

Recent research on reading instruction has led to significant improvements in the knowledge base for teaching primary-grade readers and for ensuring that those children have the early-childhood experiences they need to be prepared for the reading instruction they receive when they enter school. Nevertheless, evidence-based improvements in the teaching practices of reading comprehension are sorely needed. Understanding how to improve reading comprehension outcomes, not just for students who are failing in the later grades but for all students who are facing increasing academic challenges, should be the primary motivating factor in any future literacy research agenda.

In 1999, the Office of Educational Research and Improvement of the U.S. Department of Education charged the RAND Reading Study Group (RRSG) with developing a research agenda to address the most-pressing issues in literacy. The decision to focus this research agenda proposal on reading comprehension in particular was motivated by a number of factors:

- All high school graduates are facing an increased need for a high degree of literacy, including the capacity to comprehend complex texts, but comprehension outcomes are not improving.
- Students in the United States are performing increasingly poorly in comparison with students in other countries as they enter the later years of schooling when discipline-specific content and subject-matter learning are central to the curriculum.
- Unacceptable gaps in reading performance persist between children in different demographic groups despite the efforts over recent decades to close those gaps; the growing diversity of the U.S. population will likely widen those gaps even further.
- Little direct attention has been devoted to helping teachers develop the skills they need to promote reading comprehension, ensure content learn-

ing through reading, and deal with the differences in comprehension skills that their students display.

- Policies and programs (e.g., high-stakes testing, subject-related teacher credentialing, literacy interventions) intended to improve reading comprehension are regularly adopted, but their effects are uncertain because the programs are neither based on empirical evidence nor adequately evaluated.

The RRSg believes that a vigorous, cumulative research and development program focused on reading comprehension is essential if the nation is to address these education problems successfully. Current research and development efforts have been helpful in addressing such problems, but those efforts are limited in their funding, unsystematic in their pursuit of knowledge and improved teaching practice, and neglectful of strategies for taking evidence-based practices to scale.

The program of reading research that the RRSg is proposing fits into the larger context of research on reading in the United States. The Interagency Education Research Initiative—funded jointly by the National Science Foundation, OERI, and the National Institute of Child Health and Human Development—is sponsoring efforts that bring early research to scale with some emphasis on the use of technology. Thus, the reading research program proposed by the RRSg seeks to fill any gaps left by the existing research efforts, while being coherently organized around a central set of issues facing practitioners.¹

In this report, the RRSg characterizes reading comprehension in a way that the group believes will help organize research and development activities in the domain of reading comprehension. This characterization builds on the current knowledge base on reading comprehension, which is sizeable but sketchy, unfocused, and inadequate as a basis for reform in reading comprehension instruction. Research has shown that many children who read at the third-grade level in grade 3 will not automatically become proficient comprehenders in later grades. Therefore, teachers must teach comprehension explicitly, beginning in the primary grades and continuing through high school. Research has also shown that a teacher's expertise makes a big difference in this effort; yet, few teachers receive adequate pre-service preparation or ongoing professional development focused on reading comprehension. Finally, research has also shown that improving reading comprehension and preventing poor reading outcomes require measuring outcomes at every stage of learning.

¹The term *practitioners* in this report refers to all school district staff, including teachers, principals, and district administrators and also tutors and any other individuals implementing education as opposed to conducting research on it.

Therefore, the RRSR proposes three specific *domains* as having the highest priority for further research: instruction, teacher preparation, and assessment. In making this proposal, the RRSR emphasizes the need for research that builds on previous research findings about reading comprehension, contributes to better theories of reading development, and produces knowledge that is usable in both classrooms and policymaking arenas.

Within the federal agencies that are collectively responsible for carrying out research and development related to literacy, the capability to plan, manage, and execute the program envisioned by the RRSR is not well developed. This is particularly true within the Office of Education Research and Improvement (OERI), the agency that has the clearest mandate for addressing the problems outlined in this report. Thus, in addition to suggesting a structure and broad priorities for a program of research, the RRSR also suggests principles that might improve the management of the program.

A HEURISTIC FOR THINKING ABOUT READING COMPREHENSION

Learning to read well is a long-term developmental process. At the end point, the proficient adult reader can read a variety of materials with ease and interest, can read for varying purposes, and can read with comprehension even when the material is neither easy to understand nor intrinsically interesting. The RRSR's thinking about reading comprehension was informed by a vision of proficient readers who are capable of acquiring new knowledge and understanding new concepts, are capable of applying textual information appropriately, and are capable of being engaged in the reading process and reflecting on what is being read.

The RRSR began its thinking by defining the term *reading comprehension* as the process of simultaneously extracting and constructing meaning through interaction and involvement with written language. It consists of three elements: the reader, the text, and the activity or purpose for reading. The RRSR developed a heuristic to show how these elements interrelate in reading comprehension, an interrelationship that occurs within a larger sociocultural context that shapes and is shaped by the reader and that interacts with each of the elements iteratively throughout the process of reading. This idea is illustrated in Figure S.1.

The Reader

The reader brings to the act of reading his or her cognitive capabilities (attention, memory, critical analytic ability, inferencing, visualization); motivation (a purpose for reading, interest in the content, self-efficacy as a reader);

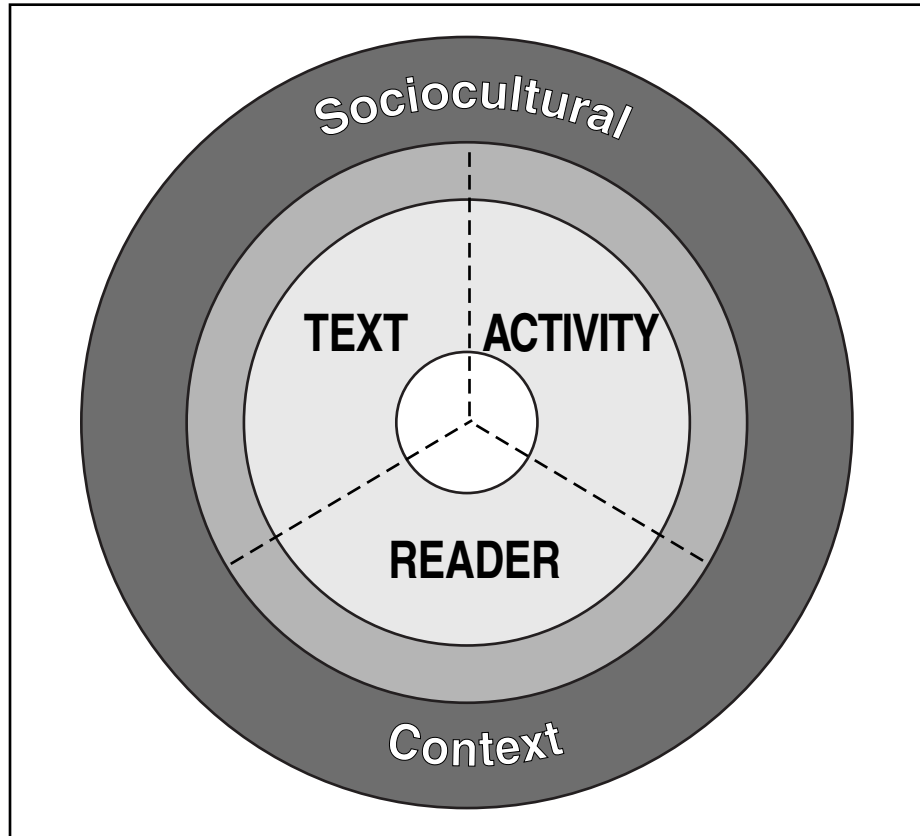


Figure S.1— A Heuristic for Thinking About Reading Comprehension

knowledge (vocabulary and topic knowledge, linguistic and discourse knowledge, knowledge of comprehension strategies); and experiences.

These attributes vary considerably among readers (inter-individual differences) and vary even within an individual reader as a function of the particular text and activity (intra-individual differences). Although considerable research has shown that each of these attributes relates to comprehension outcomes, the education field knows very little about how to most effectively enhance those attributes instructionally. Nor does the education field know how to limit the particular challenges that second-language readers face due to those readers' limited vocabulary and linguistic knowledge, nor do educators know how to build on those readers' first-language comprehension abilities.

The Text

The features of any given text have a large impact on comprehension. While reading, the reader constructs various representations of the text that are important for comprehension. Those representations include the *surface code* (the exact wording of the text), the *text base* (idea units representing the meaning of the text), and the *mental models* (the way in which information is processed for meaning) that are embedded in the text. Electronic text presents particular challenges to comprehension (e.g., dealing with the non-linear nature of hypertext), but it also offers the potential to support comprehension by providing hyperlinks to definitions of difficult words or other supplementary material.

Thirty years ago, children were assigned specific readings that were crafted for instructional purposes, or they were exposed to a select group of books in the narrative, descriptive, expository, or persuasive genres. We now live in a society that is experiencing an explosion of alternative texts that vary widely in content, reading levels, and genre. These texts incorporate multimedia and electronic options and are geared to a variety of cultures and groups. The sheer volume of reading choices makes it much more difficult for teachers to select appropriate texts for individual readers. Research that would identify reader capabilities and limitations more precisely and that would chart the impact of different text features on readers with varying capabilities would offer teachers considerable help in understanding the reading comprehension phenomenon.

The Activity

The reading activity involves one or more purposes or tasks, some operations to process the text, and the outcomes of performing the activity, all of which occur within some specific context. The initial purpose for the activity can change as the reader reads. That is, a reader may encounter information that raises new questions and makes the original purpose insufficient or irrelevant. Processing the text involves decoding the text, higher-level linguistic and semantic processing, and self-monitoring for comprehension—all of which depend on reader capabilities as well as on the various text features. Each element of text processing has varying degrees of importance depending on the type of reading being done, such as skimming (getting the gist of the text) or studying (reading the text with the intent of retaining the information for a period of time). Finally, the outcomes of reading are part of the activity. The outcomes can include an increase in knowledge, a solution to some real-world problem, and/or engagement with the text. However, these outcomes may or may not map directly to the reader's initial purpose in reading.

The long-term outcomes of reading—improved reading comprehension ability, increased knowledge, and engagement with the text—are of the greatest direct relevance to educators. One of the nation’s highest priorities should be to define the instructional practices that generate long-term improvements in learners’ comprehension capacities and thus promote learning across content areas.

The Context

When one thinks of the context in which reading is taught, the first thing that comes to mind is the classroom. But the learning process for reading takes place within a context that extends far beyond the classroom. In fact, differences among readers can, to some extent, be traced to the varying sociocultural environments in which children live and learn to read. Learning and literacy are viewed partly as cultural and historical activities, not just because they are acquired through social interactions but also because they represent how a specific cultural group or discourse community interprets the world and transmits information. If the education community is to ensure universal success in reading comprehension, those in the community must understand the full range of sociocultural differences in communicative practices. Sociocultural differences are often correlated with group differences. Groups may be identified by income, race, ethnicity, native language, or neighborhood. Substantial research considers group membership apart from sociocultural differences, but further research is needed regarding the relationship between membership in certain groups and reading comprehension.

ELEMENTS OF A RESEARCH AND DEVELOPMENT PROGRAM

The need for research in reading comprehension is critical and the possibilities for research topics in this area are nearly endless. The mission of improving reading comprehension outcomes is too important to leave to laissez-faire research managers. The research community needs to set an agenda that defines the most serious problems and prioritizes the needed research.

The RRSB has made recommendations for a research agenda and developed criteria for prioritizing the potential projects and evaluating proposals. First and foremost, the research should yield knowledge that is practical and usable in classrooms and in guiding educational policy. A potential project should be judged not only by its methodological rigor but also by its capacity to generate improvements in classroom practices, enhance curricula, enrich teacher preparation, and produce more-informative assessments of reading comprehension.

A research program that incorporates a range of quantitative and qualitative methodologies is essential to ensure rigor in answering the research questions and to generate practical and useful knowledge.

Projects should build on existing research when possible. For example, a substantial body of existing research about the development of word reading among primary-age children has contributed to successful interventions for children who experience difficulties in reading. Clearly, the reading-outcomes benefits that accrue from improved instruction in word reading will be limited if children do not also have access to improved instruction in vocabulary, oral language production, writing, text analysis, and other high-level operations that contribute to comprehension.

An educational research program must address widespread doubts concerning the quality, relevance, and usability of educational research. High-quality research efforts should be long-term and cumulative. And we as researchers should create links across the now-distinct subfields and subgroups of research in this field. One way to reach this goal is through well-designed proposal-review procedures that contribute to the task of forming a community of researchers linked by their common intellectual focus. Collaboration also provides a healthy forum for quality control and the judicious use of resources.

In drafting an agenda for a research and development program, the RRSg outlined key research questions that should be addressed within each of the three high-priority domains of comprehension research—instruction, teacher preparation, and assessment.

An Agenda for Research on Reading Instruction

Good instruction is the most powerful means of promoting the development of proficient comprehenders and preventing reading comprehension problems. A good teacher makes use of practices that employ his or her knowledge about the complex and fluid interrelationships among readers, texts, purposeful activities, and contexts to advance students' thoughtful, competent, and motivated reading. Instructional research must acknowledge the complexity of these interrelationships if it is to generate knowledge that is usable in real-life classrooms.

Given what is already known about how students learn to read and reading instruction, the RRSg identified some urgent questions related to reading instruction that need to be answered, such as:

- Would simply increasing the amount of time devoted to comprehension instruction while continuing to use practices that are currently in place improve outcomes?
- How does the teaching community ensure that all children have the vocabulary and background knowledge they need to comprehend certain content areas and advanced texts?
- How can excellent, direct comprehension instruction be embedded into content instruction that uses inquiry-based methods and authentic reading materials?
- How do national, state, and local policies and practices facilitate or impede the efforts of teachers to implement effective comprehension instruction?

Teacher Preparation and Professional Development in Reading Comprehension

Regardless of the quantity and quality of research-based knowledge about comprehension, students' reading achievement will not improve unless teachers use that knowledge to improve their instruction. There is a good reason to look closely at this issue: Researchers find that most teachers, even those who say they use reform models, still rely primarily on traditional practices. Other researchers point to the importance of teacher quality as a critical variable in student achievement.

In this report, the RRSg has provided a few ideas about how to enlist teachers to support reform efforts, how to enhance their capacity to contribute to reform efforts, and how to engage them in reshaping reform efforts in response to their experiences with enacting reform. The RRSg believes that teachers must be front and center in discussions about how to improve comprehension instruction in schools today.

Research has shown that well-designed teacher preparation programs have a positive effect on reading outcomes. But some critical questions have not been answered by the research. For example:

- What knowledge base (e.g., regarding language development, sociolinguistics, multiculturalism, reading development) do teachers need to provide effective reading comprehension instruction?
- What is the relative power of various instructional delivery systems (e.g., field-based experiences, video-based cases, demonstration teaching, microteaching) for helping teachers acquire the knowledge and skills they

need to successfully teach comprehension with students of different ages and in different contexts?

We know that the expertise of the teacher matters a lot to reading instruction outcomes, but several questions still need to be addressed in the area of teacher expertise. For example:

- What content (declarative and procedural knowledge about readers, text, tasks, and contexts) and sequencing of content are present in effective professional development programs?
- What are the critical components of professional development that lead to effective instruction and sustained change in teachers' practices?

Assessment of Reading Comprehension

All of the research recommended by the RRSB depends on having better instruments for assessing reading comprehension. The impact of assessment on instruction constitutes a research agenda of its own, particularly in the current era of accountability-oriented education reform. A system of reading comprehension assessment should reflect the full array of important comprehension outcomes and a research program should establish appropriate levels of performance for children of different ages and grades based on those outcomes. Without research-based benchmarks defining adequate progress in comprehension, we as a society risk aiming far too low in our expectations for student learning.

The RRSB proposes an approach to assessment that differs from current approaches in that it is based on an appropriately rich and elaborated theory of reading comprehension. The assessment procedures in this approach will be fluid, and they will change as more is learned from the research. More value will be placed on their usefulness for improving instruction. And because comprehensive assessment systems can place significant time demands on students and teachers, the education community has an obligation to develop assessments that are an integral part of and supportive of instruction, rather than limited to serving the needs of researchers.

Teachers who are interested in improving their instruction need reliable and valid assessments that are closely tied to their curricula so that they can identify those students who are learning and those who need extra help. The comprehension assessments that are widely used today focus heavily on only a few tasks and thus may inadvertently limit the reading curriculum to preparation for those few tasks. Knowledge, application, and engagement are all critical outcomes of reading with comprehension; assessments that reflect all three of these outcomes are needed.

Several key questions about assessment follow: Given this analysis, two important questions about assessment need to be answered:

- What would it take to design valid and reliable measures of student self-regulated strategic reading that teachers can administer in the classroom to inform their instructional decisions and to identify children who may need additional instruction?
- What would it take to design measures of reading comprehension that are sensitive to instructional interventions as well as to specific forms of reading instruction for all readers?

RECOMMENDED IMPROVEMENTS TO MAKE THE PROPOSED RESEARCH PROGRAM FEASIBLE

For the RRSG's proposed research program to develop to the point that it can actually improve comprehension outcomes, the research program infrastructure will need to be improved in a number of ways:

- The research program will require substantial, long-term funding that is sustained across administrations and political constituencies.
- The program will require intellectual leadership that extends over a substantial period of time and that is insulated from political influence.
- The program will be sustainable only if procedures for synthesizing knowledge across the various individual research activities are planned in advance.
- The program will require a cadre of investigators who are well trained for the research work.
- Research solicitations must be thoughtful, scholarly, and responsive to the intellectual resources available within the research community.
- The rigor and quality of the research review must be increased, a process that will require training reviewers and maintaining a systematic review system.

The program of research and development that we outline would require funding resources beyond those currently available to the Department of Education. The current expenditures on education research and development (R&D) are only 0.3 percent of the total national expenditures for K–12 education, a percentage far less than that devoted to R&D in other fields, such as health. The RRSG believes that the investment in education R&D should be gradually expanded to 2 to 3 percent of the total expenditures for K–12 educa-

tion, a figure comparable to that in other fields. The additional R&D dollars would enormously enhance the value of the funds that are already being expended on school improvement, special education, bilingual education, professional development, and curriculum development. As such, the additional dollars spent on R&D will represent a productive investment in the education of the nation's schoolchildren.