
**STRATEGIES FOR DEVELOPING A RESEARCH PROGRAM ON
READING COMPREHENSION**

Having a purposeful research agenda is only one prerequisite to developing a research program in any domain. In addition to formulating an array of desirable research activities, the education field will need to determine priorities—which aspects of the agenda to begin with and how to sequence the necessary research activities. Further, issues about the required infrastructure for the research effort must be addressed, as well as questions about how to sustain and steer the effort once it is under way so that knowledge can accumulate and its usability can be optimized. Considerations of the research methods are crucial, as are issues of funding levels and funding sources and collaboration among various potential funding agencies. We discuss these various issues in the following sections.

**PREREQUISITES TO ESTABLISHING AN EXCELLENT EDUCATIONAL
RESEARCH PROGRAM**

This report makes clear that although the knowledge base in the area of reading comprehension encompasses a very large territory, it is extensive in some areas but limited in others. The RRSg has mapped the various domains of knowledge to help decisionmakers identify new research that will have the most effect on comprehension instruction and reading outcomes. In so doing, a number of prerequisites for the establishment of a successful and effective reading comprehension research program were identified. Those prerequisites include (1) establishing priorities, (2) building on strengths, (3) improving the status of education research, and (4) choosing methods appropriate to the task.

Establishing Priorities

The usability of knowledge now becomes the major criterion in establishing priorities—usability of knowledge in classrooms and in establishing policies. A research program should be judged not just on its methodological rigor, but

also on its capacity to generate improvements in classroom practice, enhance curricula, enrich teacher preparation, and facilitate more-informative assessments.

1. *Criteria.* We suggest that an educational research effort that focuses only on reading comprehension as a field of research will be insufficient. The effort must also focus within reading comprehension on the highest-utility research topics. We have presented three domains of research within reading comprehension that we argue are of high priority—research on instruction, on teacher preparation, and on assessment. Even within those broad topics, further prioritizing is needed. Consulting with the research community will be key in developing likely priorities; at some point, though, decisive leadership will be needed.

Topics that are of high priority in the program of research on reading comprehension should be judged on the following criteria:

- How much knowledge has already been accumulated about the relevant aspects of comprehension?
 - How significantly will expanding the knowledge base in the way proposed affect theory development?
 - How important will exploring the instructional applications that might emerge from the research be to improving outcomes?
 - To what extent will relevant applications enhance, extend, and expand current practice, rather than represent minor modifications to it?
2. *Tensions.* Any proposed research program represents a compromise between focus and breadth. Establishing priorities is not a formulaic procedure, but one that requires wisdom in weighing various criteria. It may be helpful to note a number of points that arose in our deliberations as we tried to establish priorities.
 - *Tension between focusing on a specific age range versus a wider age range.* We discussed at some length the value of focusing our questions more specifically on a particular age range, for example, on kindergarten through grade 3, where most current reading reform efforts are targeted, or on the middle and high school grades, where practitioners are most concerned with effective reading comprehension instruction. We chose not to limit the age range of interest for a number of reasons. First, we did not wish to suggest that reading comprehension should be ignored in reading instruction in the primary grades; many accomplishments of kindergarten, grade 1, and grade 2 readers are directly relevant to current and future comprehension success, as are accomplishments in lan-

guage even of preschool-age children. Second, in recognizing the practical challenges facing the content area teacher in middle and secondary school classes, and the degree to which those challenges are intricately related to reading comprehension, we did not wish to downplay the importance of research on this age range. Third, our conceptualization of reading comprehension is inherently developmental, encompassing precursors that develop in the preschool and primary school years as well as outcomes displayed in secondary school. This conception precludes restricting the age range of interest.

- *Tension between priorities derived from our analysis of research and practice and priorities determined by other factors.* We recognize that competing priorities exist within any research program. For example, priorities are derived from political realities, are associated with the availability of fiscal and human resources, are limited by the practicalities of certain kinds of research undertakings, and are related to the likelihood that results will actually be used to change practice. The group that produced this report limited itself to thinking about what the education community needs to know. Obviously, the ultimately selected research agenda will also need to incorporate the effects of other factors in selecting research targets.
- *Tension between research that is well embedded in existing knowledge and theory and research that is truly innovative.* Researchers want to generate novel conceptualizations and revolutionary findings. Practice is often better served by smaller increments to our knowledge, such as knowing whether a student's comprehension of a text read in English is enhanced or impeded by discussing the meaning in the student's first language or deciding whether vocabulary instruction should incorporate writing sentences with the new words. Since the utility of knowledge is a major criterion, we obviously endorse research efforts that will generate modest increments to the quality of practice. At the same time, research efforts laying down the basis for future improvements in practice in domains that are not yet close to practical utility should not be ignored.
- *Tension between immediate payoff and longer-term research efforts.* Although research priorities tend to be attached to questions or problems, planning a research effort requires thinking about a packet of activities that fit together and address practical as well as intellectual issues. Thus, we suggest that those conducting the research planning effort consider a strategy for soliciting short-term and long-term projects simultaneously. Short-term projects, such as evaluating well-founded instructional interventions, could generate useful outcomes relatively quickly. Long-

term undertakings could be designed to underpin future improvements in practice by expanding the education community's basic understanding of reading comprehension. For example, a multisite, large-scale longitudinal study of reading comprehension development would be a long-term project. The entire research effort needs to be strategic and orchestrated. Although some of its components will have no immediate payoff, an understanding of how they might contribute ultimately to improving practice should always be required.

- *Tension between preplanned and emergent research priorities.* The RRSG achieved a remarkable degree of consensus on the formulation of issues in reading comprehension. It did not conclude, though, that its report should be an unfiltered basis for soliciting research proposals, in part because we agreed on the need to let the quality of research proposed partly determine the research priorities. Bad research on an extremely important topic is not likely to advance the field as much as excellent research on a slightly less pressing topic. Thus, we suggest that any solicitation of proposals be formulated with enough flexibility to allow the field to demonstrate what it can do well, while maintaining sufficient focus so that a coherent research program develops.

Building on Strengths

The quality of reading instruction in the primary grades in U.S. schools has benefited from the products of a 25-year program of research focused on understanding the development of word reading and on formulating interventions for children experiencing difficulties in word reading. We propose a focus on reading comprehension in part to build on these improvements in educational practice and in part to build a stronger research base for improving practice in preschool settings. It is clear that the benefits to reading outcomes 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 factors that contribute to comprehension. Such instruction is crucial even in the preschool years for children whose oral language skills are limited, and improved instruction needs to continue throughout the school years. Thus, the focus on reading comprehension we propose complements the currently funded research agenda on word reading, while benefiting from the advances the current research has made possible.

Improving the Status of Educational Research

Before an educational research program can demand support, it must address widespread doubts concerning the quality, relevance, and usefulness of its research. Therefore, educational funders should base their funding decisions not only on the intellectual credibility of a program but also on its practical utility. We suggest that the field of reading research take at least three steps to promote that effort.

1. *Ensure programmatic efforts.* High-utility research efforts are planned as long-term and cumulative undertakings. Changes in practice should not depend on the results of a single study or an attractive new idea; they should be based on well-replicated findings consistent with broader theoretical understandings. This presupposes a process to ensure that the research builds on previous findings and that the results of the various related research efforts are systematically accumulated, reviewed, and analyzed. These cumulative analyses should then become the subject of dissemination and the basis for changes in practice. Of course, the likelihood that research efforts will build on and inform one another is greatly enhanced if efforts are taken to build a collaborative community of researchers.
2. *Develop a community of researchers.* Research relevant to reading comprehension has been carried out within a variety of disciplines (linguistics, sociolinguistics, discourse processing, anthropology, psychology, and cognitive science) and by individuals working in quite distinct fields. In addition, the field of reading itself is sociologically somewhat complex, as emblemized by the existence of several organizations of reading researchers (International Reading Association, National Reading Conference, Society for the Scientific Study of Reading) with only partially overlapping membership and by strong constituencies of reading researchers within other organizations (American Educational Research Association, Society for Text and Discourse, Society for Research in Child Development). Making progress in reading comprehension research will require creating links across the now distinct subfields and subgroups. We suggest below that well-designed proposal review procedures can contribute substantially to forming a community of reading researchers linked by their common intellectual focus.
3. *Make both research- and practice-based knowledge optimally usable for all.* The challenge of improving reading comprehension is intrinsically a practical challenge, and reflective practitioners constitute a source of knowledge that is insufficiently represented in journals or in research proposals. If work on reading comprehension is to affect practice within our lifetimes, the concerns of practitioners need to be incorporated from the beginning. The work

must be seen as operating in Pasteur's quadrant¹ rather than as being exported to schools after the research papers are published. Mechanisms for distinguishing excellent from mediocre practice, for reviewing and accumulating the knowledge of effective practitioners, and for incorporating practitioner expertise into the research process need to be developed and nurtured.

METHODS APPROPRIATE TO THE TASK

The RRSG considered at length the issue of methodologies that are necessary to address the research questions identified by the committee. There was consensus among the members that a range of methodologies was not only necessary but also essential to ensuring rigorous responses to the various research questions. Further, the field of educational research possesses a diverse array of well-formulated, widely used methods for the conduct of rigorous research. Methods that have proven useful to advancing educational research include (1) experimental and quasi-experimental designs (Pedhazur & Schmelkin, 1991); (2) structural equation modeling (Nevitt & Hancock, 2000); (3) hierarchical linear modeling (Lee, 2000); (4) meta-analysis in experimental research (Schafer, 1999); (5) discourse analysis (Cazden, 1988); (6) video analysis (Stigler, Galimore, & Hiebert, 2000); (7) classroom observational analysis (Turner & Meyer, 2000); and (8) verbal protocol analysis (Pressley & Afflerbach, 1995).

The body of knowledge about instruction in reading comprehension has been informed by a wide range of research methods. The power of this diversity is that converging evidence now exists for a substantial majority of the claims presented above regarding the principles of instructional practice. The principle that explicit strategy instruction increases comprehension is supported by two quite different forms of empirical studies. For example, the NRP (2000) summarized experiments showing the effects of instruction on the learning of strategies and on reading comprehension. To complement that evidence, case studies of teachers nominated as outstanding also report that these exemplary teachers provide explicit strategy instruction within the classroom context (Pressley et al., 2001). However, these examples do not imply that our knowledge is completely formed on this principle. For example, the conditions for the use of strategies are not fully explicated in either the experimental literature or the case study literature. However, this convergence does suggest that strategy

¹Pasteur's quadrant refers to the quadrant of research defined by simultaneous contribution to basic and applied problems. Pasteur's contributions to the understanding of infection and contamination constituted theoretical breakthroughs at the same time that they also formed a basis for fighting disease and promoting public health.

instruction is a promising starting point for new research on reading comprehension instruction.

Statistical modeling has been advanced to permit the examination of critical aspects of complex problems such as reading comprehension instruction. For instance, structural equation modeling (SEM) allows investigators to study latent variables. Such variables represent the shared variance (e.g., the essential overlap in measurement) between two measured constructs. This is especially useful in reading comprehension research because valid and reliable measures of instructional variables, such as strategy instruction or autonomy support, are in the process of being developed. Further, SEM permits the study of mediation among classroom constructs, student characteristics, and student achievement outcomes. Hierarchical linear modeling (HLM) increases our capacity to study the effects of instruction on reading comprehension by permitting the investigator to eliminate variance in achievement attributable to unwanted sources (Lee, 2000). Especially with large data sets, or with quasi-experimental designs, variance in outcome variables that is not experimentally controlled can be statistically removed from the classroom instructional effects that are of theoretical importance. Both SEM and HLM permit investigators to form growth variables reflecting the slope and curvature of student improvement in reading comprehension or allied variables, such as reading motivation or content knowledge gained from reading.

To complement strong statistical modeling, in-depth analysis techniques permit investigators to examine the cognitive processes of readers through verbal protocol analysis (Pressley & Afflerbach, 1995). In this procedure, students think aloud while reading, and their verbal reports are examined for the qualities of their cognitive self-regulation and other higher-order thinking activities. As procedures for analyzing videotapes have advanced, widely shared guidelines for collecting, transcribing, interpreting, coding, and analyzing data have become available (Erickson, 1992; Stigler et al., 1999). These data are multivariate and interactionist. They can convey the complexity of classroom instruction. However, videotapes are necessarily limited to a few classrooms. When such data are linked to national (or state) probability samples, they can reveal generalizable patterns of instruction. Such patterns represent both the depth of classroom instruction and the breadth of generalization for the findings. Thus, methodological tools that are readily accessible to all investigators permit a diversity of approaches to research, as required in the multifaceted field of reading comprehension instruction.

Further, any substantial research effort will likely need to involve a combination of different approaches and different types of data requiring adherence to multiple evidentiary standards. In the interest of rigor, it is imperative that the methodology selected to address a research question be driven by the question

itself and not by arbitrary judgments that some methods are stronger than others. For that matter, it is also not possible to make clear-cut divisions across types of methodologies, for a number of reasons:

- Classes of methodologies overlap to a large extent.
- There is no intrinsic ranking of values associated with any particular methodology.
- High levels of rigor can be defined for any form of disciplined inquiry, whether classified as qualitative or quantitative.
- Methodologies can be assessed only with reference to the research questions they are being used to answer.

Among quantitatively oriented studies, true experiments, of course, represent an ideal methodology for assessing the effect of instruction or intervention. True experiments are sometimes not feasible, though, since their successful implementation requires a set of conditions that cannot always be met in educational settings. In these cases, well-controlled quasi-experiments provide a standard of evidence that, although not as high as that of true experiments, is acceptable. Quantitative studies, including program evaluations, are typically enriched by the inclusion of methods that simultaneously provide descriptive and correlational data on, for example, the interaction of learner characteristics and response to intervention. Similarly, some methodologies that are qualitative and observational may have strong quantitative components, such as the observation and coding of classroom teaching behaviors in a time-by-activity framework essential to evaluating the effects of instructional strategies on student achievement.

Some questions call for ethnographic methods. For example, how do teachers and principals respond to the introduction of a new reading comprehension intervention into a school? Qualitative methods are often the most appropriate ones when the goal is discovery. For example, in-depth qualitative studies on bilingual students' use of metacognitive and cognitive strategies while reading in two languages have generated information on their reading that would have been otherwise difficult to obtain. Qualitative methods are also highly desirable when in-depth information is needed about important components of an intervention's functioning. Such information may illuminate, for example, whether the intervention is likely to be undermined or supported within a school. In addition, qualitative methods are useful for providing a cultural perspective on why certain groups respond the way they do to instruction, or for describing how teachers' practices differentially affect students' reading engagement and performance.

Thus, scientifically rigorous research studies use methods appropriate to the research questions of interest. In many instances, multiple methodologies blend descriptive, correlational, and experimental methods in the more quantitative area with a range of qualitative methods essential to addressing the questions of interest. It is also possible that the appropriate methodology of interest will be predominantly one or another type, although there is substantial variability in the characteristics of a single methodology that defies simply lumping methods into categories.

When multiple types of evidence can be cited in support of a particular conclusion, a greater capacity exists for building consensus, ensuring the translation of research to practice, and supporting the sustainability of research-based practices. We hope that one aspect of this research agenda will be to increase the receptivity of educational thinking to the value of rigorous research and to stimulate the active discussion of research methods and their appropriate application. A program of research, especially one structured across several years, is ideally characterized by procedures to guide selection of questions through a process of setting research priorities. Such a program also ensures that findings can be replicated, deepens understanding, charts progress, and assesses the degree of convergence across studies and research methods. The research program on reading comprehension that we propose here should be a model for effectively choosing and using appropriate and diverse methods.

THE RESEARCH INFRASTRUCTURE: ORGANIZING FOR PROGRAMMATIC RESEARCH ON READING COMPREHENSION

Procedures for getting from here to there also need to be in place. These procedures should at least encompass decisions about how Requests for Applications (RFAs) will be researched and written, who should serve on review panels, and how the accumulation of research findings will be monitored to serve as input to later RFAs.

To ensure that a long-term, large-scale initiative in reading comprehension research is successful, several infrastructure issues must be addressed. Concerns about the quality of educational research and the oversight of projects in the field are widespread. Efforts to extend these resources by collaborations across research entities have enhanced the educational research mission and reflect the judicious use of resources by all the agencies involved in these efforts. Such efforts should be extended, no matter what changes in the organizational structure for education research funding might be undertaken.

1. *Leadership and professionalism.* For this initiative to be successful, the RRSRG recommends the following steps to ensure intellectual leadership and long-term planning:

- A director should be named to oversee this initiative and related reading research projects.
- The director should interact and collaborate with individuals across the various federal research entities involved with reading research.
- The director should interact with the field, help develop proposals, and help synthesize the knowledge base that will emanate from this and other federally sponsored reading research initiatives.
- The director should not be responsible for review.

As part of this implementation, criteria for evaluating research proposals and procedures for training reviewers and evaluating the quality of reviews need to be developed. A standing review panel with staggered, long-term appointments should be established. Panel members should have expertise that reflects the diversity of the research projects and the methodologies that this initiative is likely to attract. Creating this panel will help to establish continuity in review as well as to possibly provide an advisory component to the reading research program proposed here. This approach to review will provide considerable feedback to investigators in the field, thus contributing to enhanced research expertise. By virtue of the diversity of expertise on the panel, collaborations among researchers with different perspectives will be encouraged. Ultimately, such collaborations will lead to the integration of knowledge across subdisciplines that is essential to advancing our knowledge about reading and instruction. Individuals with limited independent research experience should not be placed on the panel. No reviewer should be appointed to this panel without training and a trial period on the panel, and procedures for terminating reviewers who fail to discharge their responsibilities should be established.

2. *Coordination.* There is an urgent need to coordinate across current efforts, while letting agencies build on their comparative advantages and develop their own ecological niches. Each federal agency involved in educational research works with its own set of priorities and constraints. The National Institutes of Health (NIH), for example, are well positioned to fund intervention trials, but not to fund curriculum development. The National Science Foundation (NSF) has funded Research on Learning Environments and other valuable demonstration projects, but these have so far had limited effect on schools or curricula. The OERI has historically funded a wide array of efforts, including basic research, demonstrations, training, development, technical assistance, and dissemination projects; the payoff from OERI's flexibility has been undermined, though, by its traditionally low funding levels and its failure to focus on particular research topics. At present, funding for R&D ac-

tivities devoted to reading comprehension is lacking among federal agencies that support education research.

3. *Sustainability.* A fleeting, intermittent, underfunded, or token approach to research on reading comprehension will be a wasted effort. This problem needs sustained attention, support, and funding that cut across administrations and political constituencies. In our view, the size and scope of the effort and the depth of the commitment must be on a scale equal to federal efforts to cure cancer or to develop a network of communications satellites. A number of specific steps will support sustainability.
 - a. *Regular syntheses.* Procedures for accumulating, reviewing, and synthesizing knowledge developed through the funded research could be built into the funding effort. The review panel, or perhaps a panel of advisors to the entire research undertaking, might oversee these regular synthesis efforts.
 - b. *Talent development.* Sustaining the effort also depends on developing a cadre of well-trained investigators. Much of what we know today about reading comprehension comes from work carried out at the Center for the Study of Reading, which received funding in the late 1970s to mid-1980s. Many researchers active in the field today received their training at this center. A new generation of comprehension researchers is needed, however. To develop a cadre of investigators capable of high-quality research, the RRSR specifically recommends designing research training fellowships and developmental grant programs for young investigators, modeled perhaps on NIH's clinical- and young-investigator postdoctoral awards programs. The optimal training environments for young investigators would give them access to senior researchers from a variety of disciplines and would integrate access to first-rate research training with opportunities to learn about schools and classrooms in an authentic way.
 - c. *Coordinated solicitations.* Once a reading comprehension agenda is established, research should be solicited in a variety of formats, guided by the nature of the problems under investigation. Solicitations should reflect a long-term plan that incorporates a mix of short-term, medium-term, and long-term goals. The crafting of these solicitations should exhibit continuity, reflecting, for example, feedback on the success of earlier solicitations and the knowledge accumulated about the research agenda. The solicitations should reflect an attempt to coordinate across the efforts of various agencies and initiatives. Although field-initiated research should continue to receive support, it is critical that high-quality reading comprehension research be facilitated through carefully crafted initiatives that reflect the priorities identified in this report and the body of knowledge about reading comprehension that will emerge from this ini-

tiative. Different types of grants should be supported, including grants that support multiple connected projects around coherent central themes with collaborations among investigators that are of sufficient scale to address the complex issues involved in research on reading comprehension.

- d. *Development work.* To sustain and extend the research effort, a systematic procedure for fostering the development of curricula, software, and instructional programs also needs to be in place. Often the practices that rest on research fail to receive prompt distribution because publishers have not yet rewritten their textbooks to reflect those practices or because the professional development efforts for bringing them to scale are inadequate. Attention to publishing, to software development, and to procedures for influencing teacher educational and professional development is needed from the beginning of the research planning.
- e. *Sufficient funding.* The effort described in this report requires a significantly greater level of funding than is currently available for educational research. Improving reading comprehension outcomes in a systematic, research-based way will demand a substantial increase in basic knowledge about comprehension processes and large-scale efforts to implement and evaluate improved instructional, teacher preparation, and professional development programs. Urgent national priorities cannot be addressed without adequate resources. Significant federal funding has been appropriated to address such priorities as establishing satellite communications networks, fighting AIDS, curing cancer, and developing stealth bombers. Our view is that failures in reading comprehension are equally as urgent and equally as complicated; we cannot expect the educational equivalent of radar or the polio vaccine. Nor can we expect to make significant progress without a sum of money comparable to what is available for addressing other urgent national priorities. The U.S. government investment in R&D is between 2 and 3 percent of all national expenditures (gross domestic product). For example, in the areas of health, energy, and transportation, the United States invests between 2 and 3 percent of the budgeted dollars in R&D. In contrast, only 0.3 percent of the expenditures focused on K–12 education are spent on R&D (Office of Science and Technology, 1998). If, as a nation, we committed the same level of research-dollar funding to education research as we currently commit to other areas, reading comprehension outcomes could be substantially improved in the next 20 years.