

Why Students Aren't Learning Very Much from Textbooks

Publishers won't produce better textbooks *until* selection committees become more discerning and demanding about quality.

Photograph by Kate Leone



Eminent researchers and scholarly organizations frequently report on the appalling ignorance of school-age American youth of important concepts and knowledge in economics, history, geography, or science (Cheney 1988, Ravitch and Finn 1987). The culprits named as accomplices to this embarrassing state of affairs are many, but textbooks are often identified as a major contributor to the general fund of ignorance.

Yet textbooks are a pervasive feature of American classrooms. Numerous studies report that textbooks structure from 75 to 90 percent of classroom instruction.¹ In most subject areas, textbooks define the scope and sequence of instruction, and the accompanying teacher guides (especially at the elementary school level) provide a road map from which few teachers make major detours.

The Messenger, Not the Message

Textbooks, of course, are the messengers, not the message. Publishers do not usually originate textbook content but, rather, reflect the curriculum re-

quirements of a dozen or more of the most populous states and cities. While the *core* content and instructional techniques in textbooks change little from decade to decade, market demands result in layer upon layer of new content and special features. New material—such as the election of President Bush in social studies books, elaborate scope-and-sequence charts required by major adoption states, or stunning pictures of recent events—give the impression that textbooks meet the high criteria of a demanding market. This impression is reinforced when education officials in adoption states proudly announce that publishers have produced new textbooks that match their curriculum demands. On the face of it, though, these claims seem dubious when other states and localities also find that textbooks match their curriculum needs, especially when virtually all school systems select from the same limited pool.

It is not surprising, then, that American textbooks have become compendiums of topics, none of which are treated in much depth. The aggregate volume of material required by many states and localities simply cannot be put into a standard-sized textbook unless the material is compressed to the point of incomprehensibility (Tyson-Bernstein 1988, Tyson-Bernstein and Woodward 1986). It is understandable that only 60 percent of the students who took the National Assessment of Educational Progress assessment, of American history understood the Constitutional system of checks and balances (Applebee et al. 1987). This important concept is usually "covered" in a drab paragraph or two, which

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does not allow the author to tell a story that would vivify the principle and fix it in the student's memory. Textbook authors simply cannot consume that much space for one topic alone because myriad other topics must be included to "match" so many state and local curriculums and, thus, sell the book to officials who are demanding "quality" textbooks.²

Next we look at what's wrong with textbooks in science and in social studies and history and, later, at what we can do to remedy the situation.

Science Textbooks

Practical-minded Americans may debunk the necessity of knowing who wrote *Moby Dick* or where the Caspian Sea is located, but few of them would claim that scientific ignorance is good for students' job prospects or for the future of the American economy. Yet student knowledge of basic science is low and getting lower, despite widespread mandates for more science course-taking. For example, a recent study showed that among 13 industrialized countries, U.S. high school students scored 9th in physics, 11th in chemistry, and dead-last in biology (International Association for the Evaluation of Educational Achievement 1988).

Deficits in teacher preparation in the sciences are a major problem in science education, but it is clear that only a small percentage of highly motivated students would be able to learn independently from available books. Market pressures have produced encyclopedic textbooks that purport to fulfill every curriculum content coverage requirement. Hurd (in Rothman 1988) has called biology textbooks "the most beautifully illustrated dictionaries we have." In a study of science textbooks for grades 6-9, Hurd (et al. 1981) found that they contained as many as 2,500 new and unfamiliar words—double what could be expected in a foreign language text for the same grades. Yager's (1983) study of 25 K-12 science textbooks found that one 6th grade text contained 3,400 specialized or technical words, a junior high text contained 4,600, and a high school biology textbook contained 9,900.

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But the problems with science textbooks involve matters much more fundamental than excessive vocabulary. Pauling (1983) found that first-year college and secondary school chemistry books included tremendous amounts of material, especially about atomic physics and molecular structure, but that these topics were treated from a theoretical, rather than a descriptive, perspective. He noted:

This is far more information than any student could be expected to learn and to understand in one year. Moreover, much of it is presented at so advanced a level—yet at the same time so superficially—that I think it could hardly be understood by a beginning student (p. 26).

Pauling's findings are echoed by Gabel (1983), who compared the changes in Holt's *Modern Chemistry* from 1958-1978, focusing particularly on chapters dealing with atomic theory, periodic law, and bonding. She found that while the length of the textbooks decreased, little content was deleted and much added. She also found increasing abstraction and a reliance on formulas without descriptive written introductions.

Perhaps the most damning findings are those concerning the failure of textbooks to expose students adequately to the processes of scientific inquiry. In their analysis of nine elementary science series published in the early 1980s, Elliott and Nagel (1987) found that in each, the emphasis was on the *products* of science rather than on its nature or processes. Little attention was given to the funda-

mentals of scientific inquiry, the attitude of objectivity, or the reality that some scientific investigations are dead-end pursuits.

In biology and life science textbooks, there is the additional complicating factor of the Fundamentalist influence on educational decision makers in the most powerful textbook adoption states. Fearing the wrath of creationists, adoption states (Texas, for example) give publishers mixed messages about what they want. Although organic evolution is the central organizing principle of modern biology, most textbook publishers relegate the subject to a discrete chapter at the end of the book or else confuse the issue with ambiguous language or contradictory statements. (The newly published *Holt Modern Biology* is a welcome exception—it has received favorable reviews from leading scientists.) When organic evolution is avoided, biology is reduced to a rubble of meaningless facts. Unless the student understands how classification relates to evolutionary relationships, the study of taxonomy, which occupies much of the space in biology books, becomes pointless drudgery.

In a recent study of student understanding of evolution, Bishop and Anderson (in press) asked successful college juniors and seniors enrolled in a Michigan State University non-majors' biology course to answer some simple questions (in sentence form), including the following: "Cheetahs (large African cats) are able to run faster than 60 miles per hour when chasing prey. How would a biologist explain *how* the ability to run fast evolved in cheetahs?" The students' answers were uniformly wrong. Most of them revealed a belief in the notion that a cheetah can develop a better skeleton or learn to run faster, because of its "need" to change in response to its environment—perhaps an application of the charming (and widely believed) myth that the giraffe "grew" a long neck because it "needed" to eat the leaves on the tops of trees.

We may suppose that these students entered 10th grade biology with the "giraffe model" firmly implanted in their minds; but how did they keep that model intact during high school,

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and even during most of a college biology course? Didn't their teachers or textbooks *tell* them that nature throws up random variations (a few cheetahs, here or there, whose individual traits of anatomy and physiology helped them to run faster)? And that *those* cheetahs were more successful in various aspects of life and therefore left more offspring? Probably the textbook did mention something about random variations and natural selection, but the mechanism was so badly and briefly explained that the students whizzed by it without real understanding. By asking students to write sentences, rather than check boxes, Bishop and Anderson discovered not only the students' ignorance of this, the most central idea in biology, but, more important, the ways in which schools conceal from themselves the fact that students aren't learning very much: multiple-choice tests can often be answered correctly by students who don't understand the material. The students' confused explanations show that they were trying, with difficulty, to remember facts (what textbooks offer and tests assess) but lacked the concepts and principles (what textbooks and tests usually avoid) that make facts memorable or allow for a meaningful interpretation of the world.

Social Studies and History Textbooks

In recent years, much has been written about the poor quality of social studies and history textbooks. The criticism has been especially severe because

textbooks fail to interest students in a subject that many critics see as inherently interesting, even exciting.

The banal content of elementary social studies books gets children off to a bad start. Young children are bored by these books because they discuss things they already know—that people live in families, that they buy food at the store, that fire engines respond to fires, or that rush hour is busy (Larkins et al. 1987). The picture of a young boy trailing his mother around a supermarket reading a trade book on knights and chivalry (reported in this journal in 1985 by Elliott et al.) suggests elementary-age children are naturally curious about the past and that the standard fare in school fails to capitalize on their curiosity. The emptiness of these books and the lost opportunities to teach some history when children would relish it have led Ravitch (1987) and others (Shaughnessy and Haladyna 1985) to call for changes in the existing curriculum. Perhaps, then, we should not be surprised that students perform poorly on tests of their knowledge of social studies and history.

A minimum requirement for textbooks, it seems to us, is that they represent the knowledge in a discipline with reasonable accuracy. Yet in the case of geography (a subject on which American students are conspicuously uninformed), it can take as long as 25 years for new knowledge in the field to work its way into the textbooks. The lag time is illustrated in Newitt's (1984) careful study of the treatment of limits-to-growth issues in 63 geography, history, economics, and civics textbooks. She found statistical and conceptual inaccuracies and gross overstatements of global hunger problems and world population growth. For example, many textbooks discussed the population "explosion" without reporting that population growth had been declining since the 1960s.

Although the failure of textbooks to keep up with new knowledge may account for student's misinformation on a few topics, their lack of historical knowledge can be attributed mainly to inaccuracies caused by excessive compression of text and by misconcep-

tions fostered through the avoidance of controversial issues. As Gagnon's (1987) analysis of world history illustrates, the textbooks' emphasis on coverage means that almost every major topic receives short shrift. With so much material omitted, students gain little sense of the development of democracy and the principles on which it is based.

Most history textbooks feature colorful charts showing the timing of historical events, but the prose itself is so colorless and thin that students are not able to fasten events to the eras in which they occurred. As Sewall (1988) notes, the ahistoricism of many editors, authors, consultants, and selection committees, as well as market pressures to include too much material, contributes to the stilted, compressed prose in textbooks and to students' inability to make connections between isolated facts and the larger patterns of history.

Better Textbooks Are Possible

Textbooks are the way they are because the market system that drives them is seriously at odds with good educational practice and because the typical selection process fails to reward the use of clear, literate, motivating prose. The refrain from publishers that they "publish what sells" says much about the power of the marketplace. In our view, publishers have the expertise to produce truly engaging, memorable books. But this can only happen if educators develop the capacity to recognize and purchase books that students will read eagerly, remember, and treasure.

Textbooks need to be better written and to cover fewer topics in greater depth. Their authors should be experts with a passion to communicate their disciplines to the young and who, in addition, have the ability to write in the style used by skillful popularizers. However, publishers are not likely to hire such authors nor to produce such books until powerful state adoption officials become convinced that the mere presentation of a topic is not enough.

Those who staff textbook selection committees should appoint members

who know enough about a subject to reject books with gross errors and significant omissions. Members should also be equipped to judge the *quality* of the writing, rather than judging the prose only on the basis of a readability formula score. When the textbook selection process becomes more qualitative and careful and when sales can be lost if textbooks are judged to be trivial, confusing, or boring, textbook publishers will inevitably become more thoughtful in their choice of topics, more fastidious about accuracy, and more concerned about the artfulness and clarity of the prose. □

¹For a detailed discussion of this issue, see A. Woodward and D.L. Elliott (1990), "Textbook Use and Teacher Professionalism," in *Textbooks and Schooling in the United States* (89th Yearbook, Part 1, of the National Society for the Study of Education), edited by D.L. Elliott and A. Woodward. Chicago: NSSE.

²For a detailed discussion of how textbooks cover the Constitution, see D.L. Elliott (April 1987), "Living Document or Historical Artifact: Presentation of the U.S. Constitution in U.S. History Textbooks," paper presented at the annual meeting of the American Educational Research Association, Washington, D.C.

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