



SCI eTIPS for Teachers

Tips for Teaching IPS and FM&E

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Textbook Selection: Making the Best Choice

The time is long past when a "thumb test" – that is, thumbing through the pages of a textbook to see if it "looks interesting" – was sufficient (if it ever was!) to determine whether a textbook will meet students' needs. Our knowledge of effective pedagogy and how students learn has evolved, and so must our analyses of textbooks.

The textbook you choose will define the health of your classroom for an indeterminate number of years. Consequently, a selection process that devotes sufficient time and resources to a thorough, objective, and systematic evaluation of prospective textbooks is critical. The all-too-common constraints on educational funding and the often-hefty costs of textbooks make it unlikely that a poor selection can be corrected quickly.

What are Your Goals?

There are many textbooks available for each level of K-12 science education. Should the same magnifying glass be applied to all of them? To do so is both time-consuming and inefficient. But how can you narrow the field? Three words: "clarify your goals." Doing so will allow you to concentrate your efforts on those textbooks that best mesh with your educational philosophy and goals. It will allow you to narrow the textbook universe to a smaller group of likely candidates so that you can compare "apples to apples" and find the best fit for your students, your school, and you.

What Does an Effective Textbook Look Like?

Science textbooks have generally expanded in length to meet more stringent state standards, and they have become flashier in an effort to stand out from competitors. All too often, however, the result is a watered-down curriculum variously characterized as "mile wide and inch deep" by *A Nation at Risk* (1983) and the *Third International Mathematics and Science Study* (1997), among others. With increasing pressure to perform on state testing, this lack of in-depth treatment is not something that educators can afford to support.

CLARIFYING GOALS

- Do you want a textbook that is inquiry-based and actively involves students in the processes of science, or are you looking for a book for students to read as a reference?
- Do you want a textbook that allows students to construct understanding from their own lab results, or do you want them to read first and perform verification labs afterwards?
- Do you want a textbook that provides answers to students' questions, or is it more important to have a book that leads students to form their own answers?

Effective textbooks obviously must meet curriculum requirements for each course and

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grade level. They must be scientifically accurate and pedagogically sound. They should address fundamental ideas, tying topics together into a well-formed storyline that promotes student comprehension and in-depth understanding. But science is a process, not merely facts to be learned. So effective textbooks will also engage students in inquiry and require them to actually “do science.” Through a strong regimen of laboratory exercises integrated into the storyline, a textbook should require students to work as scientists do, participating and reflecting on their own learning, formulating conclusions, and building on their understanding of the topics being studied.

What Professional Development Will Be Needed?

As noted in *The Cornerstone to Capstone Approach* (BSCS, 2006), unless textbook selection and curriculum implementation processes are accompanied by serious professional development, the result very often is to “maintain the *status quo* though the adoption of instructional materials that are familiar to teachers and support traditional teaching practices.”

EVALUATING LABS

- Are labs performed and concepts developed in a coherent, sequential fashion, or do the laboratory exercises appear as add-ons at the end of each chapter?
- Are the labs performed to provide evidence prior to the introduction of “big ideas” or are they the latter half of a “read and then verify” format?
- Are laboratory investigations written in a recipe-type style, or do they challenge students to think as they investigate to develop deeper understanding?
- Do labs encourage students to accumulate their own data to develop understanding?

the activities will be with students. Ideally, these workshops should take place in a rich, collegial environment that includes teachers having different levels of experience with both the textbook under consideration and teaching in general. Such an arrangement will provide teachers with a rich professional growth experience regardless of whether or not the materials upon which the workshop is based are chosen for adoption.

Supplemental Resources - How Useful Are They?

Many publishers play the quantity card with regard to teacher support materials, hoping to overwhelm teachers with the sheer volume of “free” materials they are willing to provide. (You can be certain that the cost of these “freebies” is fully reflected in the price of the textbooks!) Look at these materials very carefully. Do they serve a useful and necessary function in improving student achievement or are they so much unnecessary fluff? Now – when you are trying to improve both your students’ achievement and your professional practice – is not the time to be swayed by glitzy materials that may or may

EVALUATING CONTENT

- Is the science content accurate?
- Does the curriculum satisfy grade level standards?
- Does the curriculum cover essential topics in depth?
- Are essential topics tied together into a coherent storyline, or presented in the textbook as separate, unrelated units?
- Are figures and photos an integral part of the text and the concepts being developed, or do they seem to be “attractiveness factors” unrelated or weakly connected to the text?
- Does the textbook model the processes of science by having students “do science”?

But if your goal is to depart from the *status quo*, where should you start? Begin with professional development that is specific to your particular situation and designed to get everyone “on the same page” with regard to the textbook selection process. Depending on the backgrounds of those involved, this may mean professional development activities aimed at improving teachers’ science content knowledge. It most definitely will mean instruction in how to evaluate curricular materials.

As part of professional development related to the selection process, teachers should experience the prospective curriculum themselves. They should attend an in-depth, structured workshop related to the materials being considered for adoption. In this workshop, teachers should work through the entire textbook and perform each of the labs, using their professional expertise and experience to gauge how effective

EVALUATING SUPPLEMENTAL RESOURCES

- Are strategies and discussion points suggested for pre- and post-lab discussions?
- Are tips provided on how to effectively facilitate the discussion of reading sections?
- Is guidance provided on laboratory management?
- Is sample student data provided, along with sample results for each lab?
- Do the resources include answers to questions posed in the textbook, along with an explanation or justification of those answers that warrant one?

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not be of value and may even be pedagogically unsound. By agreeing early in the selection process not to be wooed by bells and whistles, you will be more likely to select a program that supports student achievement and enhances your instructional practice.

High-quality teacher resources will help you lead your class productively. They will allow you to get the most out of laboratory activities by providing suggestions for pre- and post-lab discussions, and they will provide tips on how to effectively facilitate the discussion of reading sections. They will include clear instructions on laboratory management, relate the ideas being studied to what was learned previously, and provide background information that will help you field unexpected questions. In addition, to help you see whether students are “on the right track,” sample student data and results for each lab should be included in the resources. These details are not glamorous, but they will impact your students’ safety, interest, motivation, and understanding while significantly easing your task as a teacher.

What About Assessment?

When examining the assessment materials that accompany a textbook, keep in mind that you are selecting for the performance of the material and not just the convenience of the format. There are advantages to having assessment items available in electronic format, but unless the questions serve to both successfully evaluate student achievement and drive further instruction, they will be of limited value to you as an educator.

Assessments embedded in or accompanying a textbook should be both formative and summative. They must be scientifically accurate and should include several item forms, such as guided response (multiple choice), open response (essay), and performance tasks. In addition, formative assessment questions that allow you to gauge student understanding “on the fly” should be included in the textbook and/or the teacher resource materials. In short, assessment resources should allow for ongoing and varied assessment that will accommodate different learning styles and engage the students in an evaluation of their own learning. At the same time, they should provide you with the feedback needed to adapt your instruction as you meet the ever-changing needs of the classroom.

EVALUATING ASSESSMENTS

- Are the assessment items scientifically accurate?
- Are both formative and summative assessment items included?
- Are assessments available in various forms – multiple choice, essay, and performance tasks?
- Do the curricular materials provide opportunities for students to participate in and reflect on their own learning?

What Resources Are Available?

In 2002, BSCS and WestEd developed a process that addresses many of the points presented in this paper. Known as AIM (Analyzing Instructional Materials), it is an extensive and rigorous protocol that deals with the selection process as both a way to select a textbook for students and a professional development opportunity for teachers. Whether working alone or in a committee, AIM facilitates a reexamination of the selection process – in a way that can transform the science education program provided by a school.

To help in the selection process and to provide ongoing support, Science Curriculum Inc. (SCI) and the Colorado School of Mines provide summer workshops based on the *Introductory Physical Science (IPS)* and *Force, Motion, & Energy (FM&E)* textbooks. In these content-rich, process-intensive workshops, teachers have the opportunity to experience and thoroughly examine either one or both programs while they learn new teaching strategies and enhance their background in physical science. In addition, to acknowledge the fact that the need for professional development does not end with the selection of a textbook, SCI sets aside 5% of the purchase price of copyrighted materials as a tuition credit for teachers from the purchasing school or school district wishing to attend an SCI workshop.

For more information on the AIM process, email the BSCS Center for Professional Development at pdcenter@bscs.org or contact them by phone at 719-531-5550, extension 119.

For more information on SCI workshops, visit <http://www.sci-ips.com/events.html> or call 888-501-0957.

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