Looking Out for Number One

An Egocentric Elementary Technology Education

The profession of technology education is beginning to realize that the elementary school is a formidable but essential frontier. Like the Western frontier of the 1800s or the “final frontier” of outer space, it is mysterious and quite unlike anything we’re familiar with. And it is populated by strange creatures we don’t understand and quite frankly are a little afraid of: kids!

We don’t understand why a first-grader will walk away from us while we’re trying to talk to her. We can’t figure out why we can’t seem to get a third-grader to ask his classmate before borrowing a pencil or a ruler. And we’re not sure what to teach them in technology education.

After all, they don’t seem to understand us when we try to explain to them how lumber is made, or how an internal combustion engine works. So should we simply conclude that technology is something that elementary children are not ready for—that it should remain strictly a secondary subject? Before we draw that conclusion, perhaps we should look a little more closely at the psychology of the elementary child.

There are at least two major differences between elementary children and technology teachers. First, many technology teachers are very interested in the technical details of industry and technology. We like to be able to change the oil in our cars and fix our own leaky faucets. Meanwhile, most elementary-aged kids couldn’t care less about faucets or motor oil. This brings up a second point: unlike most technology teachers, children tend to be very egocentric. They are concerned with things of immediate interest to themselves. Once we begin to see how a child views the world, teaching them technology quickly becomes more straightforward.

A Psychology Refresher

For those of us who are a little rusty on the material in our Psychology 101 courses, here’s a quick recap of Freud’s components of personality. The following is not meant as a definitive description of the drama that is actually played out in the human psyche. It is merely meant as a thumbnail overview.

The id. A newborn baby has only one developed part of her or his personality: the id (Latin translation: “it”). This unconscious part of the personality is comprised of an individual’s desires and the instincts and methods used to satisfy those desires. If unchecked, the id will use the most direct methods to achieve basic needs like food and oxygen, as well as other natural desires (Freud used aggression as an example), with no regard for propriety, ethics, laws, or conscience. Freud called this...
operational philosophy the “pleasure principle” (Wittig & Williams, 1984).

The ego. Clearly, adults do not operate on the basis of the id alone. Another operational phase in effect is the “reality principle.” Desires can be satisfied in a realistic manner if time and thought are put into a solution. The id, however, does not want to wait or to waste time thinking. From very early in a person’s life, the ego (Latin for “I”) serves to balance the id by employing the reality principle. Wittig and Williams (1984) noted that Freud likened the ego to the horse rider who guides and controls his steed (the id). Often, the rider finds himself safely guiding the horse where it already wanted to go.

The superego. The ego’s continuing efforts to find practical solutions to the demands of the id represent an attempt at survival. The ego and id, operating as an internally-balanced entity, prefer actions which will increase the likelihood of survival over actions which are ethical or otherwise considered good (Bernstein, Roy, Srull & Wickens, 1991). As the ego balances and holds in check the id, the superego exercises conscience-based control over the ego-id. And while the ego finds practical solutions for the desires of the id, the superego finds ethical solutions for the demands of the ego-id (Lahey, 1989).

Egocentrism. The superego is developed by learning a set of morals or ethics, usually from parents or others. Elementary schoolchildren have a developed superego; it just doesn’t always appear to be as developed as their teacher might wish! Watching a third-grade boy shove another child out of the way in an attempt to get outside to recess (apparently without considering the consequences), an observer might wonder if elementary schoolchildren even have a developed ego—perhaps the id in some children is reigning supreme. But upon further inspection, it becomes clear that the ego is in full effect. In fact, the most practical method for that third-grader to get out to recess was to push the other child out of the way. If the id were fully in control, the child would have used the most direct method—probably jumping out of the classroom window to get outside.

The real difference between this third-grader and the average adult is not the balance between the id and the ego; it’s the egocentric nature of the child. “Egocentrism . . . is the inability to distinguish between one’s own perspective and someone else’s perspective” (Santrock, 1990, p. 267). Santrock (1990) noted that by the time a child begins elementary school, she or he may have developed some ability to take another’s perspective, but that this development is not uniform.

It is possible that the third-grader was trying to be malicious when he shoved his classmate aside. But it is more likely that he simply never considered what it would be like to be shoved aside himself. That wasn’t his concern.

Implications

Savage (1990) called the division of technology content into the industries (communication, construction, manufacturing, and transportation) “industrial technology.” While this industrial perspective may function well at the secondary level, perhaps there is another way of organizing our content for elementary schools. Recognizing elementary children as more egocentric than older students, we may find that a self-centered, personal view of technology may be appropriate for them. In fact, we may find two perspectives through which to learn technology: industrial technology which involves other people, and personal technology which involves me.

Industrial technology. For example, manufacturing is an industry which young children might enjoy learning about. Engaging them in a production line to let them experience “how they do it in industry” can easily be a source of excitement and genuine learning, as can short filmstrips, show-and-tell, industrial field trips, or demonstrations. But when the unit on industrial manufacturing is over, students may still not be able to identify how manufacturing affects them. Manufacturing remains part of the realm of the outside world which is interesting but very confusing. Most adults only peripherally understand how the manufacturing industry operates and where it fits in society. So why should second-graders be expected to comprehend such things?

Personal technology. That’s not to suggest that we should shelter children from the realities of our industrial society. But a second-grader might also benefit from a more personal treatment of manufacturing.

How about making a box? A big box or small box, or round or square, or padded or decorated, are there any boxes around the room? What do you suppose their uses are? How do you think they’re made? Do you think you could make one?

To most of us, a rectangular box is easily made or corrugated cardboard with a knife and some glue. We know that we can quickly custom-make boxes from readily-obtainable materials. But what third-grader knows this? What third-grader wouldn’t benefit from having a box she made herself? A jewelry box, or a
box for marbles, or for baseball cards or colored pencils, or maybe a box for other boxes!

Another appropriate project involves having the children build a dollhouse. That's right: a dollhouse. Girls and boys delight in fantasy play (Santrock, 1990), often involving miniatures of people and objects, such as dolls and toy soldiers. One-quarter-inch plywood is a good material for the walls, and the use of thicker wood for the floor improves assembly with nails and glue. For older students, study construction might be modeled, but generally, construction principles can be integrated into any form of this project. The social-studies component of dollhouse construction activity is probably as great as the technology component, and easily be emphasized as well. Finally, cooperative learning, problem solving, research and experimentation, and many other contemporary learning methods can be a part of such a unit.

The industrial technology content conflict. It should be remembered that a dollhouse (or toy solidier bunker, or space station headquarters) is a manufactured product, as well as a replica of a constructed shelter. But is this a construction activity or a manufacturing activity? If we are designing a sequence of industrial technology experiences which includes communication, construction, manufacturing, and transportation, this should be a very important question.

But who cares? Certainly not the children engaged in the activity. However, they do care that someone is trusting them with the responsibility of using tools and materials like grown-ups do. They do care that they get to build something in school. And they do care that they're learning while doing something they enjoy.

In the realm of industrial technology, this activity may fit into one of two content subdivisions: manufacturing and construction. This conflict is of little consequence in a personal view of technology.

Technology Education Content

The content of technology education is relatively well-defined. "As a subject for educative purposes," Bonser and Mossman considered industrial arts to be "a study of the changes made by man in the forms of materials to increase their values, and of the problems of life related to these changes" (1923, p. 5). Industrial education historian and longtime AIAA Executive Secretary Kenneth Brown wrote that this was the first and only definition of the subject (1977).

At the elementary level, this content may be divided into two wholly inclusive sets: "the knowledge and processes I use to make physical changes" and "the knowledge and processes other people use to make physical changes." To simplify, technology can be viewed either egocentrically or from the point of view of society.

Technological actions. When studying the human, technological response to a problem, we find that it contains a sequence of three major actions: designing, producing, and using (Wright, 1992). Designing, or more generically, "planning," is a preparatory stage in which one or more responses to the problem are developed theoretically. Production or "building" is the physical realization of the design. Use is the application of the product to the situation which induced the technological action. Products, of course, may be used for reasons unrelated to their intended use. Some common applications of technology are improvements to human communication, construction, manufacture, and transport.

Ideally, a fourth action—assessment—takes place after the use of the product. Here the impacts of the product's application on individuals, society, and the environment are evaluated.

At the elementary level, the actions of technology may be divided into two wholly inclusive sets: Doing, which involves planning and building, and Using, which investigates how technology is applied and what effects such application has (use and assessment). This hierarchy is summarized in Figure 1.

Methodology

Technology instruction at the elementary level usually involves, in large part, student activity. This is due not only to the nature of the subject, but to the belief, attributed to Comenius, that activity precedes concept learning (Nelson, 1981). Another consideration is the attention span of the children. Expanding on Santrock's (1990) discussion, attention span is not always shorter for younger students; however, children are much more selective about what they'll pay attention to for longer periods of time. For an elementary school student, an enjoyable activity can easily consume a half-hour or much more (Santrock, 1990). Generally, when students are "doing technology," they are engaging in technology activities.

While there is no strict set of criteria which can be used to determine what is—and what is not—a technology activity, most technology activities feature all or
most of the following characteristics. These characteristics—construction, problem solving, feedback, redesign, content, authenticity, and impact consideration—are intended as guidelines only.

Construction. A technology activity is constructive. The student changes the forms of materials constructively; otherwise the student is not participating in technology. "Elementary schoolchildren," Santrock pointed out, "are far from having physical maturity, and they need to be active ... physical skills are a source of great pleasure and accomplishment for children" (1990, p. 348).

Problem Solving. In a technology activity, a solution to a problem is designed. The result of the changes the student makes in the forms of materials must be in response to a specific need or "problem." Sometimes a child will enjoy working material without an apparent aim or goal. There is nothing the matter with this! While this isn't usually part of a technology activity, it can be valuable in teaching children the use of tools, a methodology described in the next section.

Feedback. In a technology activity, feedback is provided to the student as to the strengths and weaknesses of the solution. Otherwise the student is solving the problem in a vacuum.

Redesign. The opportunity for improving the solution is available to the student in a technology activity. Otherwise the student cannot take advantage of the feedback provided.

Content. Some general concept related to technology is reinforced in a technology activity. The activity may be part of an overall sequence designed to teach students some area of technology. In the example of making a box, students might learn about fasteners and adhesives, when to use reinforcement during construction, and how to accurately cut material.

Authenticity. The importance of this was emphasized by Scobey (1968): a technology activity for elementary school students can and should have practical and authentic qualities. The student can often use the same principles that a technologist would to solve the problem.

Impact consideration. Because the students should be solving a real-world problem, the impacts of the problem should be investigated in a technology activity. Of course, in a personal consideration of technology, this can only succeed if the students are able to put themselves in the place of others. To some degree this is possible (Bernstein, et al., 1991), but will vary greatly from student to student in the typical elementary classroom.

While students are "doing" technology (i.e., planning and building), they are likely to be "using" technology as well. For this reason, much of the content about the use of technology may be presented when appropriate during technology activities.

For example, if a technology activity that students are engaged in involves wood as a material, content relative to the use of the saw, hammer, and abrasive paper might be presented during the "doing technology" activity. Similarly, if students were publishing a book, they might receive instruction in the use of the word processor, photocopier, and side-stitch stapler.

"Using technology" content which the teacher wishes to present, but which does not relate directly to "doing technology" content, may be introduced using several methods in addition to oral instruction. Here are some examples.

Demonstration and practice. There are many technological products students may need or desire to use in school, at home, or in other places. Some of these may be electronic, such as a computer or VCR in the classroom; others may be manual, such as a coping saw or a pair of scissors. Each of these technology products—tools—has a proper and safe method of use. Such use can be demonstrated by the teacher and practiced by the students.

Engaging in common use. Many technologies are in common use
around the home each day. Examples of this include the use of a fork, an egg beater, or a microwave oven to prepare food, or a needle and thread to repair clothing. Students themselves can engage in these everyday activities to gain competence and confidence in using technology products. The major difference between this and the “demonstration and practice” method is that “engaging in common use” and its results are authentic.

Research. The proper use of some products might not be known to the teacher. In fact, one unifying characteristic of many manufactured products is that they are distributed with instructions for use. If students do not know how to use a computer program, battery-powered screwdriver, or vacuum cleaner, they may be encouraged to read the instruction manual, or otherwise engage in research to determine the proper and safe use of the product.

Exploration. The use of many products may be best learned by exploration and experimentation. This is particularly true of computer software, especially in creative applications.

Conclusion
There are many totally inclusive schemes for dividing technology content into areas of study. For the senior and junior high schools, some have found that the Jackson’s Mill organizers (Snyder & Hales, n.d.) of communication, construction, manufacturing, and transportation are effective. But at the elementary level, other ways of dividing content may be equally valid.

Using an appropriate filter through which to view the content of technology, and being aware of appropriate teaching and learning methodologies, technology educators may have the tools to make inroads into the elementary school. Once we begin to understand elementary school children, we should also have the confidence to use those methods to teach that content to children.

REFERENCES

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