

"Square One TV" fun to watch and a worthwhile adjunct to the middle school mathematics classroom. □

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## Science

ROBERT E. YAGER AND CONNIE MUTHER

### A Way Out of the Textbook Dilemma

Real science for K-12 students exists when their curiosity is piqued by problems and when they raise questions about them. Students need to be active detectives, debaters, analyzers, interpreters, hypothesizers, and problem solvers. They need to see the power of direct observation, the necessity of relying on expert information, and the use of evidence in resolving questions.

Expert information can come from a smorgasbord of written sources (including many different textbooks) as well as from people practicing science within or near the community. All these sources should provide different perceptions, interpretations, and viewpoints.

The science/technology/society (STS) approach to teaching science uses local issues, questions, and problems as a starting point, then gets students involved in exploring and formulating explanations or possible solutions to issues in their own neighborhood. Rustum Roy, director of the National Science Foundation project, has called STS the science education megatrend for the remainder of the twentieth century.

The National Science Teachers Association has mounted searches for *transportable* exemplary programs across the entire U.S. that use STS approaches (Penick and Meinhard-Pellens 1984, Yager 1983). For example:

1. *Green Acres School District*, 966 Bostwick Ln., Santa Cruz, CA 95062.

Here students apply science and technology to their everyday environment by planting and cultivating vegetables in a central garden, then cooking and learning about the chemical reactions involved in cooking. One result has been changed eating habits

for the total school community—students, teachers, and parents. Yet this is only one of many STS projects at this school.

2. *East Douglas Elementary School*, East Hamilton Ave., P.O. Box 1028, Douglas, WY 82633. (307) 358-3502 (Robert Pesicka).

*Anchorage School District*, 4600 DeBarr Ave., P.O. Box 196614, Anchorage, AK 99517. (907) 269-2274 (Emma Walton).

Both these schools began with the Elementary Science Study (ESS)

hands-on, discovery-based science materials, then added a central materials supply and delivery system and teacher training program, effectively solving the three most critical problems encountered with any hands-on elementary science program. Wyoming goes beyond this published program by challenging students to solve real problems within the community.

3. *New Lincoln School*, 210 East 77th St., New York, NY 10021 (212) 879-9200 (Irma Jarcho).

*Wausau West High School*, 1200

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# Trends

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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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## 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.<sup>1</sup> 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. ..."<sup>2</sup> 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*<sup>3</sup> 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*

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