Editorial

Are We Compromising Safety in the Preparation of Technology Education Teachers?

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As our curriculum has evolved over the 40 plus years that I have been invested in technology education (formerly industrial arts education), I have observed with interest the various changes that have occurred. I entered industrial arts (IA) as a junior high school student in a mixed woods and metals class in the early 1960's. My school experience was almost entirely an unhappy one save for my "shop" class. Yes, even though leaders in the field of IA had already begun encouraging the abandonment of the word "shop" in favor of the more academic sounding "laboratory," we kids called it "shop." And, we knew what the class was about too. From our perspective, shop was about "makin' things." In hindsight, as a professor with a Ph.D., I now know that the goals of my teachers and the classes that they taught little resembled "makin' things in shop"—rather, the projects and other activities were both the sugar to make the medicine go down and the learning activities that transmitted information and skills more effectively than mere lectures and reading. I still have the chessboard, candy dish, lathe turned bowl, carved salad servers, model cannon, tool tray, and (the ubiquitous) lamp that I made in my two junior high shop classes. What's more important, I have a great deal of knowledge and skills that I can apply to many problem solving situations which neither I nor my teachers could have envisioned back then. And I know how to be safe in a lab and safely use equipment. In high school I took one year of drafting and three additional years of Woodshop (by that name). The solid cherry drop-lid desk (secretary) that I built in advanced woods was the one thing that kept me from dropping out of high school and eventually led me to both a scholarship and a career as an alternative to the petty criminal track that I had already begun to enter. When I accepted the scholarship to become a shop teacher and entered the nearby college to receive the education, I was exposed to new ideas. The professors

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there didn't call the instructional facilities shops—they were labs. The projects were learning activities or products. There was much more emphasis on why a student might build a jewelry box than on the quality of the joint in the tiny drawer that was part of it. My high school shop was well equipped, but this college lab in which I was to be prepared as a teacher was pitiful, at best. There were even some fools already talking about how we should abandon woodshop all together! And this was in the late 1960's.

On the other side of the argument, there were some diehards who maintained that teacher preparation students of that era were substandard in technical skills; that they didn't have the technical knowledge or skills to be safe in producing projects themselves and therefore most certainly could not lead school children in such endeavors. The 1960's progressives pressed for incorporation of other materials such as plastics, leather, ceramics, etc. in addition to the tried and true woods and metals. New topics were advanced such as surveying and thermoforming, along with mass production techniques replacing individual projects and general labs instead of unit shops. The traditionalists maintained that we should continue to do what we always had done and do it well—we knew who we were and should not be ashamed of it. But, despite the wide gulf of differences, both the progressives and the traditionalists did agree about one thing. That is, safety was one of the most important things for secondary school students to learn and it was foremost in all of the lab or shop classes in the education of IA teachers. Safety was paramount and in the center of everything we did.

The early 70s found me teaching one of the new *World of Construction* courses from the Industrial Arts Curriculum Project. I had mixed emotions about it. On the one hand, I liked some aspects of it very much but on the other I feared that there was something missing when the highest level of finish a student learned to apply was latex paint and that the creative spirit of the classes I loved so much in high school was gone. I had to find answers for my students who asked why they had to work in groups to build a wall section and then disassemble it instead of getting to build a gun rack like their older brother did the year before. I knew in my heart that something more than simply "shop" was going on, but I was not sure whether it was better or not. Nonetheless, safety was paramount! Students learned and demonstrated safety in every activity.

As I advanced in my profession, becoming a successful IA teacher and going on for graduate work, I not only observed the debate about the value of developing skills in the use of tools versus conceptual content, but I eventually became embroiled in it myself. Which side did I take? Up until about 1982 I was on the progressive side, pushing for a broader understanding of technology with less emphasis on vocational type skills, along with more concern that students understood "the big picture." My cognitivistic viewpoint led me to seek connections between topics in IA and the academic subjects. My belief that students preparing for tomorrow needed to understand and respond to the challenges and impacts of technology impelled me to weigh "how to do" less heavily than "why." Moreover my concern that IA be infused more clearly into

the general school curriculum and thereby cutting our vocational apron strings made me seek ways and opportunities to teach content from all school subjects via our activity-centered approach. The "standards" developed by many other disciplines were in tune with this thinking as well. Slowly, however, I began to have some fears about the new direction our curriculum was taking.

The early 1980's found me in my new role as teacher educator rather than teacher. I had my first opportunities to go out into the schools and watch fledgling teachers test out their developing wings. The institution at which I taught had wholeheartedly embraced the progressive thought—there was a manufacturing class, but no woods or metals class pre-requisites. There was communications, but no drafting, electronics, or printing. There was transportation, but no mechanical, engines, or similar classes. And, of course, we had the construction class to round out the entire "designed" world, but students came to the class with no experience with a saw, plane, or nail. The program ran for a couple of years before we produced our first student teachers. A few of those early students were great because they had come into the program from other careers or had completed technical programs at a community college that gave them lots of "shop" skills. However, the ones we had produced from freshmen were absolutely frightening to observe! Their cooperating teachers were aghast at how little these aspiring teachers knew about "how to do" and about safety. The quandary for me was that I still believed in all that was positive about the progressive approach and why it was what the youth of the 80's needed for success in their lives. At the same time, I recognized that the teachers who would lead school programs needed far more skills and knowledge than they were gaining in our progressive college program. We responded by adding a required series of traditional skills classes to our curriculum, including woods, metals, drafting, graphic arts, plastics, electronics, and power-mechanics. The aspiring teachers who had this experience were excellent in all regards. They knew what to teach in the modern era, they knew how to teach, they had skills and understood materials and processes well, and they were safe and knew how to teach safely as well as how to teach safety as a subject of study. Then we became "Technology Education."

As we began to try to live up to our new name, secondary schools and teacher preparation programs across the nation dropped skills classes in favor of systems classes, mimicking what had already failed at my institution. Deans and department heads were elated at the space and money savings and the fresher image of smaller, cleaner labs and fewer hands-on classes. The institution at which I teach today no longer has a woods class or a metals class or a required electronics class. Students never disassemble, inspect, and reassemble a small internal combustion engine. They can lead a class discussion about the impacts and potentials of new technologies, but not a one of them could actually cut a dovetail joint and many of them would not even recognize one! Cluster courses such as Materials and Processes, Imaging Technology, the big four of Manufacturing, Construction, Transportation, and Communication, and a new Emerging Issues course have replaced all of the traditional skills courses. We

are well in step with trends in the profession. But are we headed in the right direction? Are we missing anything important?

At the time I began writing this manuscript, I had just returned from the Eastern Regional TECA Conference in Virginia Beach. While watching the Manufacturing competition, I remarked to one of my colleagues, "These students know a lot of technology, but they don't know a darned thing about woodshop!" The students were attempting to make jigs and fixtures and then use them to produce a small football kicking tee using mass production processes. I saw one student trying to cut a 3/8" dowel rod with a ripsaw. The method used to enlarge a hole was to "waller it out" with the drill rather than using an appropriately sized larger drill. Early in the preparation phase one team chose to use a piece of wood with the grain oriented in the wrong direction to make a jig, resulting in a failure on its first trial. It was clear that no one on the team knew any better. Safety was stressed in that everyone wore eye protection and each team marked danger areas with yellow caution tape. They also designed and made guards for jigs and fixtures and posted instructions for their use. Yet it was clearly evident that their knowledge about the woodworking processes was so minimal that they did many operations in unsafe ways.

Immediately after the competition, I received a call on my cell phone from my university informing me that we had had a minor accident in our own lab involving a kickback on a table saw. When I investigated upon my return I realized that the student simply did not have the benefit of enough experience to make a wise and safe decision about how to use the tool. By plunging students directly into problem-solving activities without prior skill development classes, in which they learn to "feel" the power of the tools while performing simple operations, we are very likely endangering them. How many of my colleagues shudder when they look into the production areas of their labs?

Now we find that the new debate in our profession no longer concerns whether or not we are vocational-industrial, emphasizing skill development in the use of tools. Instead there is increasing emphasis on whether we stress engineering design. Courses on either end of this spectrum or anywhere between involve some conventional tools and machines and how they are used to process variety of materials. Though few labs today include the 14" radial arm saw I used in junior high school, there are smaller versions of tools like this in many labs. Some of these tools are high quality, but others are simply not designed for school use are unsafe in a school environment. A table-top size circular saw in one of our labs vibrates so much that I would rather have students use a hand-held saw instead. In conclusion, I feel that the labs of today are less safe, the students of today are inadequately instructed in safety, and the teachers of today simply do not have adequate experience with equipment to lead students safely.

In the March, 2007, issue of *The Technology Teacher* an article appeared by Gunter concerning teaching safety in the modern era. It listed numerous references and resources for information about safety and safety training. One resource that was not listed is *Safety System Design for Technology Education* (3rd Edition) by DeLuca and Haynie (2007). This guidebook examines the four

systems courses, points out hidden hazards in our modern labs, and provides activities and forms for students to use to incorporate safety awareness and planning throughout the technology education curriculum. Some colleagues in technology teacher education use this guide as a text or a reference in their laboratory management/safety instruction for pre-service or in-service teachers. Obviously, as one of the authors, I am flattered by their positive comments about the whole-view approach the guide takes on safety education. Nonetheless, I still do not feel that the labs monitored by graduates of the typical technology teacher education program of today can possibly be safe when they receive so very little training in the use of the tools they will be expected to use and to teach about. Despite some personal yearning for "the good ole days" when life was simple and a good woodshop class defined our curriculum, I know that there are more important things to teach that are more appropriate for the majority of students in the nation's public schools. Just the same, I believe that we need to retain some emphasis on skills in our technology teacher education programs so that our graduates will know enough to recognize hazards and be able to maintain safe labs in their schools. Increasingly universities are being expected to prepare teachers within a maximum of 120 semester hours. At the same time, there are increasing expectations for instruction and experiences on diversity, special needs learners, English as a second language, integrated curriculum, and general education. In addition, our programs are expected to align with the National Council for Accreditation of Teacher Education, the Standards for Technological Literacy, No Child Left Behind, and other local and state expectations, along with the increasingly rapid changes in the needs of our students and of society in general. Somehow, we have to assure that our future teachers have adequate skills and knowledge to assure their own safety and the safety of the students they serve in spite of our burgeoning curriculum and the above requirements.

References

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