Relating Technology Education to Trends in Elementary Education

A wide variety of solutions have been suggested for the challenges faced by elementary school teachers. The field of technology education appears to be in a unique position to make many of the solutions offered for educational woes practical. The authors use excerpts from the 1997 yearbook of the Council on Technology Teacher Education, *Elementary School Technology Education*.

**ESTE in the School**

There is currently an abundance of conceptions of, and confusion about, the role of the field of technology education in U.S. schools (Raizen, Sellwood, Todd, & Vickers, 1995). However, consensus is building that education about and with technology is essential for all children (Satchwell & Dugger, 1996). To many technology educators, this consensus is a clear mandate for the inclusion of technology education in public education. “Someone must meet the challenge of preparing all citizens to live in a highly technological society,” Loepp (1992) writes, arguing that the technology education profession is “in the best position to meet the challenge” (p. 20). Still, there is the sense that technology educators may have to work with professionals in other established fields of education in order to negotiate a place for technology education in the school (Sanders, 1996).

A first step in this direction is to relate important characteristics of elementary school technology education (ESTE) to compelling innovations in elementary school education. For the purpose of this article, ESTE is any “educational program in which children engage in constructional activities designed to help them learn about themselves and the world around them” (Foster & Kirkwood, 1997, p. 3).
TECHNOLOGY AND CHILDREN

Curriculum innovators have recognized the importance of constructional activities for the elementary school child, but have not demonstrated a full appreciation for the profound effect these activities can have on the intellectual development of the student. They have yet to articulate a planned curriculum that takes advantage of the readiness of the child to learn relevant aspects of technology.

Before ESTE is correlated with trends in elementary education, the development of children and the nature of technology need to be addressed.

THE DEVELOPING CHILD

Benjamin Bloom (e.g., 1985) has noted that from conception to age four, children develop 50 percent of their mature intelligence—and that from ages four to eight they develop another 20 percent. This implies that formal schooling, beginning at age five, can only influence less than half of the intellectual development of the child.

In addition to intellectual concerns, teachers and administrators must consider the physical development of children when they plan constructional activities. First-graders, for example, need smaller furniture and tools than sixth-graders, yet sixth-graders require a greater variety of tool sizes. Because children first acquire control of their large muscles and then of their small muscles, activities should be designed so that younger children use large muscles. First-graders learn to swing a hammer to drive a nail long before they acquire the dexterity to use a screwdriver to drive a screw.

Finally, schools must address the social-moral development of children. In any society, an accepted value system results in continuity of purpose, pursuit of learning, and moral courage in the face of contradictory behaviors. Public schools have no business teaching religious values. But values that are accepted by all people, such as cooperation, courtesy, and honesty are important.
whenever children are engaged in cooperative work or play.

**The changing nature of technology**

Technology has spawned positive and negative influences on society that affect the way children learn. Since technology is changing so rapidly, the teachers of our children must develop their own understanding of technology and pass this self-taught information on to their students through activities designed to allow the children to develop *their* own understanding of technology.

As peoples' use of technology has changed the world, it has also reduced the influence of significant institutions and cultures on our lives. Generations of children are different because of these changes. Dixon notes that "dozens of other momentous changes have hastened the redefinition of childhood in this century: wars, mass migrations, changes in the status of women and minorities, the pop explosion, family breakdown, democratization of institutions other than schools, cycles of boom and bust, and so on" (1994, p. 362). The factors Dixon mentions are influenced greatly by technological changes. Technology itself has changed, particularly in the changing emphasis from a goods-oriented sphere of influence to information-driven technology. Students and teachers are different from one another because their perceived and real worlds are different. Unless teachers understand the fundamental nature of the differences, they will not be able to understand the children they teach. And, unless the teachers develop a cohesive understanding of technology, they will not have the knowledge base to prepare their students for life.

**CORRELATING ESTE TO TRENDS IN ELEMENTARY EDUCATION**

The role of ESTE goes beyond simply having children know about technology. In an integrated technology education activity, especially one that requires cooperation and collaboration and results in tangible products, the teacher cannot help but develop a better realization of the way each child is developing manual dexterity, processing information, and constructing personal understanding.

Such outcomes are being emphasized as a part of recent trends in education. Several of these trends relate specifically to the role of ESTE in the classroom. They include subject-matter integration, collaborative learning, concrete learning, and curricular relevancy. If the field of technology education is to affect the lives of elementary schoolchildren, its connections to innovations such as these must be emphasized.

**SUBJECT-MATTER INTEGRATION**

Whether or not teachers and administrators recognize it, technology is in the curriculum. ESTE is evident in the social-studies unit where children learn about life hundreds of years ago in Cameroon by making models of Cameroonian homes, reading traditional Cameroonian stories, arranging their model homes into a village, and cooking and eating cassava. ESTE is evident in the math unit in which first-graders hammer nails into boards
and learn more when the concepts and skills are linked and taught together than they would if all the concepts and skills were isolated and taught separately" (1997, p. 177).

**COLLABORATIVE LEARNING**

In the past fifteen years, "cooperative" learning has become a buzzword in education. Now leaders in education are also considering the importance of **collaborative learning**.

When a group consists of students with varying talents and ability levels, the students seem to balance out one another for better understanding. In comparing pairs of high achievers with pairs of low achievers, Bracey (1994) reported that the high-achieving dyads mutually reinforced learning, while low-achieving pairs mutually extinguished learning, but that high-low pairs "were beneficial to each member in a different way" (p. 255). It should be remembered that some students learn more effectively in groups than others (Gamson, 1994).

As noted above, ESTE activities are often designed to be integrated. When the curriculum is integrated, students often work together to solve common problems (Stone, 1987). Technology activities, by their very nature, allow children to use a wide variety of materials and to engage in a wide range of activities. Avery, (Avery and Williams, 1994) looked at collaboration between vocational and academic teachers and noted that such cooperation "injects authenticity into the lives of students, many of whom have had no exposure to the connection between real life and recorded event" (p. 272). Strategies invoked by collaborative groups in solving technology-related problems often provide an authenticity that is impossible otherwise.

**CONCRETE LEARNING**

Long popular in science education, "hands-on" methods appear to be slowly gaining popularity in mathematics education. Anderson (1994), for example, described projects in which mathematics was taught through a unit on package design and construction. In the field of social studies, "object-centered learning has had a time-honored connection with the social studies and with young children" (Field, Labbo, Wilhelm, & Garrett, 1996, p 141). Rule and Sunal (1994) described an activity in which they had students arrange artifacts; Hatcher (1992) had students create their own "artifact kits" (p. 267) as part of an activity in which students demonstrated their understanding of social-studies principles. "No picture [in a textbook] can substitute for the experience of handling an object or viewing it in three dimensions," she argued (p. 267).

Clearly, activities like these lend themselves to ESTE integration. If technology education allows children to construct meaning from their environment, then activities that incorporate technology provide motivation and interest for all subject matter.
CURRICULAR RELEVANCY

As teachers know, "kids who are motivated and excited—learn" (Maselow, 1995, p. 58). And while motivation leads to learning, the literature suggests that relevance of subject matter leads to motivation.

To English teacher Lynda Gillespie (1995), "The truth is that for education to have value—for it to be meaningful and stick in the minds of our students—it must be relevant" (p. 78). However, Pahl (1995) reminds us, this is often not the case. "Research has confirmed a problem often pointed out by our students—that too many names, dates, and facts can make social studies boring and irrelevant" (p. 154).

Students who want to know why they have to learn something may be earnestly looking for relevance in their education—they're not simply complaining (Christ, 1995). So why do they have to learn this? "The typical reply goes something like this," Parnell (1996) suggested: "because you might need it someday" (p. 18). To Parnell, that familiar reply is woefully inadequate. Not only does it represent an approach to education that is failing to reach the large majority of our students, but it also tends to ignore the fundamentals of how the human brain makes connections and processes knowledge. (p. 18).

Children are stimulated to make their own meanings and connections from abstract subject matter when teachers provide them with integrated technology activities that provide real-life experiences. And when teachers present technology in meaningful ways, they can easily integrate it with other subjects. Children see the relevance of such activities and become excited about learning when they are given the opportunity to authentically solve problems and create products.

FINAL THOUGHTS

Technology education creates opportunities for elementary school teachers and technology educators to implement the latest developments in education. Curriculum innovators must consider the characteristics of children and the changing nature of technology. Technology has changed the way children process information and even the way they think. It has given them a new world to discover. We have discussed how ESTE activities should be implemented into the elementary school curriculum to provide children with knowledge of their world and to equip them with the skills to live in that world.

Teachers wishing to bring relevance to integrated, cooperative, and collaborative learning can do no better than to implement authentic, concrete, hands-on, technology-related activities.

References


Educational Leadership. 52(8), 58-61.

**James J. Kirkwood, DTE, is Professor of Industry and Technology, Ball State University, Muncie, IN. He can be reached at Kirkwood@cs.bsu.edu.**

**Patrick N. Foster** is the State Supervisor for Industrial Technological Education, Arizona Department of Education. He can be reached at patrick-foster@prodigy.net. This was a refereed article.