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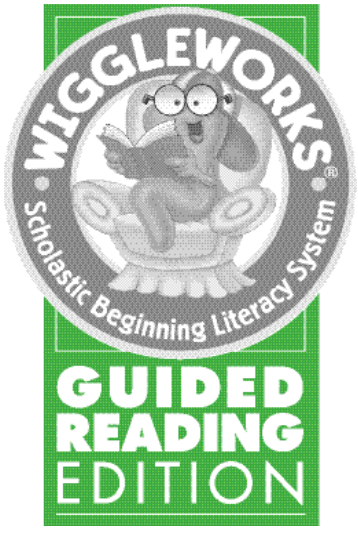
Professional Paper

The Role of Technology in the Guided Reading Classroom

Apprenticeships in Reading and Writing

By David Rose



The Role of Technology in the Guided Reading Classroom

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Technology in the Guided Reading Program

At the core of a successful guided reading program is small group instruction. Within that small group, students engage with texts that are at the right level of challenge and with a teacher who is skillful and provides the right level of support and instruction to help them succeed. The result is optimal differentiated instruction that leads to skillful, strategic, and motivated readers.

A critical challenge for any teacher, including those who lead guided reading classrooms, is how to optimize the time when students are NOT in small-group instruction. How can a teacher, who is properly focusing his/her attention on small-group instruction, ensure that his/her other students are using their time optimally? How can a teacher extend the highly leveled and individualized approach of the small group into the classroom as a whole, providing an overall classroom environment where students are able to independently practice, solidify, and extend what they are learning in a small group, and at the right level for each student?

Traditional printed books, even carefully leveled books, fail to provide the individualized support and guidance that many students will need to stay focused and motivated while they are working independently. Well-designed technology can play a critical role in this regard. By providing individualized support and guidance for students, new reading technologies can extend the reach of the teacher, ensuring that every student is engaged, highly engaged, in meaningful independent practice that optimizes their development as confident, skillful, and motivated readers.

Apprenticeships in Guided Reading: Learning with Technology

The choice of technology is important in a well-structured guided reading program. Like the other teaching and learning components, the ideal technology in a guided reading program should emphasize meaningful reading of real literature, not isolated games or activities designed to teach or practice decontextualized skills. Like guided reading, the technology should provide carefully leveled meaningful texts (*Fountas & Pinnell, 1996*).

But the technology can, and should, provide more than leveled texts. The true power of new digital technologies (as opposed to the classic technologies based on print) is their capacity for flexibility and adaptability. New reading technologies can provide a highly customizable and supportive apprentice environment in which each student, even when reading alone or in small groups without a teacher, can get just the right level of support and challenge that they need to practice and develop their skills.

In a real sense, new technologies can provide the following supports for learning a skill that are typically found in traditional apprentice workshops (*Rose, 1995; Vygotsky, 1978*):

1. Models that demonstrate skilled performance and examples of successful outcomes.

2. Authentic tasks that provide opportunities for meaningful practice.

3. Scaffolds that support novices, and that can gradually be released as they learn.

4. Timely and appropriate feedback on performance.

While all of these elements are present, optimally, when students are in small groups with a teacher, technology in the classroom can ensure that they are also present during the critical phases of independent practice—and over a time period long enough for students to build and solidify their skills. Reading programs like WiggleWorks® extends the reach and guidance that teachers are able to provide to their readers well beyond the small group sessions.

Apprentice Readers and Writers Need Models of Skilled Reading and Writing

One of the most important elements of any apprenticeship is the presence of a skilled craftsman who can model and mentor skillful performance for the learner. The same holds true for reading where considerable research has shown how important it is for students to have parents and teachers "read aloud" to them. Research has revealed that for the emergent reader, this "read aloud" activity is important for building background knowledge, developing language prerequisites, teaching the elements of print, modeling fluent reading of text, and most important, modeling the value and meaning of early literacy itself (*Neuman, Copple & Bredekamp, 2000; Fountas & Pinnell, 1996*).

For many children, there are plentiful opportunities for such important "read aloud" experiences in the home. For some students, however, the absence of such modeling of skillful reading in the home places them at considerable disadvantage in the classroom. Teachers, faced with many different students and many different activities, often cannot close the gap or provide sufficient guided "read aloud" experiences for individual students.

One of the most important roles for technology (including audiotapes, CDs and electronic books) in the guided reading classroom is to expand the opportunities for individual children to hear skillful, engaging, reading of text, even when their teacher is occupied with other activities (*Meyer & Rose, 1998*). A particular advantage of well-designed electronic books is that, like a mentoring parent or teacher, they can help make the important linkage between written and spoken words (for example, by highlighting words as they are spoken).

What about writing? The technology for supporting the apprentice writer is not as well developed as technology for reading (*Meyer & Rose, 1998*). But the flexibility of technology is also well suited to providing models for supporting the emergent writer. Well-constructed software recognizes that students will need varying amounts of support in learning to use those models.

Research into Practice

WiggleWorks: Guided Reading Edition

In the "Read Aloud" section of WiggleWorks, for example, a narrator reads the text fluently and dramatically, and with the inflection and effect that leads to clarity and engagement for an emergent reader. Most importantly the words are highlighted as they are read, drawing attention to the conventions of print, to the words themselves, and to the relationships between the sound and symbol. The "Read Aloud" section is not the only place where models of skilled reading can be found. Virtually everywhere in WiggleWorks, a student may click on any word to hear a skillful reader read that word aloud either in isolation or in the context of a full sentence. These capacities are important additions that technology can make to a successful reading apprenticeship.

In WiggleWorks for example, the "My Book" section is designed to ensure that students, at many different levels, are explicitly encouraged to use the books themselves as models for their own writing and expression. In this activity, every book in WiggleWorks is reproduced, but in a malleable format. All of the original words remain, but the illustrations are only in black-line format, drained of their finished look. The student is invited to "finish" the books using their own ideas to make "My Book."

For some students, merely coloring the book in their own way is challenging and rewarding enough. But more advanced students can "finish" them in many different ways—using the original books as a starter kit, a malleable framework or scaffold from which to create their own version. For example, students may keep the original structure and syntax of the book, inserting new words or phrases to make new meaning. Or students can erase parts of the pictures to illustrate the stories differently, or make new illustrations to create an entirely different meaning or narrative. But students may also go much farther—erasing most or all of the original sentences and illustrations to create entirely new meanings with their own book—only marginally initiated or evoked by the original. Finally, by erasing all the original words and illustration, the truly independent and creative writer is faced with only a blank page—but a page where words can be read aloud, where illustrations can be molded, and so forth—an electronic bookmaker for making new meanings that can be shared with friends.

Apprentice Readers and Writers Need Authentic Tasks for Meaningful Practice in Reading and Writing

In an apprenticeship in carpentry, a novice learns "on the job" or in a workshop, building skills by working on real projects while being carefully guided and supported by a master craftsman. This key aspect of apprenticeships—the engagement right from the start in meaningful, contextualized, goal-directed activity—has been central to learning in human culture for centuries (*Collins, Brown, & Newman, 1989; Rogoff, Goodman, & Bartlett, 2001*). Within a carpentry apprenticeship, the novice is continually engaged in real carpentry and construction—contributing meaningfully but under conditions of high support and with implicit and explicit scaffolding by the master craftsman. Over time the novice becomes more independent in his/her contributions, and the support and limits of supervision are gradually released. Throughout the process, however, the apprentice is engaged in meaningful construction—creating a cabinet or home to which they have contributed according to their skills.

Recent research in learning to read has also shown the value of having students that are engaged, right from the start, in reading connected text for meaning (*Block, Gambrell, & Pressley, 2002; Headley & Keeler, 2002*). While there may be some benefits for using software that practices isolated precursor skills, (*Meyer & Rose, 1989*) one of the key advantages of programs like WiggleWorks is that students are engaged in reading authentic texts, but in a supported environment where they are guided and scaffolded like an apprentice.

As for writing, there are similar advantages to using technology as a support for authentic writing (*Riel, 1989; 1990*). For one thing, students who are in elementary schools today often find that technology allows them to express themselves in ways that are more contemporary and current than print—the culture in which they are developing is much more based on digital communication than paper and pencil. For another, the technology allows them to communicate and share what they create with a larger audience than print had previously allowed.

Research into Practice

WiggleWorks: Guided Reading Edition

WiggleWorks provides students with appropriate literacy tasks that help readers practice and develop critical skills and strategies. Through the "Read" section of the program, students build their fluency, vocabulary, and comprehension, as they read on their own. This feature allows students to read at their own pace while providing support for reading and understanding unfamiliar vocabulary. The recording tool in the program allows students to record and listen to themselves read. Additionally, students can toggle to hear the narrator read a sentence or the entire page.

As students read the texts on their own, they can select and save words to use later in their writing or as they work with words in the "Magnet Board" section. The Magnet Board provides students with the opportunity to build phonemic awareness and phonics skills.

WiggleWorks also provides multiple ways that a student can begin to write with technology, and more support is available than in traditional pen and paper. A student in the "Write" section of WiggleWorks may begin, for example, by "dictating" their story into the embedded microphone rather than writing. For some students, this makes a huge difference, and their spoken story can be replayed whenever they like, serving as a "just in time" model for a written version which follows, or shared "as is" with classmates. For another student, the drawing tools may provide the best entry point—making a book that begins with illustrations, then the words are added later. The overall effect is that a student can construct a real book or written essay, using many different paths, that can be shared with their fellow students.

Apprentice Readers and Writers Need Scaffolds That Support Learning, and That Can Gradually Be Released As Skills Develop

For the novice reader, making meaning is difficult because so few of the constituent skills are fluent or independent. For the novice, the challenge of decoding individual words, for example, can interfere with the over-arching task of constructing meaning from an integration of those words (the semantics) with other elements of meaning like syntax, background knowledge, context, etc. A good teacher, when working with a beginner, often provides the bridging support that they need—providing a word here and there to maintain the flow, prompting the use of an emerging strategy, providing background knowledge to bridge a gap. With these devices, a mentoring teacher encourages the emergent reader to construct meaning all of the time, even when some of their subskills are not yet fluent (e.g., *Fountas & Pinnell, 1996*).

Often, well-constructed software can provide that bridging support, or scaffolding (see for example, review by *Kamil, Intrator, & Kim, 2000*). There are many advantages of these and other supports embedded in the text, supports that can be gradually released. For one, students who are not yet fluent decoders, or who can read most of the words but not all, can continue to read for meaning while the technology scaffolds them over the potholes of individually difficult words, much like a parent or teacher provides such support for early readers. Second, the combination of highlighting and voicing reinforces the link between written and oral language, and models successful reading. Third, students can get the support they need, and gradually release that support as they gain skill and confidence as independent readers.

When technology is used well, the same kind of "gradual release" is available to support the student in writing. Supports range from those that scaffold the "mechanics" of writing (like spelling and grammar) to those that scaffold the "planning" of writing (like concept-mapping and idea organizers).

Research into Practice

WiggleWorks: Guided Reading Edition

In WiggleWorks, electronic word lists are available so that students can easily include words that are "emergent" in their spoken or written vocabulary. The lists are electronically scaffolded merely clicking on a word inserts it in the story without having to type or spell fluently. Each of these—and other—scaffolds allows a teacher to concentrate an emerging writer's attention on one aspect of writing more than others so that they can make progress without being overwhelmed.

Consider the progression of supports available to the student who is struggling to decode in a program like WiggleWorks. For the earliest emergent reader, as mentioned earlier, the "Read Aloud" section provides a fully modeled expressive reading. The apprentice reader is able to follow along, or even read along, while maximally guided by the expert. In every other section of WiggleWorks, there are choices available about how much support should be provided.

For maximal support, every word may be highlighted and read aloud in sequence, a level of support appropriate to the child who has little experience with being read to, or with following the conventions of print (left-to-write scanning, separations of words in print, etc). A more active version is also available, where words are highlighted and spoken in turn, but where the apprentice reader "steps" the words ahead at their own pace (by pressing on the space bar when they are ready for the next word). Students at this stage may either shadow the reading of the expert (echo reading) or anticipate the next word, using the expert reader for confirmation.

When students no longer need word-by-word support, there are still many options. For one, every word is "live"—students may ask to hear the word read aloud at any time, just as they might ask their teacher for help if he or she were available. For another, some students find it helpful merely to use the stepped highlighting (no sound is provided) as a scaffold to guide them in reading more fluently.

Apprentice Readers and Writers Need Timely and Appropriate Feedback on Performance

No technology is available that can come close to providing the range of tailored feedback that apprenticing students need, and that teachers provide for them every day. Software that provides machine-based or "artificial" feedback to students (for example, by employing speech recognition to transform the child's speech into text) is often helpful in limited roles (*Meyer & Rose, 1989*). While the accuracy of speech recognition programs and other feedback systems based on artificial intelligence models are still somewhat limited, research and development in this area is advancing rapidly, offering the promise of even more effective learning and practice environments for students with diverse needs.

What technology can do, however, is provide new avenues for feedback from independent reading and writing that are effective for students and teachers, more effective than printed books can provide. One of those is by embedding—like WiggleWorks does—speech recording right within the reading program so that a complete record of the student's actual oral reading can be saved and reviewed. This simple technology can be used in two ways. First, by the student. The capacity to listen to their own voice reading (even several times), and compare to the model reading, is often very effective feedback for students, one that may provoke repeated reading for success. Second, by the teacher. Even though a teacher is otherwise occupied while a student is reading independently, she/he can later listen to the full recording of the student's reading either informally or formally with a reading record type of format (and they can listen several times to ensure accuracy).

Most important, such technology-assisted assessment saves student oral reading or writing so that a teacher, at a convenient time, can return to the student's work and review it. The teacher then may also leave a feedback note to the student that will appear the next time the student enters the book. The student work includes whatever the student writes or draws, but also includes what the student reads aloud, basis for careful review by the teacher. All of this provides an avenue for a teacher to "listen" to a child's oral reading fluency, even though that reading may have come at a time when the teacher was otherwise occupied, and to provide feedback even though the child might be otherwise occupied when the teacher is making it.

Research into Practice

WiggleWorks: Guided Reading Edition

There are specific tools in WiggleWorks that allow teachers to tailor and customize response and feedback to each student. Teachers can record specific instructional guidance, tips, and suggestions through the teacher recording features. As students work in WiggleWorks, they listen to an instructional message recorded by the teacher. Such "just-in-time" supports students in developing skills to self-monitor during the reading and self-correct as needed.

An additional advantage of writing in a program like WiggleWorks, however, comes in the way it can help students to begin the all-important processes of self-assessment and checking their own work. Among the features that supports students in learning to review their own work is the simple fact that the computer will read back everything the student writes aloud. This simple feedback in a different modality is often empowering and entertaining. More important, many students find that when the computer reads their writing back, that it "doesn't sound right", and they revise—either for content or mechanics. This first scaffolded step helps students learn the value of reading their own work over, looking to see if it "sounds right" indeed. The building of "self-check" skills is an important aspect of any apprenticeship in both reading and writing.

The Power of Technology to Differentiate Instruction

Apprenticeships work best when they are individualized; no two students are exactly alike, and their developmental trajectories often differ. Good teachers automatically individualize instruction whenever they have the opportunity, but those opportunities are often hard to find in modern classroom settings.

The advantage of customizing the learning environment—the apprenticeship—is twofold. First, it ensures that every child is being appropriately challenged. A "one size fits all" experience is far from optimal in today's classrooms where students are wildly different in their backgrounds and skills. To support optimal learning, classrooms must provide opportunities for learning that are matched to students' needs and capacities, not miss-matched. The ability to tailor the apprenticeship to different students' learning needs ensures, as Vygotsky points out, that every student is consistently in their "zone of proximal development"(*Vygotsky, 1978*).

Second, such customization maximizes the probability that students will be engaged and motivated. When "one size fits all" methods are used for independent work in the classroom, the results are predictable: boredom and wasted time for some students and frustration and failure for others. For a great many, especially those who need sustained and focused practice, such "one size fits all" methods lead to poor results and the need for teacher intervention. On the other hand, when the challenge is appropriate and there are supports when needed, most students are highly motivated learners—as evidenced by their avid pursuit of video games and the like which are carefully constructed to provide just the right level of challenge at all times. To learn to read effectively, students will need similar attention to providing the right challenge and support.

Universal Design, Technology, and Meeting the Challenge of Individual Differences

One of the greatest advantages of technology is its flexibility. The content, models, practice opportunities, scaffolds, and supports do not have to be presented in the same way to each student. On the contrary, the presence or absence of these components, the ways in which they are presented, the modalities in which they appear, are all highly flexible and they can be easily adjusted to meet the challenge of individual differences (*Rose & Dalton, 2002*).

With such flexibility, multimedia technologies have made it possible to overcome the barriers that many curricula present for students, making it possible to practice universal design in the classroom. Universal design as a concept was developed in the field of architecture and has since been expanded to many fields. The objective in universal design is to create products and/or environments that are designed, from the outset, to accommodate individuals with a wide range of abilities and disabilities. Rather than retrofitting ramps to existing buildings, the universal design movement educated architects in how to design buildings that are inherently accessible—where ramps and elevators, for example, are built into the original design as alternatives to stairs. Universal designs are engineered to anticipate the need for alternatives, options, and adaptations to meet the challenge of individual differences.

While the idea of universal design originally applied only to school buildings, in recent years the concept of universal design has also been extended to the curriculum itself (*Rose & Meyer, 2002*). The need for universally designed curricula, curricula that are designed from the outset to achieve results with a wide variety of learners, has become acute as our classrooms have become more diverse. The concept of universal design applied in education is often called Universal Design for Learning (UDL). UDL is now being applied in many states across the country to ensure that all children will have access to learning. As in architecture, UDL curricula are designed to provide alternatives for different learners—alternatives in the way that information is presented, in the ways that students are asked to respond, and in the ways that students are engaged (*Rose & Meyer, 2002*).

Printed books, which are "one size fits all," do not provide an adequate foundation for universal designs. They are inaccessible to many students (students who are blind or visually impaired, students who are physically disabled) and rigid and unsupportive for many others (students who are learning English as a second language, students with dyslexia and other learning disabilities).

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Universal Design, Technology, and Meeting the Challenge of Individual Differences

Continued

Digital books, and especially multimedia programs like WiggleWorks that are designed specifically to accommodate a broad range of students, are able to provide an excellent foundation for universal design in the classroom. They are able to provide the alternatives that are needed to achieve success with a broad range of students (*Rose & Dalton, 2002*).

Some examples of the flexibility in universal design can be illustrated in the features of WiggleWorks, the first major exemplar of universal design in education. WiggleWorks allows a teacher to customize many different aspects to suit the needs of her students; WiggleWorks allows a teacher to differentiate instruction.

A teacher using WiggleWorks as part of his/her program may customize instruction in many different ways – in selecting the kinds of activities and content presented to her students, in differentiating the kinds of support that each student will get, in adapting the way that information appears, in accommodating the ways in which students can navigate or respond within the program. All of these options, and many others, are available in a management section where teachers may select options for her whole class, or for individual students. This capability of technology – the capability for universal design – is one of the most important benefits of technology in a modern classroom where it is important to achieve results for ALL students.

Conclusion

Technology has already changed our culture dramatically in the ways that we communicate, work, play, and learn. That same technology must play a critical part of any classroom that is preparing children for their future.

Technology is NOT a replacement for the teacher. Technology—good technology—allows a teacher to do his/her job more effectively, extending their reach to more students, more of the time. Technology provides optimal opportunities for students to practice and solidify the skills that are taught in small group instruction, at the same time supporting the task of managing the classroom. Programs like WiggleWorks succeed in this better than printed books because WiggleWorks takes advantage of technology and universal design to customize an apprenticeship reading experience that is at the right level of challenge and support for each student. And WiggleWorks keeps track of student activity and performance, making it available for a teacher to review at his/her convenience and even to demonstrate progress to parents and especially to the students themselves.

Technology like WiggleWorks is an excellent complement in a strong Guided Reading program. Such technologies extend the ways that teachers can teach, and the ways that students can learn.

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About the Author

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In 1984 Dr. David Rose helped to found CAST (Center for Applied Special Technology) with a vision of expanding opportunities for students through the innovative development and application of technology. Dr. Rose specializes in developmental neuropsychology and in the universal design of learning technologies that will impact learning for the diverse students found in today's classrooms.

In addition to his role as co-executive director of CAST and the principal investigator for CAST's U.S. Department of Education supported National Center on Accessing the General Curriculum, Dr. Rose lectures at Harvard University Graduate School of Education. He is the co-author of *Teaching Every Student in the Digital Age: Universal Design for Learning* (ASCD, 2002) and speaks at national conferences on education technology. Dr. Rose has testified at a hearing on education technology before the U.S. Senate's Appropriations Subcommittee on Labor, Health and Human Services, and Education, and he advises state departments of education on policies related to the education of students with disabilities.

Dr. Rose received his doctorate from the Harvard University Graduate School of Education.

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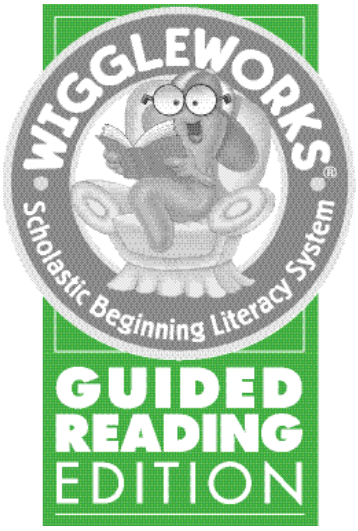

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