

Improving the Reading Comprehension Skills of Secondary Readers

Weaver Instructional Systems and the Research on Reading Instruction

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In 2002 the No Child Left Behind Act (NCLB) authorized the Partnership for Reading (PAR), an organization responsible for disseminating information about scientifically-based reading research on children, youth, and adults, and identifying and disseminating information on reading programs that include six essential components of reading instruction - phonemic awareness, phonics, fluency, vocabulary, comprehension, and motivation.

Two recent federally-funded meta-analysis of reading research influenced NCLB. They summarized what is known about reading including "best practices" for teaching reading. The first investigation was conducted by The Committee on the Prevention of Reading Difficulties in Young Children (PRD). PRD examined literature on beginning reading and low reading achievement, reviewing quantitative studies, reading programs, and qualitative studies. PRD published its findings in the book *Preventing Reading Difficulties in Young Children* (Snow, Burns, & Griffin, 1998). The second investigation, conducted by the National Reading Panel (NRP), looked at more than 460 experimental or quasi-experimental research studies of instructional strategies in order to extract the essential findings about what has been scientifically proven to work in reading instruction. NRP published its findings in an April 2000 report (NICHD, 2000).

This white paper summarizes the NRP findings in three of the essential components of reading instruction-- vocabulary, comprehension and fluency-- and how those areas are addressed by the Weaver Instructional Systems' (WIS) instructional software program design.

Weaver Instructional Systems

There are few effective age-appropriate resources available for struggling secondary readers that permit them to practice the comprehension skills they need to become proficient readers. One resource, WISE software, is a comprehensive computer-based instructional program that provides students with extensive assessment, instruction and practice in the areas of vocabulary, comprehension, and fluency training. The software is self-paced, has a non-juvenile interface and is appropriate for students from the early elementary grades through post-secondary.

The vocabulary program incorporates 7,000 core vocabulary words published by the Educational Development Laboratory (*EDL Core Vocabularies*), and is based on the philosophy that new words are best learned through repetitive usage and exposure in a variety of contexts instead of a single exposure in isolation.

The comprehension section is designed to instruct the student how to read efficiently in the content areas. Students are taught to read with a clear purpose, and improve their memory of the content that they've read. The program incorporates lessons and assessments based on 420 articles with questions relating to the subject, main idea, supporting details, action, and multiple main ideas. The company's Basic Reading Formula is a systematic approach that helps students learn how to approach their reading, what important things to identify, and how to organize what they've read for effective recall. The software consistently provides immediate feedback and reinforcement.

Research on Vocabulary Instruction

NRP identified a high correlation between vocabulary instruction and reading comprehension. Vocabulary is acquired in a variety of ways including direct instruction and conversing. According to Eunice Greer, teachers can typically introduce 8-10 vocabulary words each week, not very many considering that students typically enter school with an oral vocabulary of 5,000 words and expand their vocabularies by an estimated 3,000 to 4,000 words each year.

It has been estimated that students learn roughly 1,000 of those new words per year through reading (Nagy, Anderson & Herman, 1987).

Considering the enormous variation in the amount of independent reading that students do in school and outside of school (Cunningham & Stanovich, 1998), and, because teachers don't have the time to teach all those new words, it is necessary for students to master strategies they can use to learn words independently. In fact, such skills may be the most important tool for reading for meaning.

Research has shown that students need more than word definitions to build vocabulary. Stahl and Fairbanks (1986) recommend that vocabulary instruction be based on exposure to new vocabulary in varying contexts. NRP also concluded that vocabulary should be derived from content materials, and that instruction should not focus exclusively on words.

NRP reviewed the evidence presented in 47 studies on vocabulary instruction, and concluded that explicit instruction, implicit instruction, multimedia methods, practicing to increase capacity, and association all lead to increased vocabulary learning. The Panel also concluded that "computer technology in the service of vocabulary learning is a powerful way to increase word learning" (NICHD, 2000), and that "computer instruction increases vocabulary better than traditional instruction".

The WISE software supports vocabulary instruction by incorporating 7,000 core vocabulary words (*EDL Core Vocabularies*) that are presented to students audibly, and in a variety of contexts up to ten times each through a series of lessons and activities. This instructional design is consistent with NRP's conclusion that pre-teaching of vocabulary words and repeated exposure in different contexts improves vocabulary and comprehension.

The software also provides immediate feedback to students. For example, after responding to questions on main idea, the question is presented again to the student along with an explanation of why their response was correct or incorrect.

NRP concluded that the restructuring of reading materials, such as substituting an easier synonym for a harder word yielded significant vocabulary gains. Making sure children not only understand the vocabulary but also the task at hand can also lead to increased vocabulary learning, particularly for low-achieving or at-risk students. Finally, the software supports the use of clues in the text to help students decipher new words. According to NRP, several studies indicate that a blend of direct-definition instruction and vocabulary learning through context clues is more effective than one method alone.

Research on Comprehension Instruction

Comprehension is closely tied to background knowledge, vocabulary, fluency, and decoding skills. When students don't understand what they are reading, their ability to learn, assimilate knowledge and keep up with their classmates is hindered. This is especially critical as children advance through elementary school and transition from learning to read, to reading to learn. As they get older, many students are unable to pass tests, participate in discussions or write reports because of their inability to comprehend what they read or keep up with their reading assignments. Struggling readers experience lower expectations and decreased motivation (Stanovich, 1986). They also independently read much less than their counterparts which results in their falling further and further behind.

According to the NPR, "...reading comprehension is a complex cognitive process that cannot be understood without a clear description of the role that vocabulary development and vocabulary instruction play in the understanding of what has been read... (And) comprehension is an active process that requires an intentional and thoughtful interaction between the reader and the text". The Panel's findings on the research on comprehension concluded that five categories of instruction can improve reading comprehension in normal readers: monitoring comprehension, the use of graphic and semantic organizers, answering questions, generating questions, recognizing story structure, and summarizing. NRP also concluded that readers who are instructed in a variety of cognitive strategies can make significant gains in reading comprehension.

WISE software supports the monitoring of comprehension with its Basic Reading Formula approach, a systematic method to content reading which teaches students strategies for organizing, understanding and recalling key information from the texts. Students are instructed to determine the topic/subject, main idea, supporting details, multiple main ideas, and action. Each of 9 graded levels contains 45 Comprehension, 150 Vocabulary, and 150 Supplemental Vocabulary Lessons, along with Pretests, Instructional Lessons, Practice Lessons, Mastery Quizzes and Post Tests.

The software utilizes graphic organizers by having students identify the main ideas of stories, drawing meanings and relationships of underlying ideas.

Regarding story structure, question generating, and summarization, the program asks students a variety of content-based questions including main idea, subject, characters and story events. NRP concluded that the success of story structure instruction is more frequent with poor or below-average readers. NRP also concluded that readers improved in including ideas related to the main idea, generalizing, and removing redundancy and that Instruction of summarization improves recall.

Finally, and although the WIS software is not intended to replace teacher instruction, it does provide Multiple Strategy instruction in that it models two or more combinations of four strategies: question generation, summarization, clarification, and projection of what might occur in context. NRP concluded that evidence shows that actively involved motivated readers read more text as a result of multiple-strategy instruction.

The Panel also found that in studies involving even a few hours of preparation, instructors taught students who were poor readers but adequate decoders to apply various strategies to expository texts in reading groups, with a teacher demonstrating, guiding, or modeling the strategies, and with teacher scaffolding. The software supports this function indirectly by providing teachers with online lesson plan sets that allow them to download and print the lessons in order to prepare for pre-teaching instruction activities.

Research on Fluency Instruction

Reading fluency is the ability to rapidly recognize words and comprehend their meanings simultaneously. Fluent readers read with appropriate phrasing and expression and can readily figure out unfamiliar words and phrases using contexts and word patterns. Not surprisingly, fluency is highly related to comprehension in that non-fluent students have difficulty understanding the meaning of what they read (Pinnell, et al., 1995). Fluency is necessary for comprehension because struggling readers are too busy with the mechanics of the language to easily comprehend the subject matter. Fluency problems can also result from students reading inappropriate texts, interruptive reading practices conducted by the teacher, and conditioning of students to rely on an external monitor (International Reading Association).

Research has shown that repeated reading is an effective way for students to develop reading fluency, implying that practice has a positive effect on fluency (Samuels 2002). Guided repeated oral reading and independent silent reading are the two methods most typically used to teach reading fluency. The NRP concluded that students should read texts repeatedly and under varying conditions: "for some readings they should read entirely alone; at other times they should read a text repeatedly with phrasing support; and for other readings they should get direct feedback and guidance" (NICHD, 2000b). NRP also concluded that although such effective practices have the greatest impact on fluency, they often have a positive impact on comprehension.

WISE software reinforces reading fluency by placing students in appropriate texts, providing them with copious reading practice opportunities, and enabling them to practice reading un-interrupted. The students also work independently. The guided reading selections are timed by words per minute, word-by-word, phrase-by-phrase, and left to right, a process that enables them to increase their reading rate, increase their span of recognition, and reduce fixations. The software also provides useful feedback to teachers on each student's level of fluency. Finally, in the software students practice reading vocabulary words in context which is advantageous to practicing word lists in that it provides the "opportunity to improve the integration of skills needed for fast reading with comprehension" (Levy, 2001).

Computer Technology and Reading Instruction

NRP evaluated 21 research studies on the use of computers in reading instruction. The Panel noted the absence of research on the incorporation of Internet applications to reading instruction, and recommended that computer technology be examined for its ability to deliver instruction in areas such as vocabulary or phonemic awareness. The Panel reported that although it's difficult to draw conclusions from the studies, they all report positive results -- suggesting the possibly efficacy of computer technology for reading instruction --yet relatively few specific instructional applications have been evaluated. Four studies report learning gains in vocabulary with computer use as compared to traditional methods or when computers are used as an ancillary aid. Reinking and Rickman (1990) found that 6th grade students receiving computer instruction of difficult text words with electronic text scored higher on vocabulary measures than students reading printed pages with dictionaries or glossaries.

Research on WIS software

The effectiveness of the WIS software was evaluated in an independent study of fifty-seven incoming freshman and fifteen sophomore Title 1 students at Streator, IL High School during the 2001-02 and 2000-01 academic school years. The students used the Weaver software on average two (2) hours per week for thirty-four (34) weeks. In addition, a number of other reading programs were incorporated into the high school's Language Arts curriculum for Title 1 students. All students were pre-tested in the spring of the previous year and post-tested in the spring of the evaluation year using the Gates-MacGinitie Reading Test. Raw scores were converted into Normal Curve Equivalents (NCEs), Percentiles and Grade Equivalents (GE). The two-tailed paired-t statistic was used to determine the significance of pre-/post-test mean differences due to instruction at a P-value of 0.05 for both 9th and 10th grade Title 1 students during both the 2000-01 and 2001-02 academic school years. Both freshman and sophomore Title 1 student mean-difference gains demonstrated positive significant differences at P-values below 0.05, the upper level cutoff for statistical significance acceptance. Student group gains ranging from a low of 1.4 GE to a high of 3.3 GE with just 68 hours of instruction (2 hrs per week for 34 weeks) were attributed to the a combination of the Weaver software and Streator High School's Title 1 Language Arts curriculum.

References

Cunningham, A. & Stanovich, K. (1998). What reading does for the mind? *American Educator*. Spring/Summer.

EDL Core Vocabularies. (1989). Austin, TX: Steck-Vaughn.

Eunice Greer Interview: Implications for Scientific Based Evidence Approach in Reading. See <http://www.ed.gov/offices/OESE/esea/research/greer.html>

Levy, B. (2001). Moving the Bottom: Improving reading fluency. In M. Wolf (Ed.), *Dyslexia, fluency and the brain* (pp. 357-379). Timonium, MD: York Press.

Nagy, W., Herman, P., and Anderson, R. (1985). Learning words from context. *Reading Research Quarterly*, 20(2), 233–253.

National Reading Panel. (2000). *teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction* (National Institute of Health Pub. No. 00-4749). Washington, DC: National Institute of Child Health and Human Development.

Office of Elementary and Secondary Education (2002). The Reading Excellence Act: <http://www.ed.gov/offices/OESE/REA/overview.html>

Partnership for Reading. <http://www.nifl.gov/partnershipforreading/index.html>.

Pinnell, G.S., Pikulski, J.J., , K.K., Campbell, J.R., Gough, P.B., & Beatty, A.S. (1995). *Listening to children read aloud*. Washington, DC: Office of Educational Research and Improvement, U.S. Department of Education.

Reinking, D., & Rickman, S. S. (1990). The effects of computer-mediated texts on the vocabulary learning and comprehension of intermediate-grade readers. *Journal of Reading Behavior*, 22(4), 395-411.

Samuels, S. (2002). Reading fluency: Its development and assessment. In A. Farstrup & S. Samuels (Eds.) *what research has to say about reading instruction* (pp. 166-183)? Newark, DE: International Reading Association.

Stahl, S. and Fairbanks, M. (1986). The effects of vocabulary instruction: A mode-based meta-analysis. *Review of Educational Research*, 56 (1), 72-110.

Stanovich, K.E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly*, 21, 360-407.