with the child. The facilitator is initially guided screen by screen through prereading activities, which include suggestions to help make the story relevant to the child, as well as an opportunity to review the pictures and predict story events, with a short game that familiarizes the child with new words in the story.

### Reading Session Activities and Support

While the child reads the story, a menu of icons located toward the top of the screen or web page is available to guide the facilitator in using reading strategies when the child has difficulty. The smaller icons, following the selected camping metaphor, avoid visual competition with the story text, which is located in a large central window. This design directly reflects consideration of the facilitator-child dyad

as the target audience in attempting to visually designate screen areas for both members of the dyad and avoid directing the child's attention away from the task.

Each icon represents a cue to help the tutor remember specific reading strategy tasks that he or she can implement during the reading session. Information on the use of appropriate reading strategies are structured in "layers" of information (Gery, 1995). During a reading session, the facilitator passes the mouse over the icons to have rollover text appear in the form of a directive phrase, such as, "Look at the picture," or "Think about the story." These phrases are designed to prompt the facilitator to implement specific guided reading strategies. For more detailed information, the facilitator can click on the icons for scripted questions to use with the child, such as, "Does that make sense?" or "What is happening in the story?" In addition, the facilitator may access a

Attributes of EPSS (Gery, 1991)	Design of Literacy Explorer
Integration of information, tools and methodology for the user	<p>Integrated features include:</p> <ul style="list-style-type: none"> <li>Resources and links on reading approaches and assistive technology, (information)</li> <li>Structured guidance through reading session through reading session planner, note-taking guide, strategy reminders and decision support (tools)</li> <li>Implemented theoretically-based reading strategies, tutorials in reading and tutoring strategies, process and activity guidance (method)</li> </ul>
Interactive advisory system that can accept, manipulate, monitor, and store data	<p>Limited advisory system:</p> <ul style="list-style-type: none"> <li>Accepts and stores notes/data on individual student capabilities for later reference by same or different facilitator</li> <li>Accepts and stores information on negotiated goals for session and future objectives for facilitator/student reading session</li> <li>Guides facilitator through selecting future reading activities, by asking questions about goals and performance</li> <li>Directs facilitators toward appropriate reading material based on student profile and assessment</li> <li>Prompts use of strategies based on specific points in reading process</li> </ul>
"Infobase" of information that user will inquire against, access, or have presented to him or her to do the job	<p>Varying sources and amounts of information through providing:</p> <ul style="list-style-type: none"> <li>Central location for facilitators to find and use web resources related to reading approaches and accessibility issues</li> <li>"Layers" of information controlled by the facilitator related to reading strategies from simple hints, to text prompts, to elaborated explanations and finally, theoretical rationale</li> </ul>
Various types of information organized and presented in multiple ways	<p>Reliance on:</p> <ul style="list-style-type: none"> <li>Both visual (iconic visual hints) and textual (prompts, explanations, and rationale) representation of information</li> <li>Information on reading approach is provided in tutorials, supplemental reading and on-demand during a reading session.</li> <li>Metaphor depiction of student reading capabilities for selection of appropriate web readings</li> </ul>
Determine different views on information	<p>Customized information through providing:</p> <ul style="list-style-type: none"> <li>Facilitator section to set up student profile, explore strategies ahead of time or during session</li> <li>Facilitator access to previous session notes, goals, and progress, and ability to compare notes on a particular child</li> <li>Students' primary focus in central location on screen, colorful and large images, while facilitator prompts are monochromatic and subtle to not detract student attention</li> </ul>
Interactive productivity and application software	<p>Additional software implemented by incorporating:</p> <ul style="list-style-type: none"> <li>Prompting of use of accessibility wizards included in Windows software</li> <li>Accessibility applications such as Text to Speech and others to accommodate a wide range of users with various disabilities</li> <li>Information on a wide range of interface elements geared toward specific disabilities</li> <li>Drawing, flowcharting application tools to support the reading process</li> <li>Session planner</li> </ul>
Interactive training sequences	<p>Implemented by including:</p> <ul style="list-style-type: none"> <li>Small tutorials (Skill builders) to support the reading process on topics such as word attack, phonics, write to read, etc.</li> <li>Use of the prompting cues, session planner and the use of the Internet as a reading resource for specific support in the Guided Reading process</li> </ul>
Monitoring, assessment, and feedback	<p>Limited tracking mechanism that provides:</p> <ul style="list-style-type: none"> <li>Information on student's progress, capabilities and goals</li> <li>Suggests to facilitator approaches, strategies or breaks at appropriate points in process</li> <li>End of reading session questionnaire, to encourage facilitator to reflect on own performance as a tutor</li> <li>Tracking use of site and reminding facilitators where they ended previous sessions</li> <li>As the Expert area, where a facilitator can consult a reading expert</li> </ul>

Figure 4. Features of Literacy Explorer Aligned with Gery's Attributes of EPSS.

form of a job aid prior to the reading session, which lists all the icons, prompts, and available questions. The layers of information provide a form of scaffolding in that once the facilitator is familiar enough with the scripted questions, he or she may rely on just the icons or the rollover text prompts to remember to implement these strategies.

Additional forms of support are provided, such as comprehension questions that can be accessed on every third screen of the story text or by the facilitator at the end of the story. General guidelines for the reading session, such as, "Try to keep the session lighthearted and fun," are also provided to promote effective support during a reading session. The facilitator can access a session planner sheet to record specific words the child had difficulty with and specific things to praise along with additional notes about the child's performance. The session planner also allows the facilitator to keep track of what things he or she did during the session that were most helpful to the student, what difficulties arose, and what he or she would do the next time.

In the postreading activities, the facilitator can use performance support to provide the child with tutorial-like reading activities targeted to improve specific skills. These activities refer back to the story the child has just read and address specific reading activities, such as locating the silent "e" sound, writing to read, locating rhyming words, or ordering story events. These "skill-builder" activities are totally contained within the Literacy Explorer and are enhanced with online forms and worksheets. Although suggested as a postreading activity, the skill builders can be accessed at any point prior, during, or after the session.

## Future Design and Development

A basic prototype of the Literacy Explorer has been developed. New immersion student groups have started to evaluate the existing prototype for usability and address some of the design features listed below. In addition, the number of contained stories will be expanded, and additional technical functionality will be added. The following features have been conceptualized and will be implemented during future phases of the LAO project:

- Database infrastructure permitting storage and tracking of data for each child and facilitator
- Means for sharing information with other facilitators about a specific child
- Sharing of techniques and skills with other facilitators and parents through computer conferencing and chat features
- Incorporation of accessibility options designed to address special needs (text to speech, etc.)

- Capability to import selected website text into the Literacy Explorer for the child to read, maintaining the facilitator prompting and providing additional activities independent of reading content
- Additional resources and tutorials related to the use of the web and literacy, as well as a clearinghouse for information related to assistive technology
- Means of assessment of reading levels

## Conclusion

The use of performance technology for specific initiatives in education is a fairly new enterprise. EPSS can present an elegant solution to providing guidance and support for those committed to improving the reading skills of children, particularly those with disabilities. Given the evidence of a dramatic lack of training, skills, and knowledge, literacy facilitators are in need of a system that is accessible and easy to use and that provides a consistent approach to help improve their strategies with children. Capitalizing on a systematic process, the design teams at GMU are committed to making this system a reality. The LAO project not only provides an opportunity for graduate students to participate in the design and development processes related to performance technology solutions, but it also affords them the opportunity to play a part in supporting the goal that indeed, all children can read. 🏠

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