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What This Book Can Do for You

Which textbook, curriculum series, or other resource is best for teaching technology education in Grades K–8? This is a fair question—and harried educators and curriculum specialists want a quick, bottom-line answer.

It would be unfair, however, to give overly simple answers such as “Textbook 5 is the one for you!” Instead, this book empowers educators to make well-informed choices of curricular resources, ones that can meet their specific classroom needs in the elementary or middle grades.

In addition, we briefly argue for teaching technology in more U.S. classrooms and explain and illustrate its concepts and instructional approaches. In doing so, we exhort those already teaching technology to keep advancing the state of the art. We also help make science educators and educators in other subject areas aware that they may already have put a foot in these waters. Now we urge them to go for a real swim. All these points, as well as the organization and uses of this book, are discussed in the following sections.

HELPING EVERYONE SELECT APPROPRIATE RESOURCES ■

When one fully considers how much rides on choosing materials, it is amazing how often our educational system is willing to go from the gut. Curriculum materials daily impact what teachers will teach, how they may teach it, the learning experiences that diverse kinds of students can have, and so on. The process of choosing curricular resources should be as deliberative and intensive as it is consequential.

Yet districts typically only support a few days of committee time to select products that must be used for years. Committee members first try to carve out time on their own to look at a few assigned resources. Then they get only a couple of meetings to discuss collectively the weighty decisions of selecting curricula from among many choices. With so little time and so much pressure, no wonder participants inspect candidate resources merely by flipping through the pages, a process sometimes called the “thumb test.” Only easily judged features of the products typically get noticed: copyright date, cost, durability, diversity of people in photographs, readability levels, engaging layouts, availability of supporting products, and so on (Chamblis & Calfee, 1998).

Financially, districts will spend enormous sums to purchase the products, while devoting relatively few dollars on deciding how to spend all that money. The situation has changed incrementally in recent years, as organizations are creating more detailed information and methods for reviewing and choosing curricular resources (American Association for the Advancement of Science, 2000; Britton, Huntley, Jacobs, & Shulman-Weinberg, 1999; Goldsmith, Mark, & Kantrov, 2000; Morse et al., 2001; Muther, 1999). Fortunately, school systems and teachers are beginning to see their selection processes as a cornerstone of classroom instruction, an important investment toward a larger expenditure.

This book aims to help technology educators and curriculum specialists overcome four barriers that box local educational systems into using limited selection processes. First, not every person or system interested in choosing products has the time and/or money to obtain copies of all the possibilities. We have done this for you. We collected and describe about twenty-five curriculum materials designed for classroom use, and more than 100 informal resources.

Second, how can one find and pay for the expertise of people who already know these products well, without relying on product developers or distributors? Studies indicate that presentations by publishers’ sales representatives can be the most influential factor in districts’ selection of curricula—not the healthiest situation (Chamblis & Calfee, 1998; see Chapter 6). This book puts in your hands an extensive analysis done by independent experts of both major and minor features of the products.

In particular, how can one detect whether products are precisely aligned with national content standards? The line-by-line analysis of a resource’s topics against specific standards takes weeks or months for a single large product. The third way this book helps one choose resources is by providing just such detailed analyses.

Fourth, how can someone sift through analyses of many curricula and still get the overall essence of the resources? In addition to describing and analyzing the products, we include sample pages from the larger ones, such as textbooks.

This book names names. That is, we contrast and compare the products by name. We formally compare the products in several ways, including how well they empower teachers (or not) to help students

- Attain the technological literacy envisioned by national standards;
- Experience and understand the technology design process;
- Know about the technologies in our lives and communities;
- Have rich opportunities to adequately assess their knowledge and abilities.

We also discuss how well the resources do (or do not)

- Engage *all* students in our increasingly diverse populations;
- Connect to the real world or daily life;
- Relate activities to the goals of the units where they are placed;
- Provide adequate support for teachers to use the product effectively.

We do not include any lemons. All the resources that we describe reviewed well. However, a given resource can be strong in one feature and weaker in another, which brings us back to the matter of why simple answers such as “choose textbook 5” shortchange both educators and students.

We add one more argument: Selection must be local. For us to give overall recommendations or rankings of resources ignores the fact that what is most important in one place may be less important in another. For example, addressing diverse student populations is a paramount consideration in some locales (and more of them all the time). Such districts might choose resources that address diverse student populations particularly well, even if those resources are not the most standards-based. A district elsewhere might be in a state where standards coverage is paramount, and addressing diverse populations is an important but less acute issue at present.

So this book tries to describe resources for everyone. We do not believe one product can meet everyone’s needs. Instead, among the many resources we describe, and in the many ways we describe them, everyone should be able to find resources that meet his or her particular needs.

In addition to helping people make judgments about curricular resources in technology education, this book can also help people become more familiar with technology education in general in a couple of ways. Before discussing patterns among resources and giving individual reviews of them, we briefly describe and argue for technology education. In addition, in contrast to entire publications devoted to the definition and importance of technology education, this book has a practical advantage in promoting understanding of technology education. By spending time with the reviews of resources plus their corresponding sample pages, one can get a grounded illustration of the topics and instructional approaches of technology education.

OVERVIEW OF THE BOOK ■

This book is organized into three parts.

Part I briefly defines technology and why science educators as well as technology educators should teach it (Chapters 2–3). Chapter 4 identifies the types of products reviewed and the methods we used to analyze them.

Part II highlights the strengths and weaknesses we found among the curricular resources that we inspected.

The largest portion of the book, Part III, contains reviews of individual curricular resources, grouped into four categories of resources.

Making the Case for Technology Education: Chapters 2–3

Especially because we speak to science educators as well as technology educators, Chapter 2 briefly answers some key questions:

- What are technology, technological literacy, and technology education?
(Hint: They refer to *more than* computers and technological devices, which they also include.) Why are they important to students, teachers, and society?
- What are the standards for technology education?
Not everyone is aware that there are bona fide U.S. standards for technology education, just as there are those for mathematics or science education.

In contrast to the United States, about a dozen countries require that technology education be part of the school curriculum in its own right, just like mathematics, science, and so on. However, because technology education has not yet gained similar prevalence in the United States, there currently are not enough formally trained technology teachers.

Therefore, if all students are to become technologically literate today, we argue in Chapter 3 that technology educators must enlist science educators as allies. In fact, in the section *A Word to Science Educators*, we show that national standards and other seminal documents in U.S. science education already urge science educators to take up some technology education. We also sketch an overview of the technology education community to help pave the way for science and technology educators to collaborate. In *A Word to Technology Educators*, we make technology educators aware of science educators' perspectives and encourage them to welcome allies to their "territory."

Focusing on Print Materials: Chapter 4

This book focuses on printed curricular resources: textbooks, textbook series, monographs, or monograph series. All these kinds of resources can play an integral role in teachers' lesson planning and instruction for a technology course or a substantial part of a course or grade. By analyzing these products, we aim to help people choose from among the most widely used curricular supports for teaching the subject of technology.

Some prognosticators thought that, by now, the Internet would have made print materials go the way of the dinosaur, and there certainly is a burgeoning world of online resources for technology education. However, many of them currently lend themselves to important but secondary roles in technology courses. They form the basis of individual lessons or units rather than large portions of courses. Further, our educational facilities have not yet reached the point of having enough computer stations and rapid Internet connections to permit most students, or even some teachers, to access the Web on a daily basis.

Obviously, there are exceptions to the previously mentioned points. For example, two Web-based curricula that can provide substantial instruction are Intel Corporation's free *Design and Discovery* program for middle school students (www.intel.com/education/design) and the free Integrated Design Engineering Activity Series (IDEAS) from the American Society of Mechanical Engineers (www.asme.org/education/precollege/ideas), also for the middle grades. We further acknowledge not only that the relative amounts of use of print, online,

and other resources are shifting, but also that curriculum developers and teachers often are blending their use. For example, every chapter of the textbook *Technology Education: Learning by Design* (reviewed in Chapter 8) points students to a specific Web site that can help them understand concepts and demonstrates technological systems or processes.

However, given the overall context described earlier, we have chosen to use the limited space available in this book to thoroughly review print materials—the curricular resources still used by the greatest number of teachers as the basis for the largest portion of their technology instruction. In Chapter 11, *Informal Resources*, we list some Web sites that are resources for teaching technology, even though we do not have space to review the instruction they provide.

In Chapter 4, we provide more detail about the kinds of resources reviewed and how we analyzed them. We also give advice about choosing products from among another class of resources, the “modular” systems that are common in the technology and vocational education communities.

Contrast Among Resources: Part II (Chapters 5–7)

Part II compares several dimensions of the products:

- *Content.* Chapter 5 explains in detail how today’s available products are (or are not) able to promote students’ technological literacy.
- *Activities.* In Chapter 6, we analyze the student activities contained in the products, describing their purpose, structure, approach to technological design, and more.
- *Teacher support, assessment, and other pedagogical features.* Chapter 7 analyzes the products’ teacher support materials. It also discusses the tools and strategies available for assessing student understanding. Finally, this chapter discusses what instructional models the products use.

Reviews of Individual Products: Part III (Chapters 8–11)

Part III contains reviews for the following four types of curricular resources (described in Chapter 4).

- Chapter 8: Core Technology Products (technology textbooks)
- Chapter 9: Cross-Curricular Products (integrated products)
- Chapter 10: Supplemental Products (products intended to supplement courses)
- Chapter 11: Web Sites and Other Informal Resources (topical books, encyclopedias, and more)

In addition to analyses and descriptions, Chapters 8 and 9 contain sample pages, reproduced from the reviewed products. We group the wealth of informal resources of Chapter 11 (more than 100 of them) into categories and provide annotated descriptions of each resource.