

**Research Foundation
Paper**

The Research Base & Evidence of Effectiveness for Thinking Reader®



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EXECUTIVE SUMMARY

The following paper reviews three of the common barriers to effective reading comprehension instruction and provides examples of how *Thinking Reader*® overcomes these barriers in the classroom. These barriers include: 1) reading strategies are complex and difficult to fold into direct instruction; 2) classrooms are large and teachers do not have the time to allocate intensive strategy instruction one-on-one; and 3) additional resources are needed to meet the varying needs of the classroom. Further, the paper explores the evidence of effectiveness for Reciprocal Teaching, a dialogic form of instruction used as one of the guiding principals in developing *Thinking Reader*. The paper also summarizes the second guiding principal for *Thinking Reader*—Universal Design for Learning (UDL), an approach derived from current brain research that recognizes the distributed nature of processing in reading. Lastly, a review of the efficacy research reveals significant growth in reading comprehension for students who used the *Thinking Reader* program.

INTRODUCTION: THE NEED FOR EFFECTIVE READING COMPREHENSION INSTRUCTION

At a time when national attention seems completely focused on early reading and decoding, every middle and high school teacher experiences an equally urgent problem—the lack of reading comprehension skills among their students. Early reading skills like decoding, while necessary as a foundation for “higher order” reading, are simply not sufficient. Even students with adequate decoding skills often reach middle school lacking the strategies and skills that they need to comprehend grade-level texts.

The RAND Report (Grissmer, Flanagan, Kawata, & Williamson, 2000) recently focused particular attention on the national need to improve reading comprehension instruction. Although there is a solid scientific basis for teaching reading strategies (National Institute of Child Health and Human Development, *Report of the National Reading Panel*, 2000), research has shown that teaching reading comprehension strategies to students, especially to struggling readers, is immensely challenging. In spite of this apparent progress in identifying effective reading instruction approaches, the current practice of research-based methods is quite limited. For example, Pressley’s (1998) study of grade 4 and 5 classrooms indicated that there was very little comprehension instruction going on, results that are consistent with those found by Durkin (1979) two decades ago. This state of affairs underlines the need for greater attention to issues of reading comprehension instruction in today’s diverse classrooms.

The scarcity of adequate instruction in reading comprehension is not the result of a lack of effective methods that have been well researched. Among other methods, there is a well-established research base supporting reading strategy instruction to develop comprehension for students with and without learning disabilities (National Institute of Child Health and Human Development, *Report of the National Reading Panel*, 2000). Other research-validated methods include the instruction of self-monitoring and self-evaluation (Englert et al., 1991; Paris, Cross, & Lipson, 1984), the use of dynamic and embedded assessment (Campione & Brown, 1987; Cioffi & Carney, 1997; Feuerstein, Rand, & Hoffman, 1979), supports for vocabulary (MacArthur & Haynes, 1995), and anaphoric reference (Boone & Higgins, 1993). Why are these methods not more widespread?

Barriers to Effective Reading Comprehension Instruction

There are three prominent barriers to successful instruction in reading comprehension. First, teachers—especially upper elementary and middle school teachers—are often inadequately trained or prepared for the teaching of comprehension strategies. Recent research suggests that it takes teachers several years to learn how to provide reading strategy instruction, since it requires a shift from teacher-directed instruction with a focus on asking and answering questions, to teaching that is focused on thinking processes, problem solving, and interactive learning with students (Duffy, 1993). In general many teachers find this approach very difficult to implement with students (Duffy). As a result, teachers are ill prepared to deliver the direct, systematic instruction that struggling readers often need.

Second, effective strategy instruction requires an abundance of opportunities for supported practice because good results depend upon frequent and sustained practice with plentiful, individualized feedback. With 8–15 students in a resource room or 20–30 in a regular classroom, the typical teacher of students with learning disabilities lacks the time and resources to achieve intensive strategy interventions or to provide the accumulated opportunities for supported practice that struggling readers will need.

A third barrier to the implementation of strategy instruction is the increasing diversity of today's classrooms. In the wake of the IDEA '97 amendments, classrooms host much more varied student populations, presenting a broad spectrum of unique strengths and weaknesses. To meet students' varied needs and preferences, teachers are finding that they need yet additional training, time, and resources in order to properly individualize instruction. With regard to students with reading difficulties in particular, teachers are rarely able to provide the ongoing support or adaptations within the curriculum that would allow individual students to overcome their difficulties and make progress. The kinds of instruction and support that a student with decoding-based learning disabilities (like dyslexia) will need are very different from those that will be required for students with other disabilities, such as Asperger's syndrome, Specific Language Disabilities, and so forth. Teachers simply do not have the skills or resources to individualize instruction for the range of students that they now encounter.

Extending Printed Books to All Students

In most classrooms printed books are the prevailing technology for teaching reading comprehension skills. While a venerable medium, and even a preferable medium for most proficient readers, printed books are often inadequate platforms as the primary technology for instruction. This is true because they provide little relief for the aforementioned barriers.

First, printed books provide little support for the teacher at the point of instruction. What support is available for the teacher is usually provided only within the Teacher's Edition of a basal series. For teachers who are not yet skilled in the systematic teaching of comprehension skills, this indirect support is rarely sufficient, usually not available at the teachable moments, not contextualized to the content, and not individualized to the student. What is needed is more support for instruction within the pupil's edition, not the teacher's edition.

Second, existing print technologies deliver the same book, the same reading challenge, to each student—one size fits all. With the palpable individual differences in students that every teacher actually faces, this creates enormous barriers from individual differences. At any one time, not only would nearly every student differ in their level of skill with any single strategy, but students would differ also in the kinds of strategies that are within their zone of proximal development. With printed books, the entire burden of individualizing instruction and support is left to the teacher—if she has an opportunity to work with a specific child that day. Few teachers have the knowledge to individualize instruction without help, and almost none have the time to do so on a consistent individual basis with their students. As a result, most students receive instruction and support that is actually appropriate for some other student, and they continually face reading material that is not in their zone of proximal development.

A New Approach: *Thinking Reader*

Thinking Reader is designed to do one thing: to ensure that students, even struggling students, get the systematic support and practice they will need to become skillful, strategic, self-aware, and motivated young readers.

Drawing on Reciprocal Teaching research (Palincsar & Brown, 1984), and other research on effective strategy instruction (National Institute of Child Health and Human Development, *Report of the National Reading Panel*, 2000; Pressley, 1990), CAST and Tom Snyder Productions developed the *Thinking Reader* approach. It provides for the explicit use of strategies with an integrated system of prompts, hints, models, and feedback designed to encourage students to make predictions, ask questions, summarize, clarify, visualize, and make personal responses about what they are reading. A multi-level strategy system of scaffolds provides different levels of challenge and support for each student and teaches them directly about the strategies they use in *Thinking Reader*. Additionally, through an electronic work log, students are prompted to review and reflect on their work in relation to their learning goals, supporting student goal-setting, self-monitoring, and self-efficacy. Teachers have access to the work logs and are able to use them for evaluation and to guide instruction.

Thinking Reader succeeds in this task by embedding these teaching techniques directly within a new and flexible medium for reading, creating an apprentice reading environment, one that replaces “fixed” and inert reading materials with “dynamic” and supportive instructional ones. Within *Thinking Reader*, every apprentice reader finds an appropriate level of challenge, and the systematic individualized support and guided practice that they will need to succeed.

The pedagogies and new technologies that underlie *Thinking Reader* have been researched and developed over many years. Specific prototypes have been refined and tested experimentally in middle school resource rooms and regular classrooms. The final outcome is a unique combination: solid, research-based methods for comprehension instruction embedded within an innovative new classroom medium for reading. The effect is to reduce many of the barriers to teaching reading comprehension.

First, *Thinking Reader* provides needed support for the teacher. By embedding research-based instruction and support directly within the materials, teachers have a powerful ally. Each student consistently finds, within the pupil edition, a fully supported apprentice reading environment that extends the reach of their

teacher: virtual “mentors” that teach and model effective practices of good readers, prompts that scaffold students as they practice new strategies, and feedback that helps them continue to grow.

Second, *Thinking Reader* provides an opportunity for the kind of structured, systematic, and extended practice that is necessary for true skill building. Unlike printed books, which provide challenges but no support or guidance, *Thinking Reader* provides both. As a result, students don’t just practice; they practice with focus and concentration. For example, *Thinking Reader* can provide support for decoding. Consequently, even readers who struggle to decode can concentrate on building strategies for comprehension rather than having to focus entirely on overcoming the barriers of decoding. As another example, students who are early apprentices in a reading strategy need considerable “mentoring” and “prompting” to guide them as they develop toward independence. In *Thinking Reader* such guidance is available consistently and systematically—and directly within the book at the point of contact.

Third, and most importantly from an instructional standpoint, within *Thinking Reader* the instruction, supports, and guidance are all adaptable to the individual. Where print books are “fixed” and one size fits all, *Thinking Reader* is flexible and customizable. That flexibility is used to make sure that the pedagogy “fits” the child—that the level of support and challenge, the guidance and instruction, are all focused on exactly what the child needs to learn. It is not just the content that is “leveled,” it is the instruction itself. Like a good tutor, *Thinking Reader* can adjust the levels of support and challenge—the pedagogy—to keep every child in their “zone of proximal development” for maximal success.

Evidence of Effectiveness

Thinking Reader, *while innovative, is based upon a solid and reliable foundation of research.*

READING STRATEGY RESEARCH

There is a paucity of comprehension instruction in the elementary grades (Pressley, 1998) despite the robust knowledge base regarding the positive outcomes of effective comprehension instruction. Meta-analyses reported by the National Reading Panel (National Institute of Child Health and Human Development, 2000); Swanson & Hoskyn (1998); and Gersten, Williams, Fuchs, & Baker (1998), among others, suggest that we know a good deal about specific strategies that enhance comprehension, the effective instruction of those strategies, and the relationship between strategy instruction and engagement and learning. In fact, across meta-analyses of instructional research, the greatest effect sizes have been obtained for research on strategy instruction. One of the best-researched and validated methods is Reciprocal Teaching.

RECIPROCAL TEACHING RESEARCH

Anne-Marie Palincsar and Ann L. Brown collaborated to design and investigate the methods of Reciprocal Teaching, a dialogic form of instruction in which teachers and students engage in the concurrent use of four comprehension-monitoring and -fostering strategies for the purpose of constructing the meaning of text. Studies of Reciprocal Teaching conducted by its designers (Palincsar & Brown, 1984) and meta-analyses of their and others' replications (Rosenshine & Meister, 1994), indicated that Reciprocal Teaching is a robust intervention leading to positive gains in students' comprehension of instructed text, as well as transfer text, and modest gains on standardized measures of reading comprehension. For example, Rosenshine & Meister found effect sizes of .88 for experimenter-designed tests and .32 for standardized tests. Reciprocal Teaching was determined to be effective as a means of promoting both reading comprehension (with middle school students) and listening comprehension (with primary grade students). Various studies that meet the evidence standards of the What Works Clearinghouse also support these findings. Reciprocal Teaching forms one of the key foundations of the *Thinking Reader*.

UNIVERSAL DESIGN FOR LEARNING RESEARCH

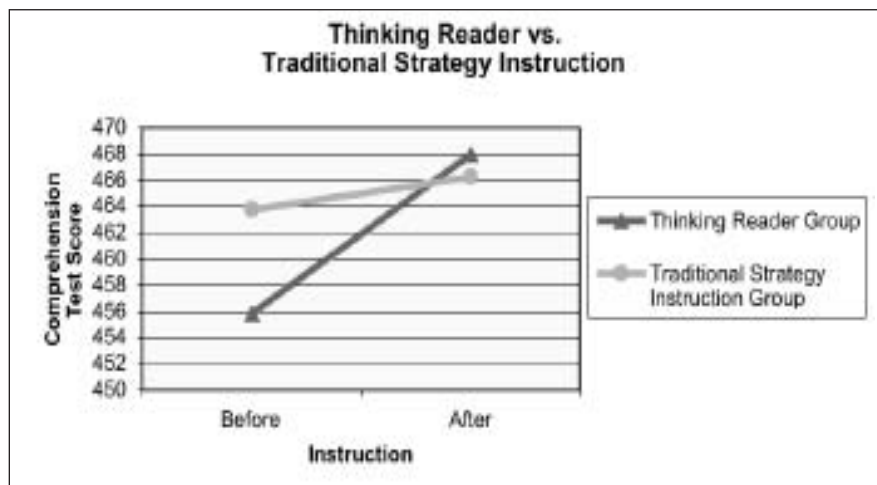
For the past decade, CAST research has focused on the role of technology and digital text in supporting diverse learners' literacy achievement. Recent work has applied research on reading comprehension instruction, specifically Reciprocal Teaching (see above) and principles of universal design for learning (Rose & Meyer, 2002) to the design of interactive digital texts with embedded strategy instruction (Dalton & Pisha, 2001; Dalton, Pisha, Eagleton, Coyne, & Deysner, 2001). Universal design originated in the field of architecture, where structures are designed to accommodate the full range of users, including those with disabilities, with the result that all benefit (e.g., consider the multiple uses of curb cuts and captioned video). Universal Design for Learning (UDL) extends this concept of access to learning by applying recent advances in the neurosciences regarding how the brain processes information to instructional design. Like all UDL applications, *Thinking Reader* is designed to be accessible to students with a wide range of disabilities.

BRAIN RESEARCH

The overall approach of Universal Design for Learning is based upon a framework derived from current brain research (see Rose & Meyer, 2002). That framework recognizes the distributed nature of processing in reading and intentionally addresses each of the major kinds of learning involved in applying reading strategies. Specifically, *Thinking Reader* addresses: 1) The way that the brain learns to recognize the elements of text; 2) the way the brain learns new strategies for operating on text; and 3) the way that the brain differentially engages in reading strategies. One of the principle investigators of *Thinking Reader*, David Rose, teaches a course called "Neuropsychology and Instructional Design" at the Harvard Graduate School of Education which applies the same principles to instructional design generally.

THINKING READER EFFICACY RESEARCH

In a recent federally funded experimental study (Dalton et al., 2001), CAST evaluated the *Thinking Reader* with 102 students, most with learning disabilities and all performing below the 25 percentile in reading. After controlling for gender and pre-test scores on comprehension and vocabulary, students in the *Thinking Reader* condition demonstrated significantly greater gains in comprehension on the Gates MacGinitie Reading Achievement Test than did their peers in a traditional strategy instruction condition.



Moreover, qualitative analyses of student and teacher interviews and questionnaires indicate that students viewed the *Thinking Reader* digital text as extremely helpful and that there was substantial variation in how students used the various supports. Teachers reported positive impact on students' engagement and self-efficacy. A comparison of the two groups' on-task behavior revealed that students reading in *Thinking Reader* spent significantly more time "on task" and had significantly more opportunities to respond and practice strategies than did their peers using traditional strategy instruction (Coyne, Pisha, Dalton, Deysher & Eagleton, in preparation). More research, supported by the Institute for Educational Sciences of the U.S. Department of Education is now underway.

For a complete report on the *Thinking Reader* validation study, contact Tom Snyder Productions at 800-342-0236 or ask@tomsnyder.com.

TECHNOLOGY RESEARCH

In order to overcome the inherent limitations of print-based materials for reading instruction, CAST has received grants totaling over \$2 million for research and development of supported reading comprehension environments for struggling readers. That work in turn has been built upon over \$10 million in research and development on learning technologies that are flexible enough to achieve results for a wide variety of learners, including students with disabilities. Unlike traditional print-based materials, technology-based materials are inherently flexible and therefore customizable for a wide range of learners. Furthermore, these new reading environments allow students multiple opportunities to practice using strategies in context and to access models of successful performance, critical elements to successful reading strategy instruction.

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