TECHNOLOGY in Practice
Applications and Innovations

Welcome to *Technology in Practice: Applications and Innovations*

Introduction

We designed this program to help students understand what technology is and why it is important in their lives. To do this we used research on learning to create a program that will help all students learn about technology. As a result, *Technology in Practice: Applications and Innovations* may not look or read like other programs you have used. The first step in understanding this program is to read this *Program Overview*. The overview addresses important features of the program. After you have read the overview and have a broad understanding of the program, you might want to read through some student lessons and the accompanying teacher materials.

Curriculum development is only one step in a process that joins science educators, students, teachers, parents, and administrators in developing scientifically and technologically literate students. Because of feedback we receive from teachers and students, we know that our instructional materials make a positive difference in education. We hope this is true for you and your students as well. We also know that curriculum development is an ongoing process. For this reason, if you or your students have feedback on this program, we encourage you to write us at info@bscs.org.

Program Overview

Program Goals

Technology in Practice: Applications and Innovations is designed to help educators accomplish the following goals:

1. Develop students' understanding of basic concepts and skills related to technology, within a science context.
2. Improve students' understanding of how technology relates to their lives.
3. Promote the development of critical thinking and problem-solving abilities in students.
4. Increase the participation and success of all students, particularly underrepresented populations.

Organizing Principles

Seven features make *Technology in Practice: Applications and Innovations* unique. We have included the following features because they address the findings of the current research in technology and science education, middle school philosophy, and contemporary learning theory.

1. Integrates technology within a real-world context
2. Incorporates the principles of technology that will be important for the 21st century workforce
3. Includes collaborative learning strategies
4. Uses the BSCS 5E Instructional Model
5. Accommodates different cognitive styles
6. Offers a variety of teaching strategies
7. Broadens the role of assessment

1. Integrates technology within a real-world context

Often when people think of technology, they think of electronics. This program helps students understand that a technology is something that helps humans solve a problem. Helping humans solve problems offers a rich array of opportunities to use as a context for learning about technology. Throughout the modules, students examine real-world situations such as designing technology to help disabled people, using technology to predict weather patterns, and solving environmental problems using technology. Using these real-world contexts not only helps students understand why technology is important in their own lives, but it also serves as motivation for students to become interested in the topics and explore them further. Research has shown that understanding how concepts relate to their own lives increases students' interest and motivation.

2. Incorporates the principles of technology that will be important for the 21st century workforce

The students explore many of the concepts of technology—the design process, costs, benefits, criteria, constraints, and decision making—as part of this program. These concepts help students learn critical-thinking and problem-solving skills. These skills are important as today's students move into the 21st century workforce. Even if students do not choose a career in engineering or design, the skills they learn in this program will be valuable for any path they undertake.

3. Includes collaborative learning strategies

Technology and science are collaborative enterprises. A single technological design is often the result of many scientists and engineers working together, communicating their results, sharing their ideas, and building on past success. Furthermore, most work settings require that employees cooperate with one another to accomplish tasks.

In the classroom, collaborative learning research indicates that collaboration among students increases the level of student success. For those reasons, we chose to incorporate collaborative learning strategies into the curriculum. The model we use is based primarily on the work of Johnson and Johnson (1987), Adams and Hamm (1996), and Thousand, Villa, and Nevin (1994).

5. Accommodates different cognitive styles

Each learner has a preferred style of learning. Unfortunately, that style may not match his or her teacher's preferred style of teaching. To help address that discrepancy, the diversity of teaching strategies and the BSCS 5E Instructional Model provide a regular variety of classroom experiences. This allows more opportunities to address a diversity of learning styles and make the most of the range of ways that students learn.

6. Offers a variety of teaching strategies

The instructional model, collaborative learning theory, and research on successful schools all support using a variety of strategies in the classroom. *Technology in Practice: Applications and Innovations* is composed of many hands-on and minds-on investigations that keep students engaged in the study of technology. In addition to those investigations, the curriculum includes strategies such as simulations, debates, role playing, research projects, and creative writing. Additional strategies help students to make sense of what they are learning and to organize information. Many of these strategies increase the participation and success of all students, particularly underrepresented groups of students, in the classroom. Researchers have noted that certain strategies and topics help increase the success of underrepresented students, including collaborative learning, activities that develop spatial skills, information that helps students prepare for careers, topics that are relevant to the students and that build on their prior experiences, and the reinforcement of basic skills (Johnson and Johnson, 1987; Kahle, 1987). *Technology in Practice: Applications and Innovations* incorporates these strategies and topics.

7. Broadens the role of assessment

American education is driven by testing and grading. Tests and grades represent only one aspect of assessment, and in this curriculum we have broadened the role of assessment to include an interactive and ongoing process between the teacher and the student. This process of embedded assessment allows the students and the teacher to have a more authentic measure of what the students know, value, and are able to do. For the teacher, this process helps determine the flow of the lessons.

Broadening the role of assessment like this allows the teacher to modify lessons to meet the needs of the students. This change also encourages students to be responsible for the results of their education rather than accepting grades as an external consequence that is out of their control. Ongoing assessment helps the students understand their progress, monitor their growth, and develop specific skills.

References for the Front Matter

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Thousand, J.S., Villa, R.A., & Nevin, A.I. (Eds.). (1994). *Creativity and collaborative learning: A practical guide to empowering students and teachers.* Baltimore, MD: Paul H. Brookes Publishing.

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