
The Case for Improving Textbooks

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Good textbooks are more than attractive transmitters of information; they relate to students' lives, help students summarize and ask pertinent questions, use graphics judiciously to augment content, present concepts in a logical manner, and use appropriate vocabulary.

Commercially developed basal reading and content area programs are used extensively in American classrooms. Estimates from a number of classroom studies (Durkin, 1981; Barr and Dreeban, 1983; Mason and Osborn, 1983) indicate that the contents of basal reading programs account for a great deal of how time is spent during reading periods in elementary schools. Although the amount of classroom time devoted to published social studies, mathematics, and science programs is not as well documented, even the most cursory look into elementary school classrooms can lead an observer to conclude that published programs are used a lot.

Because published textbook programs are so pervasive in American schools and because they often, in effect, constitute a curriculum, it seems important for educators to raise some questions about these programs. For example, an educational researcher might ask, "How well do textbook programs represent the most recent and scientific knowledge of teaching and learning?" A teacher might ask,

"Just how important are good textbooks? Shouldn't a student be able to learn from just about anything?" A school administrator might pose the reasonable queries, "Just how good are published programs?" and "What about the publishers?" In this article, we discuss, but don't claim to fully answer, these questions.

Our discussion of these questions derives, for the most part, from the research on text and textbooks that has been conducted during the past decade. It is also based on our experi-

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ences with students and teachers and in analyzing and developing instructional programs. We have come to believe that improving textbook programs used in American schools is an essential step toward improving American schooling.

Are Research Findings Evident in Textbook Programs?

In discussing how the most recent and scientific knowledge about teaching and learning is represented in textbooks, we draw upon two cognitive theories that have implications for the development of reading comprehension: schema theory and metacognitive theory. Two additional topics of research have direct implications for instruction in reading comprehension: instructional design and learning strategies. Validating theories and ideas about teaching or learning involves translating theory into practice and testing its application in the real world of classrooms, teachers, and students. Each of the theories and topics we discuss has been validated by substantial empirical evidence, and each has important implications for the development of textbook programs.

Schema theory. According to the schema theorists, readers employ sets of schemas as they read. Schemas can be thought of as a reader's organized knowledge of the world or prior knowledge. The more related a read-

er's schemas are to the content and structure of the text being read, the more likely the reader is to comprehend, learn, and remember the information. R. C. Anderson (1984) writes, "A reader comprehends a message when he is able to bring to mind a schema that gives a good account of the objects and events described in the message." He describes reading as an interactive process that involves the reader in the simultaneous analysis of many different levels of many different processes: graphophonemic, morphemic, semantic, syntactic, pragmatic, and interpretive. To support his claims that a reader's schema affects both learning and remembering information and ideas in a text, Anderson proposes six hypotheses about the way in which schemas function in the processing of text:

1. Schemas provide "ideational scaffolding" for assimilating text information—that is, a reader's schemas provide a niche, or slot, for a piece of information.

2. Schemas provide the reader with a basis for determining importance in

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a text and the parts of the text to attend to most closely.

3. Schemas enable inferential elaboration; given that no text is completely explicit, a reader's schemas provide the basis for making inferences and for elaborating the meaning of a text.

4. Schemas allow orderly searches of memory and provide the reader with a guide to the types of information that need to be recalled.

5. Schemas facilitate the reader's editing and summarizing of what is being read.

6. Schemas permit a reader to reconstruct gaps in memory; the reader can use schema, along with text information, to generate hypotheses about missing information.

Anderson also proposes five implications of schema theory for reading instruction and for teaching reading in the content areas:

1. Teachers' manuals should include teaching suggestions designed to help children activate relevant knowledge before they start reading.

2. Teachers' manuals should include suggestions for building prerequisite knowledge.

3. Teachers' manuals should feature activities (for example, prediction techniques) that will lead readers to meaningfully integrate what they already know with what they are reading.

4. Publishers should employ devices (such as advance organizers) to highlight the structure of a text.

5. Researchers and the publishing industry (as well as teachers) should be aware of the strong effects of culture on comprehension, and not so confidently assume that children from different subcultures will bring common schemas to written material.

We propose some additional ideas for translating schema theory into practice. Textbooks should be written so that they utilize concepts and vocabulary, as well as structures of text, appropriate to the students reading them. And from this basis of "appropriateness," textbooks should be written to systematically move students to higher levels of concepts and vocabulary (and to more complex text struc-

tures), so that students will acquire schemas for reading increasingly difficult and demanding expository and narrative materials. We also propose that a fundamental reexamination of the "magazine" style of most basal reading programs is perhaps in order. The steady diet of short articles, short stories, and novel excerpts that is typical of basal reading programs may actually promote the *nonretention* of information and vocabulary, and prevent schema development. (Students in these programs do not have to remember very much for very long. This week's story about polar bears leads to next week's story about a captured princess in a castle in Spain.)

Metacognitive theory. Abundant research in the fields of reading and cognitive psychology provides support for a metacognitive theory that has important implications for teaching students to comprehend and learn new information. Metacognition refers to individuals' knowledge of, and control over, their own thinking and learning. It involves not only knowing what one does and does not know, but also knowing what to do when one fails to comprehend (Armbruster and others, 1983).

As a consequence of research on metacognition, we now have a clearer picture of the differences between immature (or unsuccessful) readers and more proficient readers. Successful readers know what strategies and resources are needed to perform a task effectively, and they engage in self-monitoring and remedial activities to ensure successful completion of the task. In contrast, immature readers characteristically lack the ability to monitor their understanding as they read and an ability to use what they know to direct remedial activities such as self-questioning and rereading. They are also less efficient at activating relevant prior knowledge so as to better understand the text; their ability to discriminate important from irrelevant sections of text appears to be fragile (Baker and Brown, 1984).

Of particular interest to educators are the findings that instruction in at least some metacognitive skills can

have a positive effect on student performance. In a number of training studies, students who were taught specific study strategies, such as summarizing and self-questioning, significantly increased their performance on criterion tasks (Day, 1980; Palincsar and Brown, 1984). The successful training studies all included instruction to heighten metacognitive awareness of the study situation and included teaching when, where, and how a strategy should be used.

Most reading programs now include a strand called "Reference and Study Skills" in their scope and sequence charts. However, the careful textbook program evaluator will find some problems: only rarely are metacognitive strategies clearly articulated to either the teacher or the students; the practice provided with a given strategy is insufficient to ensure its continued use; and the strategies included show signs of not being carefully field-tested. We suggest that metacognitive strategies be explained so that students will understand how to use them and that students be provided with a sufficient amount of practice so that the strategies can become functional. We also urge that the strategies be carefully field-tested.

Instructional Design. A large body of research that seems to be ignored all too often by those responsible for planning textbook programs comes from the area of instructional design. Instructional design theorists hold that the problems of many unsuccessful students are the result of ambiguous instruction and that such students achieve much greater success in carefully designed and rigorously field-tested programs.

During the past 20 years, the work of Gagne, Ausubel, Lauda, Markle, Bloom, and Engelmann has had both an indirect and a direct effect on program writers concerned with design of instruction. Some, but certainly not all, recently developed textbook programs reflect several of the tenets developed by one or more of these theorists. The many features, issues, and problems related to the design of instruction are beyond the scope of

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this article. However, we believe that the further development of the principles and practices of instructional design, as well as the assessment of the impact of “designed” instruction on student achievement, are of primary importance in this era of educational accountability.

Learning strategies. Learning strategies refer to the range of mental operations that are initiated, consciously or unconsciously, to facilitate comprehension and recall. A number of studies have examined the types and functions of student learning strategies (Rohwere, 1971; Jones and others, 1984). From these studies have emerged a lot of information about the varying learning strategies of good and poor readers. Beginning in the upper elementary grades, when curriculum objectives demand more abstract, inferential, and critical thinking, some students develop a repertoire of reading, learning, and thinking strategies with which they become increasingly proficient. By their late high school years, such students are equal to college students in their ability to learn from textbooks. Frequently, low-achieving students do not appear to develop such strategies. Rather, their scores on reading and strategy tests may actually decline after grade six, so that by the end of high school there are marked comprehension and learning differences between high- and low-achieving students. There is evidence that strategy training improves the performance of low-achieving students for learning words, sentences, prose, geometric figures, terms and definitions, names and events, and concepts. Moreover, low-achieving students can be trained to use a variety of strategies including visualizing, categorizing, structuring, outlining, and inferencing.

Not all strategy training is successful, however. Jones (1980) conducted an analysis of the strategy training in studies in which students were successful and those in which students were not successful. She found that the studies in which students failed to improve employed only very generalized strategy instruction. The studies

in which the students achieved the greatest success were characterized by procedures that (1) defined the strategies specifically, (2) provided step-by-step instructions in how to use the strategies, (3) built in opportunities for practice with feedback and corrections, and (4) informed the students when to use a strategy.

These findings are consistent with those of the metacognitive researchers who found that low-achieving students required training beyond that initially planned, and that they needed to be taught when to apply a strategy. These researchers also found it necessary to fade out the level of strategy instruction so that students would take responsibility for their own learning and use the strategies independently (Brown and others, 1981). We believe such findings have important implications for authors and writers of textbook programs.

How Important Are Good Textbooks?

While there may be people who believe that students should be able to learn from just about anything, a number of researchers have found that the more organized and readable a text, the more students will learn from it. Some researchers have labeled a text that is well organized and readable as “considerate” to its audience. An “inconsiderate” text, by contrast, requires the reader to organize its content and establish relationships between parts of the content; as a result, readers are steered away from concentrating on the text’s content. Several elements affect student comprehension of content; these include text structure, coherence, unity, audience, appropriateness, and graphics.

Text structure. Although many factors contribute to make a text considerate, two are outstanding: structure and coherence. Armbruster (1984) uses the idea of text structure to describe the arrangement of ideas in a text, and the nature of the relationships connecting the ideas. She lists some of the text structures identified by rhetoricians, linguists, and psycholo-

gists that appear to capture some fundamental patterns of human thought:

(1) *simple-listing*—a listing of items or ideas where the order of presentation of the items is not significant;

(2) *comparison/contrast*—a description of similarities and differences between two or more things;

(3) *temporal sequence*—a sequential relationship between ideas or events considered in terms of the passage of time;

(4) *cause/effect*—an interaction between at least two ideas or events, one considered a cause or reason and the other an effect or result;

(5) *problem/solution*—similar to the cause/effect pattern in that two factors interact, one citing a problem and the other a solution to that problem (Armbruster, 1984, p. 203).

Another approach to defining text structures is to identify structures that are somewhat more specialized, that is, appropriate for particular types of texts. Story grammars have been developed to specify the relationships among the story elements that underlie narratives. One story grammar (Stein, 1978) describes story elements in the following order: setting, characters, conflict, resolution. The contention of a large group of people doing research about learning from text is that students will learn more readily from textbooks with stories that follow common story grammars. Studies done with large numbers of students of differing ages (Stein and Glenn, 1979) conclude that when story content is organized according to a well-known story grammar, memory for the story is better than when the presentation of these elements is altered.¹

Numerous researchers have concluded that well-organized expository text not only contributes to comprehension but also facilitates the total amount recalled after reading a text, as well as the extent to which recall is organized (Meyer and others, 1980; Meyer and McConkie, 1973). In the early 1970s a series of passage organization studies was devised to compare the effects of organized and unorganized text structures (see Shimmerlik, 1978, for a summary of these studies). These studies were consistent in demonstrating that organized text greatly facilitates memory for both the detail

and organization of the text content. Similar results occurred in other studies comparing different types of text. Meyer and McConkie found that students recalled elements of logical structures in expository prose not only in immediate recall but also in delayed recall. Meyer and others (1980) found that good readers had high recall regardless of how the text was organized, but underachievers (readers with adequate vocabulary but poor comprehension) had good comprehension *only* with well-organized texts. This research seems to demonstrate that good readers have strategies that poor readers do not possess for dealing with poorly organized texts. The research also suggests, however, that lower achieving students do not benefit from well-organized texts. We suggest that writers of textbook programs need to be aware of the importance of text structure—that is, how ideas in text are arranged—and, when appropriate, make the structure of the text explicit.

Coherence. Armbruster (1985) defines coherence as the "flow" of ideas in text and refers to both global and local coherence. Global coherence is the integration of ideas across whole chapters of lessons. Introductions, overviews, summaries, and visual displays or diagrams contribute to global coherence. Local coherence refers to the flow of ideas at the paragraph and

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sentence level. The signaling devices of expository text, such as headings, subheadings, and the use of numbers and letters for enumeration of specific points, are signs of local coherence.

Titles can have an important effect on comprehension as can visual displays, diagrams, and charts. Armbruster reports that the explicit use of connectives, repeated references and concepts that help to carry meaning across sentence boundaries, also can enhance local comprehension. She offers three guidelines for making expository text coherent:

1. Explicitly state the relationships among ideas.
2. Make anaphoric references clear.
3. In descriptions of temporal sequences and processes and in explanations, order the ideas in one direction only—from the earliest to the latest, the simplest to the most complex, and so on.

Unity and audience appropriateness. In addition to structure and coherence, Armbruster and Anderson (1981) propose two more factors that authors of text should consider when writing textbooks for students. These are unity and audience appropriateness. Unity refers to purpose. Text that addresses a single or unified purpose and does not stray from that purpose by including irrelevant and distracting information is a unified text. Audience appropriateness considers the knowledge base of readers; that is, their familiarity with a topic and the complexity of concepts, sentence structure, length, and vocabulary.

Good writers quite naturally worry about unity and audience appropriateness. We suggest that publishers should permit their writers to deal with these worries and *not* burden

them with additional demands that make it impossible for them to write unified and audience-appropriate texts.

Graphics. Pictures, layout, charts, and tables can be thought of as special types of text that may be considerate or inconsiderate in much the same way as prose text. Some studies indicate that graphics facilitate comprehension, while others indicate the opposite effect. Close examination of these studies, however, indicates that pictures closely integrated with the meaning of the text may markedly increase comprehension while those that are not directly relevant or are unclear may actually decrease comprehension (Levin and Lesgold, 1978; Schallert, 1980).

Common sense prescribes that publishers should be careful as they select graphics for inclusion in textbooks. Our observation is that graphics in texts are almost always attractive; however, we suspect they may not always be functional and that they occasionally overwhelm and distract from the text.

Analysis of Existing Textbook Programs

Although the textbooks students use have been analyzed rather extensively, there has been surprisingly little research about teachers' manuals and students' practice materials. Nevertheless, a review of recent research about student and teacher materials should lead school administrators to consider the quality of their textbook programs.

Readability formulas. Readability formulas were created to help authors, editors, and teachers assess the difficulty of student texts. Standard readability formulas are measures of sentence length and the complexity, unfamiliarity, or length of vocabulary items. Davison (1984) and her colleagues compared "original text" (from magazines and books) and the same texts rewritten to conform to readability formulas. She comments that the rewritten texts "do their bit to lower the vocabulary scores and sentence length" but notes that the effect of the change may be contradictory. For example, paraphrasing hard vo-

cabulary can lengthen a sentence and add subordinate clauses to it; dividing long sentences into two or more shorter sentences may require a reader to make *more* inferences because the connecting words that relate the parts of a long sentence often get lost when the sentence is divided. Davison observes that such changes can seriously distort the logical relations between the parts of a text, disrupt the presentation of ideas, and make it difficult or impossible to convey the meaning of an original text. She concludes that, although steeped in tradition and simple and cheap for both publishers and school districts to use, readability formulas may have a harmful and negative effect on texts that are written (and rewritten) for classroom use. Davison advises that informed subjective judgment and classroom tryout of texts should accompany, if not replace, the current ubiquitous use of readability formulas.

Narratives in basal readers. Basal reading programs are developed to prepare students for the challenges of "real-life" reading. What are the characteristics of basal readers, and do they prepare students to read "real" books?

In a study comparing characteristics of basal reader stories with those of trade book stories, Bruce (1984) found a number of differences between the two groups, and concluded that publishers of basal programs should expand the range of story types they include in their readers. Children reading in basal readers are not exposed to many of the story types they will encounter in "real-life" reading. Bruce identifies characteristics of trade books that are lacking in basal stories; for example, in trade books, there is more interpersonal and internal conflict, more information about the protagonist's point of view, and more first person narration. Bruce also points out that an awareness of a text's characteristics—with respect to features such as conflict, inside view, and rhetorical structure—should influence how the text is presented, what questions are asked of the student, and what difficulties or responses to expect.

Science and social studies. Although research about narratives has been carried out for a number of years, research about the characteristics of content area texts is more recent. Anderson and others (1980), in analyzing social studies and science texts, found many instances of unclear text. They point out that the effect of poor quality text on how much content area knowledge students acquire in the elementary grades may *not* be very great, primarily because many teachers do not use these textbooks as the primary learning source (but rather emphasize learning by doing, discussing, watching movies, or listening to the teacher). They suggest that poor quality texts may contribute to nonuse of texts in the early grades, but are more concerned about the effects of poor quality texts on how upper grade students learn to comprehend information from text.

Vocabulary texts. Vocabulary texts (glossaries and dictionaries) may be difficult to learn from because they provide little information to link unknown words to students' prior knowledge, and so little elaboration for each word. Anderson and Jones (1981) identified some effective instructional strategies for teaching word meanings that include using the domain of the word, the critical features of the definition, examples and nonexamples of the word, and its use in sentence contexts. Jones (1983) examined glossaries from social studies texts and dictionaries widely used in elementary schools and found that they provided sentence contexts or examples. But she also found that the definitions were seldom broken down into critical features, and that the domain was infrequently specified (except by the occasional reference to synonyms, many of which were unfamiliar words). She documented the all too familiar tendency of dictionaries to define one unfamiliar word with another unfamiliar word. (*A mesa*, for example, may be defined as a *butte*). Jones asserts that many words are much easier to understand when illustrated, yet found few pictures in the glossaries and dictionaries she examined.

Teachers' manuals. Durkin (1981, 1984) looked at the teachers' manuals associated with basal reading programs. In her analysis of comprehension instruction in the teachers' manuals of five basal reading programs, she categorized suggestions to teachers as instruction, review, application, and practice. She recorded the number of suggestions in each category and gave examples of their quality. She found, for example, that when manuals specify comprehension instruction, the instructions are often vague and unclear and, even of more concern, "they offer precise help (e.g., obvious answers to assessment questions) when it is least needed, but they are obscure or silent when specific help is likely to be required" (p. 31). Her observations about review are not encouraging: "the frequency with which information or a skill is reviewed appears to have no connection with difficulty or importance for reading. Instead, the amount of review in all the series seemed more like the product of random behavior than of a pre-established plan" (p. 35). Her comments on application and practice are no less distressing.

Publishers have not ignored the Durkin study. The basal programs she examined are now in new editions that textbook evaluators should examine carefully. Furthermore, other reading programs are available, some of which do not follow the traditional format of those programs she examined. The conclusions of her study, however, should prompt teachers and administrators to take seriously the task of examining textbook programs they contemplate using.

Student practice materials. A number of classroom observation studies have indicated that most teachers follow teachers' manuals—some carefully and some much less carefully. Some of these studies (L. Anderson, 1984; Mason and Osborn, 1983; Fisher and others, 1978) indicate that students spend a lot of time working in workbooks and other practice materials. The results of one classroom study (Mason and Osborn, 1983) revealed that the students spent as much or

more time with practice materials as they did with their teachers.

Given the extensive use of workbook type tasks, what are the characteristics of these tasks? In an analysis of workbooks associated with basal reading programs, Osborn (1984) found many troublesome workbook tasks. The workbook tasks in some programs had very little or nothing to do with what was going on in the rest of the program; the directions were often unclear, obscure, or unnecessarily lengthy; many of the tasks were trivial and had little to do with reading or writing. On the other hand, some of the most important tasks were presented only once or twice in an entire book, thus serving merely to expose students to a concept or skill rather than to permit meaningful practice. The vocabulary of the workbooks was sometimes more complex than that of the rest of the program; the art and page layouts were often confusing. Osborn found very little "systematic and cumulative" review of what is taught in a program represented in the corresponding workbook. Although she found examples of well-constructed tasks, she concluded that "workbooks are the forgotten children of basal programs," and urged publishers and teachers to attend to the problems inherent in these practice materials.

We think this review of student and teacher components of textbook programs should make school administrators a little nervous, particularly if they have in their charge a lot of students *not* progressing through school at an acceptable rate. We also think this information should lead all educators concerned with issues of quality in textbook programs to ask questions of the publishers of educational programs.

What Is the Role of Publishers?

The task of the publishers of textbook programs is a complex one: they produce programs that have an important educational function. On the other hand, they are in business and must develop products their customers will buy. Competition among publishers

probably contributes to their concerns about being "different" and their caution about making changes. This caution affects the likelihood that findings from new lines of research and practice will be translated readily into textbook programs. We agree completely that sometimes caution about the new and the latest is warranted. But we observe that even when the research and practice implies reasonable changes in textbook programs, publishers are frequently reluctant to incorporate the changes until their customers begin to ask for them.

We hope that educational consumers—teachers and school administrators—will take a deeper interest in the textbook programs used in our schools and join with educational researchers and publishers to improve these programs. We believe that teachers should have access to the very best tools to help them in their onerous and honorable task of educating young people. □

"Stories that are written according to the structure of a story grammar may enhance comprehension. However, we should also like to cite the research that points out that stories that merely conform to the structure of a story grammar are not necessarily interesting stories. Children like stories that contain elements of surprise and suspense. Younger children prefer stories with happy endings. By 5th grade, though, children like their stories to reflect a just world, in which the good get rewarded and the bad get punished (Jose and Brewer, 1984).

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