Trends

West Wausau Ave., Wausau, WI 54401.

Textbooks have been abandoned in these high schools in favor of pamphlets, articles, news reports, and periodicals. Units focus on major issues, such as acid rain and sources of energy, and delve into the social/political debates surrounding each proposed science/technology solution.

More than two dozen programs spanning the entire K-12 sequence have been identified. Not one of them has a textbook as a central ingredient. Textbooks are available, but only as sources for information—even conflicting information. Students are encouraged to read, think, explore, do research with the help of others, and test ideas in an effort to solve real problems.☐

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Robert E. Yager is professor of science education, Science Education Center, The University of Iowa, Iowa City, IA 52242. **Connie Muther** is director, Textbook Adoption Advisory Services, 25B Esquire Dr., Manchester, CT 06040.

Textbook Selection

CONNIE MUTHER

Where to Get Help if the Science Textbook Fails

Many districts are faced with the task of selecting textbooks for a specialized student population. Recently a large city district sent six biology textbooks to be evaluated for a highly mobile student population, many of whom speak English as a second language. After only a few hours' reading, it was obvious that only one book (with a 1983 copyright) had not been written to a readability formula, and the vocabulary load of all six books was staggering, the worst offender being a best-seller.

Since I know so little about biology, I asked others.[1] They confirmed: most books are written to a readability formula, producing short, choppy, difficult-to-comprehend sentences; and more vocabulary is introduced (and rarely reinforced) than in foreign language textbooks. Most books offer an encyclopedic approach, with few chapters referring to content previously presented, yet packed with so many topics and concepts that ". . . 20 concepts would have to be covered per period, an average of one every two minutes. . . ."[2] Questions do not stimulate thinking but do require vocabulary definitions or recall of facts that are, in too many cases, erroneous, misleading, or outdated.

A Consumer's Guide to Biology Textbooks 1985[3] documents even more problems in the 18 biology textbooks submitted for Texas review and adoption. The authors concluded that ". . . the textbooks offered for general biology, with one possible exception, fail to teach the basic concepts of either science or biology, and therefore fail to meet the needs of those special students attracted to this course."

Bruce DeSilva, a national reporter for the *Hartford Courant* called several publishers about errors he had found in their general science textbooks. Several publishers refused to be interviewed, but those who agreed apologized for most of the errors DeSilva located and promised to correct them in their next revision. But what about *your* students already using those textbooks? If these are the offerings for average students, what about your special students? Even more upsetting, many experts feel, "real science" is simply not being presented in today's science textbooks.

I called more people for possible solutions. The following list and my May 1986 column in *Educational*

Leadership provide some alternatives to the use of inadequate textbooks:

1. *Insights Visual Productions*, P. O. Box 644, Encinitas, CA 92024. (619) 942-0528.

Insights produces videotape training workshops demonstrating how to teach science activities in K-6 textbook programs. I recommend them for middle and high school teachers for simple, clear explanations of the sciences. The company has a free 20-day review policy.

2. *American Association for the Advancement of Science* (AAAS), 1333 H Street, N.W., Washington, DC 20005. (202) 326-6400.

AAAS offers many programs. Be sure to get on their mailing list. "Science Resources for Schools" (SRS), a program for science teachers in the middle grades, is currently developing activity-based, hands-on, field-tested packets of materials for middle school teachers.

Challenge of the Unknown, a project designed to encourage middle school students to become better problem solvers, offers seven *free* 20-minute videotapes showing men and women using mathematics as a tool to make tasks easier. You can obtain a free master copy video and teachers' guide from Karol Media, 22 Riverside Dr., Wayne, NJ 07470.

3. *Math/Science Clearinghouse*, The Franklin Institute Science Museum, 20th & The Parkway, Philadelphia, PA 19103-1194. (215) 448-1235.

Serving the Philadelphia area, this clearinghouse publishes an annual catalog describing field trip sites in the area, conducts workshops to help teachers use local museums, creates linkages between corporate research laboratory personnel and high school science faculties, and has established a science colloquium series to bring teachers into the mainstream of science. Write for their newsletter.

4. *National Science Foundation* (NSF), 1800 G St., N. W., Washington, DC 20550. (202) 357-7066.

The Instructional Materials Development program at NSF supports the development of materials that aid instruction, including print, software, video, manipulatives, and laboratory materials. Information can be obtained by writing to Instructional Materials Development Program, Division of Materials Development, Research and Informal Science Education at the above address.

5. *National Science Teachers Association* (NSTA), 1742 Connecticut Ave., N. W., Washington, DC 20009. (202) 328-5800.

Like most national subject-area associations, NSTA identifies transportable, exemplary science programs that work. For names and addresses of these programs, obtain their monograph series, *Focus on Excellence*.

6. *Science through Science, Technology and Society* project (STS), Pennsylvania State University, 128 Willard Bldg., University Park, PA 16802. (814) 865-9951.

STS, a materials resources project funded by the National Science Foundation, scours this country and abroad in search of stimulating supplementary science materials that focus on citizen/science education rather than abstract science. Summaries and information on obtaining these classroom-developed materials are published every other month in a newsletter. Programs are given a quick review to see if they meet STS criteria. Although K-12 materials are reviewed, most apply to grades 7–12. If you've developed something unique and successful, submit it for review. If you're looking for stimulating supplementary materials or are building a science program without a textbook, look for alternatives here.☐

1. Among those interviewed were Robert Yager, University of Iowa; William Mayer, University of Colorado; Wayne A. Moyer, Math/Science Clearinghouse, Pennsylvania; Bruce DeSilva, *The Hartford Courant*. Three authors of biology textbooks and an editor wish to remain anonymous.

2. Mary Budd Rowe, "Science Education: A Framework for Decision Makers," *Daedalus: Scientific Literacy, Journal of*

the *American Academy of Arts and Sciences* (Spring 1983): 127.

3. Wayne A. Moyer and William V. Mayer, *A Consumer's Guide to Biology Textbooks 1985* (Washington, D.C.: People for the American Way, 1985), 12.

Connie Muther is director of Textbook Adoption Advisory Services, 25B Esquire Dr., Manchester, CT 06040.

Research on Teaching

ROBERT MCNERGNEY AND MARTIN HABERMAN

It's Time to Wait

Teachers typically wait less than one second after they ask a question for students to reply. They wait about the same amount of time before responding to students' answers. *Wait time* is the term researchers use to describe these pauses. If teachers can learn to increase their average wait time to three seconds or more, students' use of language and logic will improve. Students' *and* teachers' attitudes and expectations will also likely improve. Why?

The idea of wait time appeals to our common sense. If we are not given time to think, we won't. When we have time to think and talk through what we have done or observed, our ideas multiply and, in turn, are clarified and refined. Yet, the rapid-fire speed at which most elementary and secondary teachers ask questions and respond to students' answers is astonishing and may prevent any thoughtful consideration by students or by teachers themselves.

Several things happen as wait time increases. Students lengthen their responses and make more inferences and logical arguments. They exchange more ideas with one another. There are fewer failures to respond. More students participate, and unsoliticited but appropriate comments increase. Students become more confident rather than trying to guess what's on the teacher's mind. Achievement improves even on questions that require complex thinking.

Teachers, too, are affected as wait time increases. They stay on the topic longer and develop ideas in depth. Their questions decrease in number but improve in quality; they invite elaboration or contrary positions. Teachers' expectations for certain students improve. Their disciplinary acts decrease.

Teachers can learn to lengthen their wait time. The most promising approach involves taping teachers, having them transcribe their tapes, and encouraging them to try again. The payoffs seem well worth the effort.

For more information on this topic, read Mary Budd Rowe's "Wait Time: Slowing Down May Be a Way of Speeding Up!" *Journal of Teacher Education* 37, 1 (January-February 1986): 43–50. □

Robert McNergney is associate professor, Curry School of Education, University of Virginia, Charlottesville, VA 22903. **Martin Haberman** is professor, School of Education, University of Wisconsin-Milwaukee, Milwaukee, WI 53201.

Supervision

CARL D. GLICKMAN AND JEAN W. JONES

Creating the Dialogue

School systems are increasingly shedding dogmas about supervision being a particular set of skills, behaviors, procedures, and observations, and are developing their own programs based on adaptations, revisions, and combinations of particular approaches. The aim of supervision is not to ensure the soundness of using a certain approach. Standard uses of such approaches as clinical supervision, developmental supervision, and the Hunter model are being criticized by their own developers (see Hunter 1985, Glickman 1986, and Goldhammer et al. 1980). The critical point is that supervision creates an instructional dialogue among and with teachers that results in planning and acting upon improvements in learning for students (Sparks 1983, Beach 1976, Franseth 1972, Lovell and Phelps 1976, Goldsberry and Hoffman 1984). As Rutter and others (1979) concluded from their study of successful high schools:

> Rather, good morale and the routine of people working harmoniously together as part of an efficient system meant that both supervision and support were available to teachers in a way which was absent in less successful schools (p. 184).

Sometimes an instructional dialogue is created from formal observations, conferences with or without observations, drop-in visits, walking in the hall and talking to teachers, or meeting with groups of teachers, and so on. Essentially, a dialogue occurs when supervisors provide the elements of time, focus, and structure for individuals to meet and talk. Without these elements, a school remains a collection of individual teachers isolated and invisible (Glickman 1985).

It is when talk engages teachers individually and collectively in thinking about instruction that a successful school emerges, as Little (1982) wrote of her findings about such schools.

> Teachers engage in frequent, continuous, and increasingly concrete and precise talk about teaching practice. . . . By such talk, teachers build up a shared language adequate to the complexity of teaching, capable of distinguishing one practice and its virtues from another, and capable of integrating large bodies of practice into distinct and sensible perspectives on the business of teaching (p. 331).

How the dialogue is created will vary among schools, as will the person responsible for supervision. What is important is that instructional dialogue becomes a prevailing part of a school.