Reading Instruction for

Low-Achieving and At-risk Students

by

Michael L. Kamil
Stanford University

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Michael L. Kamil

In recent years there have been several attempts at integrating the research on reading. Snow, Burns, and Griffin (1998) delineated three areas of knowledge that, if appropriately dealt with, will prevent reading difficulties: knowledge of the alphabetic principle, fluency, and comprehension. Snow, Burns, and Griffin suggest that these areas represent opportunities for appropriate instruction. If students do not acquire the skills, they will be at risk for developing reading difficulties.

The National Reading Panel (National Institute of Child Health and Human Development [NICHD], 2000) systematically synthesized the research on reading instruction relevant to these three areas. The report examined effective reading instruction and conducted meta-analyses where appropriate. The three areas were elaborated so that knowledge of the alphabetic principle became knowledge of phonemic awareness and phonics. Fluency was divided into reading practice and guided reading. Comprehension was divided into vocabulary and comprehension. The report also examined two other areas. It synthesized the research on teacher education and professional development literature to determine their effects on reading instruction. Finally, the National Reading Panel (NRP) looked at the effects of computer technology on reading instruction.

A third effort (RAND, 2002) specifically targeted reading comprehension with the intent of generating a research agenda to add to knowledge about comprehension. In order to develop such an agenda, the RAND report synthesized what is known about comprehension. It is the synthesis of what we know that is important, rather than the research agenda, for the purposes of the paper.

In what follows, we attempt to synthesize some of the material from these various reports and to add material that was not included in them. This report is not entirely bound by some of

the restrictions of the other reports. For example, The National Reading Panel Report *only* reviewed published reports of experimental and quasi-experimental research. What follows reviews those studies, but goes beyond those criteria, where appropriate, and includes other genres of research.

Who are at-risk or low-performing students?

A search of the research literature reveals several different approaches to defining "at-risk" students. Some studies take a "predictive" approach, looking at categories of learners who were statistically more likely to drop out of school early or demonstrate low academic achievement, defining those students to be "at-risk." Others studies defined "at-risk" as students at schools who received funding from programs such as Head Start or who were eligible for free lunch programs. And still other definitions looked at more general categories of behavioral/ motivational, socioeconomic, and academic factors that we commonly associate with at-risk learners (i.e., low socioeconomic status [SES], low academic achievement). In the following paragraphs, examples of these various definitions of at-risk students are given.

Definitions

One approach to identifying learners at risk for reading difficulties can be termed the predictive approach. For example, Catts, Fey, Zhang, and Tomblin (2001) assessed the impact of five kindergarten variables (letter identification, sentence imitation, phonological awareness, rapid naming, and mother's education) to predict reading outcomes in second grade. In another study, language impairment in kindergarten, children's literacy, knowledge/experience in kindergarten, and initial reading achievement in second grade were good predictors of subsequent reading outcomes (Catts, Fey, Tomblin, & Zhang, 2002).

Other researchers have found that language delays in the early years were an important risk factor for later literacy difficulties (Larney, 2002). Even medical conditions can be predictive

of reading difficulties. Otitis media (infection of the middle ear) at ages 0–3 is a significant risk factor for delayed reading at ages 8–10 (Kindig & Richards, 2000).

A second type of definition is based on instructional progress. In a review of research of K–3 students who were unresponsive to early literacy interventions, Al Otaiba and Fuchs (2002) found certain characteristics represented risk factors for reading. These risk factors included phonological awareness deficits, phonological retrieval or encoding deficits, low verbal ability, behavior problems, and developmental delays.

A third definitional category consists of genetic or parental factors as risk factor for reading difficulties. For example, Gallagher, Frith, and Snowling (2000) studied the influences of having a dyslexic parent: For those students, letter knowledge at 45 months was the strongest predictor of literacy level at 6 years. Early speech and language skills predicted individual differences in literacy outcomes, and genetic risk accounted for unique variance over and above these other factors.

The final category has to do with definitions based on socioeconomic status. For example Justice and Ezell (2002) defined at-risk students as pre-school students from low-income households enrolled in Head Start. Another common way of identifying these students is to determine whether they qualify for free or reduced lunch.

The definition of at-risk students for failure in learning to read includes those students who have reading disorders, speech/language impairments, low literacy level of parents, limited early literacy exposure, low SES, or low motivation/low reading engagement. Many students fall into more than one of these categories. They may be more seriously at-risk than those who only fall into one of the categories.

The concept of “at-risk” obviously varies with age or development to reflect the specific factors or skills associated with ages and stages of development. For example, at the pre-school/elementary age, studies of “at-risk” learners might target students with limited early-literacy experiences, or students with phonological awareness difficulties. Older students may not

need these same interventions, but may need other interventions, perhaps something that will increase their motivation or engagement.

At some level, there are few radically different instructional strategies that will work *only* for at-risk students. Over the years, we have attempted to match instruction with diagnostic information and found that it doesn't turn out all that well. First, there are few instructional strategies that target specific skills. Rather, most instructional strategies are broad-based. Second, teachers are often not prepared to make decisions based on hard data. This unpreparedness is a function of the difficulty of collecting and synthesizing relevant data. It is also a lack of substantive preparation in how to use data to make appropriate instructional decisions. This lack of teacher knowledge can be corrected through appropriate professional development.

The current NCLB legislation provides an interesting case in point. The requirements include a large amount of assessment, professional development, and the use of appropriately grounded (in scientifically-based reading research) instruction. Clearly, the content of many NCLB efforts involve finding ways to help teachers base instructional decisions on consistent data.

However, one of the areas where there are clearly different strategies for instruction are for English Language Learner (ELL) or second language students. While we do not have a complete synthesis of the data on this population at the moment, the National Literacy Panel for Language Minority Children and Youth is reviewing the extant research in six areas: relationship between oral language and literacy, relationship between first and second language literacy, development of literacy, context in which literacy is developed, effective practices and professional development to promote literacy, and assessment of literacy. It is hoped that what this synthesis will provide is a framework of the things that do and do not "work" for ELL school populations. A small body of research is currently available to guide reading instruction with second language populations. Until the more complete analysis is available from the National Literacy Panel, instructional practice will have to be guided by what has already been analyzed.

In the following sections, some of the strategies for working with students in teaching reading are described. This discussion parallels, for the most part, the NRP framework, using the categories developed for analyzing the reading research literature. These categories are important because they form the basis of current federal reading policy and are built into NCLB, for example. However, the discussion goes beyond the NRP analysis, adding new data from updates to the NRP databases where appropriate. The topic of motivation and engagement is also added to this discussion, even though it was not part of the NRP analysis.

Phonemic Awareness

Phonemic Awareness (PA) is an oral language skill involving the ability to manipulate sounds in oral language. PA has been implicated as a powerful predictor of reading ability. So the most important point here is that while every student needs to be phonemically aware, only a relatively small number of students need PA instruction. The students who need PA instruction tend to be those who are labeled "at-risk." PA instruction includes tasks like:

1. Phoneme isolation, which requires recognizing individual sounds in words—for example, "Tell me the first sound in paste." (/p/)
2. Phoneme identity, which requires recognizing the common sound in different words—for example, "Tell me the sound that is the same in bike, boy, and bell." (/b/)
3. Phoneme categorization, which requires recognizing the word with the odd sound in a sequence of three or four words—for example, "Which word does not belong? bus, bun, rug." (rug)
4. Phoneme blending, which requires listening to a sequence of separately spoken sounds and combining them to form a recognizable word—for example, "What word is /s/ /k/ /u/ /1/?" (school)

5. Phoneme segmentation, which requires breaking a word into its sounds by tapping out or counting the sounds or by pronouncing and positioning a marker for each sound—for example, “How many phonemes are there in ship? “ (three: /š/ /I/ /p/)
6. Phoneme deletion, which requires recognizing what word remains when a specified phoneme is removed—for example, “What is smile without the /s/?” (mile)

Although phonemic awareness is an oral language skill, PA training is more effective when letters are used to assist students in manipulating phonemes. Because knowledge of letters is important for other aspects of reading, it is more efficient to teach both PA and letters at the same time.

Another important finding relates to the format for instruction. It is intuitive that the most effective instruction is delivered individually. However, the NRP found that PA instruction was most effective when delivered in small groups. This is probably due to the additional vicarious learning that takes place while listening to other students’ responses.

Fortunately, this is a relatively simple intervention. Something on the order of a maximum of 20–25 hours of instruction seems to be the optimal point for benefits from PA instruction. However, this seems to be most effective for students in kindergarten and first grade. The research has shown that acquiring phonemic awareness early is predictive of reading ability through elementary school (Juel, 1988).

Phonics

Phonics is applying letter-to-sound correspondences in order to translate print to sound. In general, systematic phonics instruction was found to be effective in raising reading achievement.

The NRP compared three types of phonics programs:

1. synthetic phonics programs which emphasized teaching students to convert letters (graphemes) into sounds (phonemes) and then to blend the sounds to form recognizable words;
2. larger-unit phonics programs which emphasized the analysis and blending of larger subparts of words (i.e., onsets, rimes, phonograms, spelling patterns) as well as phonemes;
3. miscellaneous phonics programs that taught phonics systematically but did this in other ways not covered by the synthetic or larger-unit categories or were unclear about the nature of the approach.

All three types of programs worked, but the greatest effect size was for synthetic phonics (d = 0.45). In addition to this it was concluded that the use of systematic phonics instructions was better than no phonics instruction.

Phonics instruction has its greatest effects when delivered in kindergarten (d=0.56) and first grade (d=0.54). There are diminishing returns for students in second through sixth grade (d=0.27). To be effective, systematic phonics instruction introduced in kindergarten must be appropriately designed for learners and must begin with foundational knowledge involving letters and phonemic awareness.

Phonics instruction produced substantial effects for at-risk students in kindergarten (d=0.58) and for first graders (d=0.74). Phonics instruction also significantly improved the reading performance of disabled readers (d=0.32).

Systematic phonics instruction helped children at all SES levels make significantly greater gains in reading than did non-phonics instruction. The effect size for low-SES students was d=0.66 and for middle-class students was d=0.44.

Phonics instruction is an important part of early reading instruction that research shows is effective for a wide range of students. It seems to be less effective for older students and for students who already have some degree of reading skill.

Fluency

Fluency is defined as the ability to read rapidly and accurately with expression. (There are variations of the definition that do not include the expression dimension, but they appear to be appropriate *only* for early reading.) Fluency is a proxy for a cluster of reading skills. If those underlying skills have been automated (learned to a high level), readers can apply them with little effort.

What are these skills for which fluency is a proxy? Clearly, to be fluent requires a good deal of control of the alphabetic principle. When the 'with expression' criterion is added, some degree of comprehension is also measured by proxy.

The NRP found that fluency could be affected by guided reading practice and by a technique known as repeated reading. Guided reading practice involves giving feedback as students practice reading. Repeated reading requires a student to read and re-read the same passage until it becomes nearly automatic.

The analysis of guided oral reading research showed an average effect size of 0.41. The effect of fluency instruction was even apparent on measures of comprehension (d=0.35).

Vocabulary

Davis (1942) presented evidence that reading comprehension comprised two "skills": word knowledge (vocabulary) and reasoning. The finding that vocabulary is strongly related to general reading achievement has remained unchallenged. Why is vocabulary so important?

Beginning reading involves teaching students to decode text to speech. When a reader accomplishes that decoding to speech, the assumption is that the reader can comprehend the speech. This can only happen if the words that are decoded are in the reader's oral vocabulary. The importance of a strong oral language vocabulary should be obvious.

Anderson, Wilson, and Fielding (1986) showed large differences in amounts of daily reading among children. The number of words encountered in leisure reading per year varied

from 8 to 4,700,000. These enormous variations in reading, of course, lead to large differences in children's vocabularies and comprehension abilities. Hart and Risely (1995) report similar findings, but identified these deficits in at-risk, low-SES students.

Research (e.g., Anderson & Freebody, 1984; Stanovich, Cunningham, & Freeman, 1984) has shown that reading ability and vocabulary size are related, but the *causal* link between increasing vocabulary and an increase in reading ability has been difficult to demonstrate (Stanovich, 2000, p. 162).

Nagy and Anderson (1984) examined printed text for Grades 3 through 9. They estimate that good readers read approximately 1,000,000 words per year. Clearly, not all of these words are unique, but the sheer numbers lead to the conclusion that students could never be taught that many words. Instructionally, there seems to be no choice but to rely on students' learning vocabulary from context. Consequently, more reliance was placed on students' own learning from context. However, the NRP review showed that, while learning from context is important, direct instruction of vocabulary is effective in improving both vocabulary and comprehension. The implication is that *both* direct, explicit instruction *and* learning from context are important. A further implication is that explicit instruction *may* be useful in closing the gap between the students with the highest levels of vocabulary knowledge and those with the lowest. What were the specific findings with regard to vocabulary?

Repetition and rich support for learning vocabulary items are important

One clear finding from the dataset is that there is a large improvement in vocabulary when students encounter vocabulary words often. While not surprising, this does have direct implications for instruction. Students not only need to encounter target vocabulary items frequently, they should be given items that are likely to appear in many other contexts. However, this does not mean that students should be taught only high-frequency words, particularly when they may already know those with the highest frequency. Rather, the targeted words should be

those that occur often enough to be useful in reading.

The context in which a word is learned is critical. Lists are, generally, less effective than connected text for learning most vocabulary. However, if vocabulary is organized by categories, it will be learned more easily than a list that has no such context (e.g., Meyerson, Ford, & Jones, 1991). Students will learn words better if they are actively engaged in the task of inferring vocabulary meanings from context, rather than simply being given the definition (e.g., Jenkins, Matlock, & Slocum, 1989).

Vocabulary tasks and instruction should be restructured when necessary

It is often assumed that students who do not learn vocabulary words need more practice. Research has shown, however, that it is often the case that students simply do not understand the task involved. For example, simply asking students for the definition of a word might be confusing. Asking the student to give an example of the word or to use it in a sentence might be easier. Revising learning materials or designing instruction to meet the needs of learners often facilitates vocabulary learning (Gordon, Schumm, Coffland, & Doucette, 1992). Once students know what is expected of them in a vocabulary task, they often learn rapidly. Restructuring tasks seems to be particularly effective for low-achieving students or at-risk students (e.g., Schwartz & Raphael, 1985).

Group learning formats may be helpful for vocabulary instruction

Structuring the delivery of vocabulary instruction to include group learning formats has found empirical support. Examples of group learning formats that were successful include learning vocabulary in pairs, peer tutoring, and reciprocal teaching strategies (Malone & McLaughlin, 1997; Eldredge, Quinn, & Butterfield, 1990). One possible explanation for this is that students seem to learn vocabulary items when they are simply listening to other students respond.

Vocabulary learning should entail active engagement in learning tasks

Findings consistently show that having students actively participate in learning vocabulary words is best (e.g., Dole, Sloan, & Trathen, 1995). Successful examples of active engagement in tasks included a variety of methods, such as having students make mental pictures of the definitions, acting out the definitions with sign language, using the word in writing tasks, and actively attending to context clues to infer word meanings.

Computer technology can be used to help teach vocabulary

Research demonstrates the benefits of computer technology for vocabulary instruction (Davidson, Elcock, & Noyes, 1996; Heller, Sturner, Funk, & Feezor, 1993). Research suggests that animations of target words may help to augment vocabulary learning (Higgins & Cocks, 1999). Multimedia presentations may be particularly effective for helping second language learners (e.g., Chun & Plass, 1996; Knight, 1994).

Vocabulary should be taught both directly and indirectly

Direct instruction of vocabulary should be included in reading lessons. There is a need for instruction of those vocabulary items that are required for a specific text to be read as part of the lesson. Such instruction can help to make the translation of print to speech meaningful by introducing the items orally (Brett, Rothlein, & Hurley, 1996).

All of the studies reviewed by the NRP that examined direct instruction of vocabulary found that both comprehension and vocabulary improved as a result of the direct instruction.

One crucial question is which words should be taught directly. While the research provides no empirical data on this issue, some researchers have begun to develop methods to answer this question. One promising approach has been developed by Beck, McKeown, and Kucan (2002), who suggest that vocabulary words fall into tiers, based on frequency of use. They recommend that teaching highly frequent words (Tier One words) is probably not worth the effort

because students are likely to know them already. They also suggest that teaching the least frequent words (Tier Three) is of little benefit to students until they encounter them in the text. Words that fall in between those two extremes should be the content of explicit vocabulary instruction. Beck et al. reason that students will be likely to encounter these words often enough to make the investment in learning them worthwhile. We await definitive research to evaluate these promising suggestions.

Vocabulary can be acquired through incidental learning

Incidental learning of vocabulary through listening, other reading instruction, and storybook reading was found to improve comprehension. Two factors that have been found to impact learning outcomes include the frequency of the word encounters and the instructional techniques involved with the repeated readings of texts (Senechal, 1997; Dickinson & Smith, 1994). Not all vocabulary has to be taught explicitly.

There is also some evidence about the possibilities of vocabulary instruction for second language learners. One of the intriguing lines of research involves cognates.

This emphasis on cognate searching is not necessarily a trivial strategy. Cognates in Spanish and English, most of which are taken from Latin and Greek, often “look alike” and sound alike (Nash, 1997). The entire set of these shared cognates is estimated to be between 10,000 to 15,000 words, which accounts for one third to one half of the active vocabulary of the average educated person; there are additional cognates in a person’s passive vocabulary, which includes specialized, literary, and obsolete words (Nash, 1997). If the transfer of the knowledge of these words could be accomplished, a first language learner would indeed have a head start to learning a second language.

Conclusions about Vocabulary Research

The effect of explicit instruction of vocabulary is one of the more interesting findings of the NRP. While it is clear that vocabulary learning *must* include more than explicit instruction, it is also clear that explicit instruction is clearly one way to improve comprehension.

Comprehension (Prior Knowledge)

One of the assumptions that is often made is that at-risk students have prior knowledge deficits. If that is so, then there is reason to assume that work that increases general world knowledge might be beneficial. But we have very little evidence that this type of intervention will solve the problem. The solution would be to provide students with a rich background and pre-reading activities. While there is not a great deal of research on the instruction of prior knowledge, the importance of having sufficient prior knowledge is clearly important (Dole, Valencia, Greer, & Wardrop, 1991).

Comprehension (Strategy Instruction)

The NRP analyzed 203 studies of comprehension strategy instruction and found that there was research evidence for the efficacy of eight strategies. These eight strategies are described below.

Comprehension monitoring is the process by which readers decide whether or not they are understanding the text. If they are not understanding, they need to learn to apply "fix-up" strategies to correct whatever problems are occurring. Some of these fix-up strategies are restating, looking back, and even looking ahead for clues that might help (Bereiter & Bird, 1985).

Students often learn better when they are engaged in **cooperative learning** with other students. While cooperative learning is often thought of as a social organization for the classroom, it is also a specific learning strategy whereby students can work together on clearly defined tasks to arrive at a solution. Klingner, Vaughn, and Schumm (1998) had small groups of

students translate content material from ‘teacher talk’ to ‘kid talk’ and showed gains in reading.

Graphic organizers are alternative representations of text, visual or spatial. Graphic organizers are also known as semantic networks, concept maps, or text maps. They have been extensively researched and the National Institute of Child Health and Human Development has even thought of them as a general teaching tool (NICHD, 2000). Graphic organizers can be used before, during, or after reading. Most of the uses have involved effects on reading, but an interesting use of graphic organizers after reading has shown improvement in written summaries (Bean & Steenwyk, 1984).

Story structure refers to the common components in story (or narrative) text. These components are often given as: setting, initiating events, internal reactions, goals, attempts, and outcomes. While many students arrive at school with a complete knowledge of stories, others do not. The research showed that knowledge of these components helps the reader comprehend stories better than without such knowledge (e.g., Singer & Donlan, 1982).

Question answering is one of the most prevalent forms of comprehension assessment. It is also an effective comprehension strategy. One interesting example is the QAR technique (Raphael, & Pearson, 1985) in which students are taught that questions can be answered by referring to the text as well as the information one already knows.

The other powerful questioning technique is **question generation**. Students are taught to create (and then answer) their own questions about a text. A meta-analysis of the research on question generation (Rosenshine, Meister, & Chapman, 1996) concluded that there were large effect sizes for multiple choice (.95), short answer (.85), and summarization (.85) assessments. Question generation can be used independently or as part of multiple-strategy instruction, as in reciprocal teaching.

Summarization is the result of reading the text and extracting the most important information from it. As a strategy, it forces the reader to extract the main ideas and eliminate redundant and unnecessary details. To do this requires reading and re-reading of the text,

accounting for greater comprehension. The classic studies of summarization can be found in Brown and Day (1983) and Brown, Day, and Jones (1983).

The final category of research-supported strategies is not really a strategy. Instead, it is the application of **multiple strategies**. Instructionally, students are taught to use combinations of strategies to assist in comprehending the text.

The important question that arises about strategy instruction is whether or not strategies should be taught to students singly or in combinations, as multiple strategies. Reciprocal Teaching (Palincsar & Brown, 1984) is an instructional intervention that combines multiple strategies (e.g., question generation, summarization, etc.). The reported effect sizes are fairly substantial, about .88, in the best cases (Rosenshine & Meister, 1994).

Ray Reutzel (Personal Communication) has just completed an experimental study in which he varied the instruction of strategies either teaching a single strategy at a time or teaching multiple strategies. The multiple-strategy approach had a clear superiority. It is always unwise to depend on prepublication results, but this does seem promising as a "meta" strategy for instruction that will leverage students' abilities to comprehend.

In general, there seems to be relatively strong evidence that suggests teaching strategies in multiple combinations is superior to teaching strategies one at a time.

Teacher Education and Professional Development

It would be inappropriate to be concerned about successful reading instruction without a concern for teacher education and professional development. These have become important topics. The research on teacher education and professional development in reading is fairly extensive, amounting to more than 300 studies published between 1961 and 2001 (Pang & Kamil, 2003). However, these studies are unevenly divided between experimental (N=39) and descriptive or qualitative (N=267).

Consequently, the NRP reported on only a small number of studies in its analysis. The important framework that drove the NRP analysis was that the research had to be experimental and it had to report both teacher data (i.e., Did teachers learn what was taught?) and student data (i.e., Did students' reading improve?).

There were *no* studies of preservice teachers that fulfilled both criteria. Primarily, there were no student measures, in all likelihood because of the difficulty of tracking teachers after they graduate. However, there were studies that did examine teacher change. The NRP conclusion was that teachers did learn what was taught in teacher education programs; the behaviors changed in line with the content of instruction.

For the professional development research, there were studies that reported both teacher and student data. While there were relatively few studies (N=21), the results were consistent in their effects on student achievement.

In that sample, 17 of 21 measured teacher outcomes and 15 of those 17 showed at least moderate improvement. That is, the teachers learned and adopted the content of the professional development programs. A total of 15 of the 21 studies measured student outcomes. Of those 15 studies, 13 reported improvements in *student* achievement. Most important, if there were no gains for the teachers, there were no gains for the students.

In short, this confirms, albeit with only a limited set of studies, the positive effects of professional development on student achievement. It also can be argued by analogy that teacher education will have an effect, since the precondition for improving student achievement existed. Teachers did learn the content of the preservice programs. There is reason to expect that they would do a better job of teaching their students, much as the inservice teachers did. This still awaits experimental confirmation, however.

Computer Technology

There have been very few scientific studies of computer applications in literacy. Kamil and Intrator (1998) and Kamil, Intrator, and Kim (2000) have shown how few studies have been published about computer applications in reading and writing.

The NRP review of research came to several conclusions, albeit on the basis of a small number of studies. Primary among these is that the addition of speech to text improves reading.

There are several programs on the market that have conducted in-house evaluations and show promising research. These include the Voyager and Waterford Programs. These programs are intended to be "total solutions" for reading instruction. That is, they are intended to replace all, or at least most, of the conventional reading instruction students would receive.

These programs do not represent the best of what's possible with current computer technology. They are not fully speech-enabled. That is, they do not, generally, allow students to communicate by speaking to the computer. Nor can they process free-form answers. There are programs of smaller scale that do have these capabilities, but most of them have not been the subject of rigorous scientific research. However, Walberg (2001) does conclude that the Waterford program does produce improvements in reading.

One exception is the Reading Tutor, developed by Mostow and his colleagues (see, for example, Mostow & Aist, 2001) at Carnegie-Mellon University. This program is also a "total solution," but it is capable of listening and translating speech input. Another program of smaller scope is Soliloquy. This is a program that is designed to deal with oral reading and fluency training. It accepts speech input and provides feedback on the basis of that input.

None of these commercial programs has the capability of understanding freeform inputs, although this is quickly becoming possible. Kim and Kamil (2002) demonstrated that the use of an intelligent agent (much like the Microsoft paper clip) could produce greater learning from reading. This is far from definitive with regard to practices that will improve poor learners' reading, but it is definitively promising.

The promise of computer technology is great; the applications are still a long way from fulfilling the promise. One conclusion does seem apparent: The use of computers for at least some reading instruction does provide gains in reading achievement. This is probably due to the extra time that students spend in instructional contexts when they are *not* working with the teacher. Even if the incremental gains attributable to the computer are small, they are greater than what might be expected if the student were left alone.

Motivation

Motivation is one of those concepts that continually surfaces as an important focus in reading and learning to read. Motivation (in reading) can be defined as the cluster of personal goals, values, and beliefs with regard to the topics, processes, and outcomes of reading an individual possesses (Guthrie & Wigfield, 2000, p. 404).

This is not the same thing as interest, attitude, or beliefs (Guthrie & Wigfield, 2000). One could have an interest in reading, but choose not to do it. Motivation is the underlying factor that disposes one to read or not. Engagement is yet another variable in this affective cluster of concepts. Engagement in reading is the extent to which an individual reads to the exclusion of other activities, particularly when faced with other choices.

Alvermann et al. (2002) found that students often exhibit far more sophisticated reading when they are in situations away from the classroom. For example, students engaged in complex reading and writing activities around computer games when they did not exhibit such behavior in classrooms.

Strategy Instruction. Guthrie et al. (1996) found that all students who increased their intrinsic motivation across the school year also increased their usage of strategies. Guthrie and Wigfield (2000) listed several strategies that were likely to increase self-efficacy in both elementary- and middle-level students: activating prior knowledge, looking for information, comprehending informational texts, interpreting literature, and self-monitoring.

Motivation and engagement are critical for readers. If students are not motivated to read, they will simply not benefit from reading instruction. As much of the work in motivation and engagement shows, these are critical issues that must be addressed for success in reading instruction.

What Doesn't Work?

Despite the many positive conclusions of the reviews about what works in reading instruction, there are some instructional strategies that did not find support in the literature.

Free reading practice. There are many techniques commonly used in schools to encourage students to read more. Examples of these are Sustained Silent Reading, DEAR (Drop Everything And Read), and Accelerated Reader (AR), a computer-managed program. Although having students read more seems to be intuitively a good idea, NRP found no research that supported it. It is important to note there was so little research that one cannot conclude on the basis of research that doing this sort of free reading improves students' reading abilities. The most carefully conducted study showed no differences in achievement as a result of the program (Carver & Liebert, 1995).

Reinking and Watkins (2000) conducted a design experiment that showed Accelerated Reader could work if there were sufficient additional resources devoted to the instructional context. With those additional resources, there do seem to be some benefits to AR. The additional resources involve professional development for teachers. As noted above, this is clearly a variable that will have an effect on student achievement.

While the idea of having students read more seems to be a worthy goal, it is clear that we do not yet have a sufficient body of evidence to recommend it.

Generalized instruction. One of the conclusions that can be drawn from the NRP work is that explicit, systematic instruction is far more effective than other forms of instruction. The superiority of explicit instruction was found for phonemic awareness, phonics, vocabulary, and

comprehension. What this means is that instruction, to be effective, should be carefully planned and presented so that students *know* what is expected of them.

Conclusion

There are many questions about a comprehensive reading program that have not been answered either here or in the other syntheses mentioned earlier in this paper. Among the most pressing of those is how all of these individual components operate when they are presented in a coherent curriculum. Another is the role of family and culture in learning to read. It is not that these are unimportant questions. Yet another is the type of reading materials used in instruction. We also do not really know how, for example, comprehension strategies should be taught in different disciplines (e.g., history, biology, etc.). There is evidence (Alexander & Jetton, 2000) that strategies function differently in different content areas, but we do not have systematic ways of teaching in these contexts. These unanswered questions need to be addressed systematically to determine their relation to reading instruction. Clearly, we still have much to learn.

However, while we have much to learn, what is most important is that there are many questions that have been answered. Every reading program designed for early reading instruction should provide students with the basic elements described above: knowledge of the alphabetic principle (phonemic awareness and phonics), fluency, and comprehension (vocabulary and comprehension strategies). In addition, good professional development will help students of all abilities learn to read more effectively. Finally, computer technology is another way to leverage resources to produce gains in reading for students.

This paper began with a description of at-risk students. It proceeded on the premise that there were few differentiated ways to match students with instructional interventions. What *all* students need is instruction that focuses on their abilities and assists them in strengthening their weaknesses. The best cure for at-risk and low-achieving students is sound instruction.

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