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Improve or Perish, Revisited -- Again

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Improve or Perish, Revisited—Again

By Johnny J Moye and Petros J. Katsioloudis

The technology and engineering profession has not remained stagnant and has changed with the technological and educational requirements of the time. However, there is still work to do.

Students use geometry and spatial awareness to enlarge images used in lino-printing.

Those who do not remember the past are condemned to repeat it. One does not have to be a historian to realize the truth in those words. It is true of words written years ago concerning the health and well being of the technology and engineering education profession. Karnes (1959) published *A Major Problem in Education: Improve or Perish* and Gallagher (1993) published a follow-up to that article with *Improve or Perish–Revisited.* Both authors identified issues critical to industrial arts and technology education respectively. This article revisits and addresses some of Karnes' and Gallagher's concerns as well and provides examples of how the technology and engineering profession has laid a foundation for the improvement of general education in the United States.

In his article, M. Ray Karnes (1959) identified three specific concerns facing the industrial arts profession. They were:

1. "Industrial arts programs may be sharply curtailed."
2. As "competition for a place in the curriculum increases, industrial arts personnel in America seem to assume, in far too many instances, a defensive posture."
3. Professionals should take a "positive approach" when addressing industrial arts programs. (p. 5)

In 1993, John V. Gallagher *revisited* Karnes' article and provided a very detailed list of concerns for what was then called technology education. Gallagher opened his article by stating: "Except for this author's substitution of 'technology education' for 'industrial arts,' the warning to the profession . . . applies more today than ever before" (Gallagher, 1993, p. 28). Two of Gallagher's concerns were that "colleges graduate fewer technology teachers than ever before," and that a "number of technology teacher education programs have been discontinued or are scheduled for closing" (1993, p. 28). He also discussed how "current national trends in education [did] not include technology education nor the subject of technology as an imperative area of study" (Gallagher, 1993, p. 28). Gallagher's introductory paragraph concluded by stating: "...the profession must dramatically increase professional performance and leadership, and cut new paths in technology education at all levels" (Gallagher, 1993, p. 28).

It was a very different world when M. Ray Karnes (the then American Industrial Arts Association President) published his article in 1959. A major concern of the United States government was "evidence and rumor relating to gains being made on the educational front in Russia" (Karnes, 1959, p. 5). On October 4, 1957, the Soviet Union launched the first Sputnik satellite, and "politicians and press attacked the nation's educational system for inadequate math and science training. Engineering students flocked to American universities" (Miller, 2007, ¶ 1). Today, students are no longer flocking to universities; in fact the United States struggles to produce enough scientists, technologists, engineers, and mathematicians (Moye, 2009).

There is evidence that the technology and engineering education profession has evolved over the years to address current and future educational needs, but there is still no firm consensus concerning the direction of the profession. In 1985 the American Industrial Arts Association (AIAA) changed its name to the International Technology Education Association. In 2010, the International Technology Education Association membership voted to change the organization's name to the International Technology and Engineering Educators Association (ITEEA). Some ITEEA members may offer differing views concerning what the name change means to them. To the authors of this article, the change represents the idea that improving students' technological (STEM) literacy is much more than teaching technology; it requires students to learn design and engineering principles as well as developing the cognitive ability to apply those principles to solve problems. When discussing the name change, Starkweather (2008) summed it up nicely when he stated, "The real questions ahead may not be so much related to a name, but rather to what teaching and learning for the current generation of students should be like in the years ahead" (p. 26).

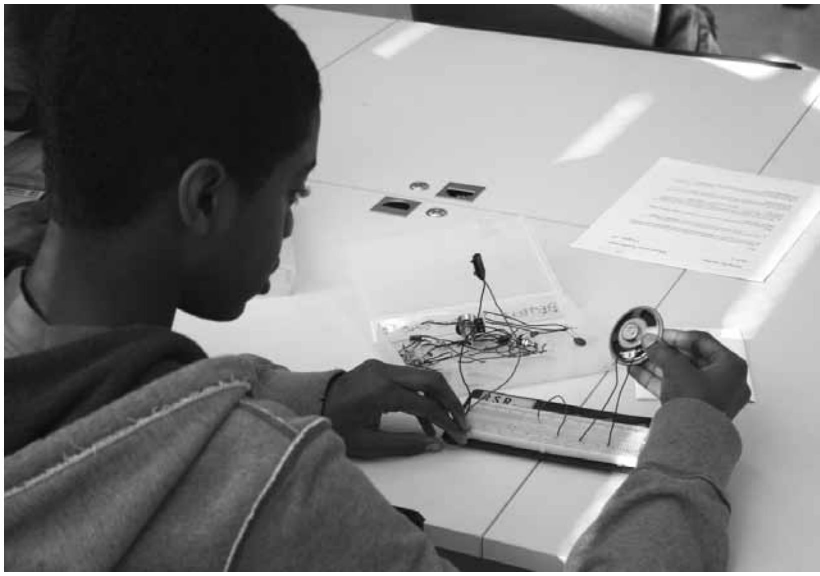
Technology and engineering education presents students with problem-based activities that require them to use design and engineering principles. These principles require a student's understanding and utilization of STEM subject content. Technology and engineering education is an excellent vehicle to integrate STEM as well as social science information into technology and engineering lesson planning (Moye, 2008). It is important to remember that the STEM acronym is still relatively new to our vocabulary. The ITEEA name change and the fact that technology and engineering comprise one half of the STEM acronym (and education approach) are examples that the technology and engineering profession has not remained stagnant and has changed with the technological and educational requirements of the time. However there is still work to do.

A student solders a surface-mounted device in his Electronics 2 class.

One of Karnes' (1959) concerns was that "industrial arts programs may be sharply curtailed" due to budget constraints, increased core academic requirements, and the "increase in tendency to counsel pupils away from industrial arts elective courses" (p. 5). Fifty years later, these concerns continue to exist. Technology and engineering education courses are considered electives in most states, and it is difficult for students to include more courses into their schedules. Wright, Washer, Watkins, and Scott (2008) found that technology education teachers felt that there was a strong "lack of respect/status/program value" (p. 89) for their programs and that they believed that technology education "was used as a dumping ground in public secondary education" (p. 90). Gray and Daugherty's (2004) study of what factors influenced students to enroll in technology education programs found that respondents indicated that high school counselors were not influential in their career choice of technology education. These feelings may indicate that both faculty and student respondents believed that high school counselors did not fully understand technology education and thus did not direct students into those courses. When asked of the most important issues facing the technology and engineering profession today, the Pennsylvania state technology education supervisor stated: "The major problem facing Technology Education is the misunderstanding of what we are and offer students" (W. Bertrand, personal communication, January 20, 2010).

Both the Karns (1959) and Gallagher (1993) articles expressed concerns that the number of technology education programs and the number of teachers those programs produced were decreasing. Very much a concern then, the situation has become even more critical (Moye, 2009). So critical that Volk (1997) predicted the demise of technology education preparation programs by 2005 due to decreased enrollment trends. When discussing problems facing the profession, Len Litowitz (Millersville University) stated that: "There are many problems facing technology teacher prep today. Perhaps the greatest problem is simply the lack of technology teacher prep programs in the U.S." (personal communication, January 16, 2010). Wright and Devier (1989) reported that, in 1987, there was an approximate surplus of 70 industrial arts/technology education teachers in the United States, "compared to a surplus of 100 the year before" (p. 3). They also identified that the number of students enrolled in industrial arts/technology teacher education programs declined significantly during the 1980s (Wright & Devier, 1989). Ndahi and Ritz (2003) found that, in 2001, 71 institutions produced 672 technology education teachers. In 2007/2008, 32 institutions produced 258 teachers (Moye, 2009). The Ndahi and Ritz (2003) and Moye (2009) studies concluded that between 2001 and 2008 the number of institutions producing technology teachers decreased by 45%, and the number of teachers produced decreased by 38%. The demise of technology education teacher preparation programs as Volk (1997) had suggested has yet to occur, but maintaining the required number of technology and engineering teachers is certainly at a critical stage.

Gallagher identified that "technology teachers must change the ways they do their professional tasks" (Gallagher, 1993, p. 28). The technology and engineering education profession has taken many steps between 1959, 1993, and the present to *improve* the education it provides students. Two very significant events concerning professional task guidance were the development of the *Jackson's Mill Industrial Arts Curriculum* (Snyder & Hales, 1981) and the creation of *Standards for Technological Literacy: Content for the Study of Technology (STL)* (ITEA/ITEEA, 2000/2002/2007). The Jackson's Mill document placed a focus on the areas of communication, construction, manufacturing, and transportation laying the foundation for the content that is currently being taught in most technology and engineering courses. *STL* "presents a vision of what students should know and be able to do in order to be technologically literate" (p. vii). Program names (industrial arts/technology education/technology and engineering education) and the content taught in those programs have evolved over the years. That evolution persists, as programs continue to change in order to prepare students for science, technology, engineering, and mathematics-related professions and continued education. Program name and content changes are not the only concern. Technology and engineering teachers must prepare themselves to meet current and future needs. In some respects, teachers could be considered the weak link in the evolution of change. Sanders (2001) stated that "Programs calling themselves 'technology education' now outnumber 'industrial arts' programs six to one" (p. 51); however, "Four programs in ten still associate with vocational education, a slightly higher percentage than did so in 1979" (p. 52). When discussing technology teacher preparation, Lewis stated:



A student completes a bread board project in his Electronics I class.

> The implications for teachers are that they would need at minimum to possess some measure of domain knowledge in the main disciplinary areas of the standards (such as

manufacturing, construction, or transportation). Teachers should also possess some agreed-upon competence level in mathematics and science. There are implications here for the retooling of both preservice and inservice teacher development programs (2005, p. 50).

In closing, Karnes (1959) stated:

> The plea here is that every industrial arts teacher in America engage in a critical analysis and evaluation of industrial arts education in his community, that he make a concerted effort in the interest of continued improvement of the education program in general and of industrial arts in particular. Programs of the highest quality are not likely to evolve under the restrictive influences of a defensive attitude. Teachers in all phases of education are working energetically and aggressively to strengthen their respective programs. Poor programs in any field will find it increasingly difficult to gain and maintain support; the future for industrial arts programs of high quality is indeed bright (p. 5).

Gallagher (1991) concluded his article by stating, "We must save our profession. No one else will do it for us" (p. 31).

The Future is Bright

In these authors' opinions, not all is doom and gloom, but as previously mentioned, there is still work to do. To use an old nautical term, the technology and engineering profession must *keep a steady strain* to move technology and engineering education into the future.

Many indicators show that our profession has maintained a steady strain, and the future is bright. Today there are more females and minorities enrolling in technology and engineering courses than in the past (Sanders, 2001). There is an "increase in the number of states that include technology education in the state framework" (Dugger, 2007, p. 14). There is research indicating that technology and engineering education helps students perform better on their standardized core academic tests (Reed, Harrison, Moye, Opare, Ritz, Skophammer, Wells, Kwon, Carlson, & Figliano, 2008). Another indicator is that, in 2008-2009, the National Assessment Governing Board/National Assessment of Educational Progress (NAGB/NAEP) developed an assessment tool designed to gauge student technological and engineering literacy. The development of this assessment tool indicates that the United States Government realizes the benefit of the technology and engineering education profession and the necessity to measure the progress of American students' technological and engineering knowledge.

A defensive attitude is a deterrent to progress (Karnes, 1959). Our profession has demonstrated many successes, and we must advertise those successes rather than take a defensive posture! The technology and engineering profession has changed more than just its name over the past 40 years. It has changed what is to be taught and how to teach and assess what has been taught as well as how to perform program evaluations (ITEA/ITEEA, 2003). It is time to broadcast what technology and engineering education is all about and how it benefits students and our nation! For many years our profession has, as Karnes stated, "taken a defensive position" (1959, p. 5) when discussing our profession. The future is bright for the technology and engineering profession, and a defensive position is not necessary.

Karnes (1959) and Gallagher (1993) suggested that the industrial arts/technology education profession must continue to improve in order not to perish. The programs have prospered because leaders have recognized this fact and addressed past concerns. Our profession will not *perish,* because we recognize that the key to continuous improvement is to visit and revisit concerns, again and again.

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