Technology as a Context for School Science

During the '60s most leaders of national science curriculum projects were anxious to rid K-12 science of all technology. Many accepted the axiom advanced by the architects of the PSSC that science in its purest form, the less technology and its related issues hold increasing attractiveness for students than does basic science (Voelker 1982). Moreover, students whose attitudes toward science actually worsened from 1960 to 1980 (Yager and Bonnstetter 1984, Yager and Yager 1985).

Many analysts of the 1960–1985 period see the elimination of applied science from school programs as the major failure of the national experiment. Nearly all studies illustrate that technology and its related issues hold more interest for students than does basic science (Voelker 1982). Moreover, young people are becoming increasingly knowledgeable about technological advances and interested in the issues they create. The opposite appears to be true for science per se: the more intense the effort to present science in its purest form, the less motivated students are to study and to learn (Voelker 1982). Students whose schools do not emphasize technology seem to learn about it from real-world issues and concerns. The situation is a paradox.

The use of technology as a context...
for learning science concepts, laws, and theories is a major topic of discussion among educators and scientists today, and many are proclaiming it as the missing ingredient in the science offerings of the '60s and '70s. We should not assume that students cannot appreciate and understand technology without their first understanding basic science. When students deal with technological devices or problems arising from technology, such a context provides concrete examples, built-in motivation, an action component, and a relevant real-world dimension. Within that environment, skillful teachers can lead students to appreciate the crucial role of science in understanding devices we encounter in daily living and in resolving specific problems. Instead of teachers and textbooks expounding on the importance of knowing basic science, students seek out the knowledge because they first see the need and the value of such information through direct experience.

Some educators argue that basic science may not be appropriate or useful for many students (Shamos 1983, 1984). If such a line of thought has any validity, it seems foolhardy to require more years of study of pure science just because lawmakers and other leaders proclaim that such experiences will help resolve the current crisis in science education.

*The Manmade World* (David et al. 1971) is an example of a curriculum project that broke away from the mold of most science programs of the '60s and '70s. The course concentrated instead on topics such as Technology and Man, Decision Making, Optimization, Modeling, Systems, Patterns of Change, Feedback, Stability, Machines and Systems for Men, The Thinking Man's Machine, Communicating with Computers, Logical Thought and Logic Circuits, Logic Circuits as Building Blocks, Machine Memory, and A MINIMICRO Computer. Although the program did not attract many users 16 years ago, many teachers are now using the activities included in the course to help students study science through technology. Recently E. Joseph Piel, an architect of *The Manmade World*, announced an industry-supported effort to revise and update the program. Word of this new effort has attracted greater attention and support than occurred when the focus was first conceived.

More and more schools are realizing the value of technology as a focus in their science programs. For example, students in Linn-Mar Middle School's (Marion, Iowa) two-year science program deal with real problems associated with dried foods, solar energy, air pollution in closed rooms, toxic wastes in the community, and heavy metal pollution in the home. Students interact with parents, community leaders, and school personnel. Their science experiences have progressed far beyond a textbook, a science classroom, and the expertise of a single teacher.

The PRISM project from the Rochester, New York, schools is another example of a program that focuses on technology and local relevance (see Osborne 1977). This program has the added goal of attracting more minority students to careers in technology.

Where technology has been tried as a focus for school science, enrollments have increased, public support for the effort has grown, student test scores have increased, and, most important, student interest and motivation have improved. Technology not only provides an entree; it seems to revitalize science study and learning and may be the long-sought vehicle to stimulate more students to learn pure science.

References


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Art Education

Organizations Voice Support for Art Education

The current renaissance in art education began over a decade ago with the back-to-basics movement. Many states passed legislation mandating that state education agencies review the curriculum to determine what subjects are essential to a child's education. As a result, the three Rs were re-emphasized, and the arts gained fresh relevance as a basic course of study in a balanced curriculum.

Instructional leaders, professional organizations, and private foundations have become increasingly committed to the visual arts in education and have produced a number of reports and studies. Among these, the Getty Trust's Beyond Creating: The Place for Art in America's Schools has received widespread and serious attention. The report recommends a discipline-based approach to art education consisting of art production, art history, criticism, and aesthetics. As the debate over the proper content and approach to art education continues, instructional leaders at all levels are joining art educators in lively discussion of the purposes of art education in schools.

In addition, numerous organizations have voiced support for arts education. Many of them also support Quality Art Education: Goals for Schools, a statement of the National Art Education Association that emphasizes three major goals for art education:

1. All elementary and secondary schools shall require students to complete a sequential program of art instruction that integrates the study of art production, aesthetics, art criticism, and art history. Two subsidiary goals are for art instruction to be conducted by teachers certified in art and for visual arts courses to be required at all levels. Nine states now mandate certified art educators in grades K-12. More states need to recognize that specialists in art are as essential to a child's education as they are in music, physical education, or reading. Also, visual communication skills do not cease to be important when a child completes elementary school and then regain relevance when a child reaches high school. Too many junior high and middle school students are being deprived of a visual arts education.

2. For graduation from high school, every student shall be required to complete at least one year of credit in one of the fine arts. The National Art Education Association states that "although one year of visual arts instruction is not sufficient to ensure the rich learning one could gain from a complete program in art," one quality course of study in the visual arts could give "students insight into how art affects and influences their lives." Effectively planned, such a course of study could "help students interpret the visual material they encounter daily and make decisions about visual experiences that are based on understanding and knowledge. . . . Visual illiteracy is as inexcusable as is verbal or mathematical illiteracy; society needs citizens whose awareness of the quality of their visual surroundings is such that they will strive throughout their lives to improve it and enhance it." Twenty-three states now require art as a part of high school graduation requirements, and more are expected to follow suit. According to the National Art Education Association, an acceptable course of study in the visual arts should include in-depth study in the techniques of at least one art medium, practice in several media, and studies in art history, aesthetics, and criticism.

3. For admission to a college or university, every student shall be required to have at least one year of credit in the visual arts. The college board considers the arts to be one of the six "basic academic subjects" valuable to a high school student's preparation for college. Although only four states now mandate or recommend the arts as a basic academic subject for preparation for college, a number of states have proposals under consideration.

1. Getty Center for Education in the Arts, Beyond Creating: The Place for Art in America's Schools (Los Angeles: The J. Paul Getty Trust, 1985). Educators may receive a complimentary copy of the report by writing to The Getty Center for Education in the Arts, 1875 Century Park East, Suite 2300, Los Angeles, CA 90067-2561.


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