The Trouble with Textbooks.

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*****Note: Figures may be missing from this format of the document**

Some of these dilemmas are under close scrutiny. According to the American Association for the Advancement of Science (AAAS), 12 of the most popular middle school science textbooks used across the nation are riddled with errors and do not have an acceptable level of accuracy (AAAS, 2000a).

In addition to this alarming information, the AAAS review of the 10 most popular high school biology text-books found numerous facts, but little to explain the underlying scientific importance of the facts. The evaluators rated all 10 textbooks poor in "demonstrating use of knowledge" and "encouraging students to reflect on their own learning" (Hoff, 2000).

Publishers of these science textbooks counter the criticism by stating that policymakers (state legislators and Department of Publication Education officials) are getting what they want. State officials demand that their state's academic standards and materials requested by their clientele be reflected in the textbooks adopted. A prominent publisher argues that the instructional content of the textbooks is not determined by publishers but rather by teachers. To support this argument, publishers state that teachers are surveyed by publishing companies to gauge their interests and that teachers also serve on state and local textbook adoption committees, thus providing feedback on textbook content (Hoff, 2000).

These reports about textbooks present serious dilemmas for most science teachers who believe that textbooks play a major role in middle level and secondary science instruction. Previous studies report that most science teachers use science textbooks for most of their instructional time (Lumpe and Beck, 1996). Using a single comprehensive science textbook has been the norm for many years, and this is unhkely to change given the current state and structure of education systems and textbook publishing.

So what can effective science teachers do to overcome the obstacles of inadequate textbooks? They can first fa-miliarize themselves with the problem and with the circumstances that have led us to this point, and second, take steps to correct textbook inadequacies in the classroom.

Textbook adoption: History and current issues

The forces that have an impact on textbook selection or adoption can he examined from an historical perspective. Currently, 23 states have textbook adoption policies (Miller, 1997). These states are located predominantly in the South whcre the idea of textbook selection and adoption originated. Following the Civil War, the vast economic and ideological differences between the North and South spawned Southern distrust of all things Northern. Because most publishers were located in the North, Southern states moved to a textbook adoption system to exert some control (Apple, 1991).

Issues of racism, poverty, and teacher qualification fueled textbook controversies. Historically, each state hoped to overcome problems from any incompetcnt teachers through dictated uniform and accurate textbook content (Herlihy, 1992). In addition, minority groups and those living in poverty traditionally have not had eqnal access to quality textbooks.

Some unresolved issues are hundreds of years old, particularly the concept of "official knowledge." Original sources and multiple perspectives must be considered in teaching controversial subjects, especially when evaluating material for inclusion in textbooks. Issues of science textbook content in the areas of evolution, sexuality, and resource conservation are all affected by politics.

In addition to political influences that affect textbook publication, textbook sales are also big business. In 1996, K-12 textbook sales generated a staggering 3.5 billion dollars, which is significant to both publishing companies and taxpayers (Miller, 1997). A handful of adoption states sets the standards for the nation's curricula. Texas, California, Florida, and North Carolina account for about 25 percent of the nation's school-age population, and publishers generally target their textbooks' content to the needs of these states, forcing a set content on the whole country.

These states hold sway over the changes that are made. They have powerful state textbook selection committees that are lobbied heavily by various interest groups. For example, fundamentalist Christian groups lobby heavily regarding evolution content in Texas, which has the largest student population and consequently orders thc most textbooks. Publishing companies reduce their overhead by offering essentially the same books developed for these target markets to states that do not have such intensive selection programs.

As easy as it is to criticize textbook publishers, they face an enormous challenge. They must produce a product that is factually correct, is coherent, can pass each state's selection process, and can withstand the assaults of a bewildering multitude of critics—and still turn a profit. Many critics' concerns are diametrically opposed (for example, one side supports the dilution of evolution topics, while others consider it the unifying force in biology). A textbook could be flawless in all other regards, but be rejected on a single controversial point.

These practices do not leave the teaching profession unscathed. Breadth and depth of content, science education goals, and "Teacher proof' textbooks that attempt to compensate for bad teachers are all issues that place teachers in tenuous positions as educators. New teachers, in particular, must choose from the material provided by the textbook companies as they develop coherent lesson plans and teaching styles in their first few years of teaching. Questions often arise, such as:

- Do I spend nine weeks on evolution because it is a unifying concept in biology or do I spend a week on changes over time because many parents object to the teaching of evolution?
- On which goal of science education—science content, science process, or career awareness—do I focus my instruction?

Publishers and adoption committees

Publishers and state adoption committees have been jointly hammering out the content of textbooks for almost 100 years to bring acceptable books into the classroom. Social reform groups appropriately call for fairer and more accurate representation of scientists and students in terms of race, ethnicity, gender, and special needs, commonly referred to as inclusion. Actuated by selection committees and reflected by publishers in their textbooks, the current trend is toward greater breadth (i.e., range of coverage) and less depth (i.e., amount of coverage per topic). This view of breadth vs depth is diametrically opposed to the view of science education espoused in the *National Science Education Standards* (National Research Council, 1996).

Science texts are often lengthy (one first-year high school biology textbook is more than 1000 pages) and clearly contain more material than is necessary for an introductory course. These glorified encyclopedias make the coherent presentation of material difficult. The authors, contributing authors, content specialists, and teacher reviewers present multiple perspectives. All of their credentials seem adequate, as do those of the state selection board. Accuracy of knowledge is not in question here, but the overcrowding of facts and the lack of both continuity and narrative perspective is. Again, the dilemma looms: Is there too much content or too little content? Is the content accurate or inaccurate? These problems pervade all science textbooks presented by the major publishers.

Frequently, science textbooks are evaluated for readability. Given the range of reading abilities of an increasingly diverse student population, what's a teacher to do? Should teachers opt for rich, detailed language that demands use of higher level thinking skills or texts that use short choppy sentences that provide basic information? Subtle differences in meaning cannot be conveyed in simple sentences and unchallenging vocabulary. For example, Lisa Delpit, urban and multicultural educator, maintains that lack of access to meaningful language may deny minority and poverty level students the opportunity to experience rich instructional conventions and strategies that are essential to success in U.S. education (1995).

Working with textbooks

Whether or not effective teachers are aware of the factors affecting textbook publishing, they must try to overcome the obstacles of inadequate textbooks. Most teachers do recognize the gaps in content coverage and the lack of depth of knowledge in the textbooks they use. When evaluating science textbooks for their classrooms, teachers are often confronted with several dilemmas. They are the need to determine the appropriate use of a textbook; assess the sufficiency of the depth of content especially regarding content accuracy; evaluate the appropriateness of diversity representation in a text that focuses on science content; and choOSe between a book that is difficult to read, but paints a more accurate picture of the complexities in sciencc, or a book that is easy to read, but oversimplifies scientific material.

These dilemmas should lead teachers to ask the following questions:

- How should the text be used considering the poor reports about current textbooks?
- Should instruction center around the text with the teacher providing supplemental materials or should technologies in the classroom become an alternative to textbook use?
- To what degree can teachers be involved with textbook adoption?

If textbooks, as the AAAS report suggests, are inadequate for effective instruction, then teachers must either supplement and revise their instructional materials or prepare new information that addresses the content concerns in the adopted textbook.

Encyclopedic in scope, literally and figuratively weighty, difficult to transport between home and school, perhaps the science textbook serves best as a classroom reference. Because textbooks are both overused and misused, teachers can ask the following questions to determine how best to use the science textbook.

- Are there gaps in the texts between curricular objectives and content? If so, then teachers should identify skills covered in the texts; divide the skills into workable tasks and subtasks and arrange them into sequence according to their planned instruction; and use the text to introduce concepts, build skills, and provide examples.
- Do texts adequately reflect the range of the reading levels of students?
- Do texts reflect the range of student attention to the tasks?
- Are the directions that come with the textbooks and any accompanying workbooks adequate to be used by all students independently?

To ensure access to the material in the textbook for all students, teachers could provide study guides with questions and activities. These guides assist students as they read selections, highlight key points, and provide a structure for reflection. Teachers might also highlight the text when possible. By providing alternative reading materials and activities, using audiotapes, or giving students opportunities to read the text aloud, teachers can support the text. When teachers use the textbook as a resource and reference, students learn to do the same. By designing their own activity- or lab-focused lessons, teachers can employ alternative technologies and reading sources.

Science teachers must become critical consumers of their science textbooks. They must be willing to question the use of their textbooks, and they must discover what the content of the textbook will offcr in terms of teaching and student learning. Tcachers should reflect on the results of their search for good textbooks, what this means in relation to their own thinking about content, and how to most effectively facilitate instruction.

When considering the use of science textbooks, teachers would do well to take to heart a 1941 quote: "A good textbook should stimulate pupils to perform experiments, to engage in individual and group projects, to make field trips, to read other science books and to carry on other worthwhile activities" (Knox, 1941, 2). Effective science teachers should do just that.

References

American Association for the Advancement of Science. 2000. Heavy books light on learning: Not one middle grades science text rated satisfactory by AAAS,s Project 2061. Online at: *www.project2061. org/newsi nfo/resea rch /textbook/art iclesihea vy2. h t m.*

American Association for the Advancement of Science. 2000. Big biology books to convey big ideas, reports AAAS,s Project 2061. *Science Books & Films* 36(5): 92-202.

Apple. M. 1991. Regulating the text: The socio-historical roots of state control. In P.G. Altbach, G.P. Kelly, H.G. Petrie, and L. Weis, eds., *Textbooks in American Society: Politics, Policy, and Pedagogy*, pp. 9-12. New York: New York Press.

Delpit, L. 1995. *Other People's Children: Cultural Conflict in the Classroom*, New York: The New Press.

Herlihy, J. 1992. *The Textbook Controversy.* Norwood, N.J.: Ablex. Hoff, D.J. 2000. Science group bemoans quality of biology textbooks. *Education Week;* online at *www.edweek.org/ew/ewstmy. cfm?slug= 42AAA.H19.*

Knox, W., G. Stone, M. Meister, and D. Wheatley. 1941. *The Wonderworld of Science, Book* 4. New York: Charles Scribner,s Sons. Lumpe. A.T., and Beck, J. 1996. A profile of high school biology textbooks with implications for biology instruction. *The American Biology Instructor* 58(3): 147-53.

Miller, M. 1997. Surprise! National school standards exist; but educational curricula are established by textbook companies, not the government. *U.S. News and World Report* 17, 35.

National Research Council. 1996. *National Science Education Standards.* Washington, D.C.: National Academy Press.