Technology Education: Three Reasons Stereotypes Persist

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On February 17, 2006, the *CBS Evening News* aired a story entitled, "Kids Build Soybean-Fueled Car" (Hartman, 2006). The story on CBS demonstrated both the positive effects that technology education (TE) can have on secondary students and the negative stereotypes that continue to exist about TE. CBS detailed the efforts of minority TE students at West Philadelphia High School as they attempted to build a bio-diesel powered car. Ultimately, the students succeeded in building a car that was both fuel efficient and offered excellent acceleration (Hartman, 2006).

The story "Kids Build Soybean-Fueled Car" offered insight into the thought process prevalent in TE classrooms across the United States, demonstrated what could be accomplished with a group of students that had little (or no) academic expectations, and showed the relevance students saw in a well-designed TE class. Conversely, the CBS reporter repeatedly referred to the class as "Auto shop," mentioned that students in the class had been removed from other classes for "Disciplinary reasons," and showed pictures of an all male class with a White male as their teacher (Hartman, 2006).

Americans who viewed the CBS story saw an insightful group of minority urban students who used critical analysis to solve a complex real world problem. However, as the public viewed the accomplishments of the students at West Philadelphia High there was a perception that this type of achievement was the exception to

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what occurs in most American high school "auto shop" classes. Furthermore, the age old reputation that "auto shop" is a place for male students who could not succeed in traditional classes was not disputed, even as the term "auto shop" is outdated. Finally, the audience was introduced to the familiar concept of an "auto shop" teacher, a White male.

Many viewers were rightfully taken aback by the amazing accomplishments of the disadvantaged youth at West Philadelphia High School; nevertheless, there was clearly an underlying message that such success is not expected in TE. Unlike most viewers, TE professionals who observed the story of students building an incredible car had to wonder why, despite all of the positive ideas displayed, was TE still portrayed as "shop class" or a dumping ground for students who had failed elsewhere?

The likely answer to why the American public continues to stereotype TE is because TE lacks a unified name with a comprehensive curriculum, fails to recruit significant numbers of female and minority undergraduate students, and fails to educate non-TE teachers about the scope of TE. Until TE addresses the reasons why stereotypes persist, the American public will continue to misunderstand and misrepresent the TE curriculum.

Non-Uniformity Creates Misunderstanding

If TE professionals do not believe the general public fails to understand TE they should simply remember the times they have defined TE to someone outside the profession. Hoepfl (2003) noted the problem TE professionals have when defining TE by citing a phrase that is a common starting point, "Remember industrial arts?" (p. 6). It is hard for someone outside of TE to understand the current content of the TE curriculum if a TE professional uses an antiquated term as the primary descriptor. Furthermore, as soon as the term industrial arts (IA) is used it becomes the main descriptor and presents the public with a mental picture of a "shop class." Even though some TE teachers still use IA to define TE, Akmal, Oaks, and Barker (2002) noted, "Over the past 20 years, technology education has worked diligently to move from a subject where students

primarily manipulated materials (industrial arts) to one of systematic instruction about technological systems and enterprises (technology education)" (p. 2).

TE has tried to distance itself from the IA descriptor, this is evidenced by the fact the American Industrial Arts Association changed its name to the International Technology Education Association (ITEA) in 1985 (Foster, 1994). Over 20 years has elapsed since the formal change of TE, but there is still lack of national uniformity, both in the discipline's name and its curriculum. Confusion within the discipline naturally leads to misunderstanding by those outside of TE. Demonstrating the divisions present within TE, Akmal et al. (2002) found the names, "Technology education, industrial technology, industrial and technology education, industrial technology education, introduction to technology, and professional technical education" (p. 5) used as course titles for TE curriculum in 39 states. Adding to the public's confusion about the content of TE is the mergence of pre-engineering education as a portion of TE. Pre-engineering's emergence as a yet another name of TE was documented by Lewis (2004) who found, "Three states (Massachusetts, Utah, and Wisconsin) now include "engineering" in the official name of subject" (p. 28). The issue of including engineering in the name of the subject is further compounded in states where pre-engineering in the form of Project Lead The Way (PLTW) is an accepted part of the technology education curriculum. In Indiana which Lewis (2004) called, "A strong PLTW state" (p. 28) Rogers (2005) found, "Indiana technology education teachers have embraced pre-engineering education as a valuable component of technology education." (p. 13). Pre-engineering and pre-engineering in the form of PLTW have essentially added two other names by which TE may be known.

The large array of names makes it clear that TE is a divided curriculum and provides a basis for understanding why the public does not comprehend TE. The lack of a uniform name and curriculum is further exaggerated by the fact the United States is a modern and transient society. For example, if a student enrolls in a traditional subject that subject is likely to be similar at any two locations within the United States. Conversely, it may or may not be

the case that TE classes are the same, or even similar, in two locations. If a student moved between schools they might find a TE course with any of the variety of titles described earlier.

Some TE professionals might argue that since the TE curriculum was adopted a relatively short time ago it will take some time for the public to become familiar with TE. It would seem, however, since TE has been in place for over two decades the public would be reaching a point where many individuals had taken a TE class or have had friends or relatives enroll in a TE class. Regardless, the lack of a comprehensive universally accepted curriculum model under the banner of TE has greatly hampered the public's understanding of TE. Without cohesive universally accepted guidelines and standards it is likely that TE will avoid universal recognition and continue to be many divergent curriculums under many names.

The fact that TE has many names and curriculums makes it appear that TE is fractionalized and that TE is destined to break into numerous divisions. Consequently, there was a national effort to unify TE under an all-encompassing curriculum, in 2000 the ITEA created Standards for Technological Literacy (STL) (ITEA, 2000). The goals set forth in the ITEA's STL are admirable and give an excellent idea about the scope and rigor of TE. However, standards are only useful if they are implemented and Akmal et al. (2002) noted roughly one-third of states, "were aligned with current educational reform and had established standards for technology education, reporting they used established standards and benchmarks to assess curricular effectiveness" (p. 6). Essentially state supervisors of TE told Akmal et al. states can accept or reject the STL at their own discretion. Thus, STL must be revised so they are universally accepted or groups such as the ITEA must work to ensure their implementation is mandated at the federal level.

The problem of TE using various standards in the same state was demonstrated in a study by Cardon (2002). Cardon detailed the wide range of curriculum that is taught under the banner of TE in the state of Michigan, "Districts are encouraged to follow state benchmarks and goals, but each can decide the curriculum design it wishes to follow" (p. 145). Cardon's findings about the implementation of

standards demonstrate the immense task that would be necessary to unify TE under one set of standards in the state of Michigan. Imagine what would be necessary to unify thousands of districts in 50 states. As the implementation of standards was left to the discretion of each district it is not surprising that Cardon found, "A significant difference in the implementation of technology education curriculum designs among secondary schools within the state of Michigan" (p. 147).

After demonstrating the difficulty TE standards faced in one state, Michigan, it should not be surprising that in 2002 only 34% of the states stated they had adopted some type of technology standards (Akmal, et al., 2002). With such a low percentage of states adopting TE standards it would seem the problem of non-uniform standards, and thus curriculum, could have been addressed sooner in order to avoid the current confusion surrounding TE. Currently, the TE movement is 20 years old and not well understood by the public.

To some TE professionals the fact TE has failed to unite teachers under one name and one curriculum is disconcerting at worst and not a problem at best. Some TE professionals believe it is acceptable or even desirable, that teachers in various regions of the country have the autonomy to teach the curriculum they see fit. Those who believe in local control of TE standards trust their curriculum design(s) can better prepare students for the future than can one imposed by a national organization such as ITEA or PLTW. If no TE teacher subscribed to the local autonomy belief why have the STL not been universally accepted? Additionally, those who subscribe to the local autonomy belief fail to see how the lack of a common name and curriculum prevents the public from understanding TE.

The general public's lack of understanding about the TE curriculum is largely because it has so many divergent paths that have led it to elude branding. Hoepfl (2003) defined the branding concept by stating, "Branding a product involves identifying a market and the image to be conveyed, then positioning that product in a way that it is accessible to others" (p. 6). It is obvious that TE has not been branded by the general public, at least not in a successful, productive, and meaningful way. Without successful branding it is impossible to sell or market any product and this

harkens back to the stereotypes presented by CBS. It is unlikely the narrator of the CBS story knew about TE, because it has never successfully been branded. However, the term "shop class" had been branded and the public continues to recognize this image in place of a branded TE image.

Lack of Undergraduate Recruitment

The lack of a non-uniform curriculum affects the public's perception of TE, but there is another issue that also perpetuates stereotypes about TE. The failure of TE to recruit females and minorities into undergraduate technology teacher education programs (TTEP) is a serious problem. Should TE ever hope to completely legitimatize itself it must address the stereotype that it is a profession open only to White males.

As early as 1992 Daugherty and Wicklein recommended, "The technology education profession should develop strategies to overcome stereo-typical perceptions of the discipline" (p. 10). It would not be difficult to suggest that one of the stereotypical perceptions that Daugherty and Wicklein described, and the public envisions, is that of a White male instructing male students in a traditional "shop" class. By failing to address these perceptions as incorrect TE has perpetuated stereotypes and has failed to produce a universally accepted product.

Akmal et al. (2002) offered a glimpse into the future of TE, "In short, due to political agendas, reductions in funding, and some confusion over what constitutes technology education, technology education is facing some serious challenges in the immediate future," (p. 12) from this quote it is apparent the survival of TE will depend on creating a large number of advocates. The greatest way to ensure TE continues to exist will be for many students to enter a TTEP in the coming years. In 1998, Wright and Custer noted, "The technology education profession has made only limited efforts at recruiting students into technology education preparation programs" (p. 1). The lack of recruitment is disturbing as Akmal et al. noted, "The demand for technology education teachers increases, yet almost all states reported a shortage in the preparation of new technology

education teachers" (p. 7). Akmal et al. and Wright and Custer presented their findings despite the fact that every TE professional knows the survival of TE depends on undergraduate students enrolling in TTEP. Yet, there is surprisingly little information about strategies for recruiting potential students into TTEP. Any recruitment strategies involving TE programs must address two vital areas. First, before successful recruiting can occur, the name and curriculum debate must be addressed. Secondly, and just as critically, TE recruitment must address the lack of diversity in its university level programs.

Perhaps the lack of a cohesive national TE curriculum is causing students not to enter TTEP, because without a common name how is it possible to recruit students? Any recruitment effort will be stifled by the fact the TE curriculum may have multiple labels in one state. Furthermore, undergraduate students may not know about TTEP at their (or any other) university or may not fully understand the scope and concept of TTEP. In 1998, nearly a decade and half into the TE movement, 43.9% of TTEP majors believed, "Their original intention was to become an industrial arts teacher," and, "About 20% indicated that they did not know the difference [between IA and TE] when they enrolled in the teacher education program" (Wright and Custer, p. 4). It seems hard to believe that students entering TTEP could not define TE. Yet the fact TE is splintered, coupled with a lack of recruitment literature makes it a highly believable scenario. It is a distinct possibility that undergraduate students simply did not (and continue not to) know TE programs existed at their university. How could an undergraduate student choose TE as a major if they have never heard the curriculum identified as TE?

What research there is about recruiting students into undergraduate TTEP notes that long standing traditional methods of recruitment are the least likely to influence students to enroll in TTEP. Wright and Custer (1998) found, "Video or audio-visual presentation about technology education," and, "Brochures distributed at the high school or community college." (p. 8) were the least affective ways to reach potential TE teachers. Wright and Custer make it clear that university professors need to be more active

in recruiting potential TTEP students and less reliant on traditional recruitment methods.

Another problem that hinders TE's perception is the lack of the diversity in the field. It is no secret that TE has long been dominated by White males. Regarding the lack of diversity in the field Sanders (2001), said,

> Despite these demographic shifts, technology education is still mostly taught by middle aged white men. The impli-cations of an aging white male faculty at a time when the field is promoting "technology education" for all are obvious and must not be overlooked (p. 52).

Mike Fitzgerald, the Technology Education Specialist for the state of Indiana, documented the situation in Indiana when he confirmed the lack of diversity by indicating that in 2004, 5.4% of Indiana TE teachers were female. Further demonstrating the lack of diversity, Fitzgerald could not offer a percentage of minority TE teachers in Indiana (M. Fitzgerald, personal communication, March 29, 2006).

The nationwide under-representation of females and minorities in TE was documented by Sanders (2001) who found that, "Concerning the enrollment of minorities Sanders found, 'Minority students comprise one-fourth of technology education enrollment, paralleling the minority proportion in the general population' " (p. 52).

While the number of female technology education faculty members appears to be improving; as noted by Sanders (2001), "Only one faculty member in ten is female this is ten times the percentage reported two decades ago" (p. 52). Despite these gains, Akmal, et al. in 2002 documented that 14 states expected the number of females in TTEP in their state to decrease or remain at the current level. The status of minority TTEP students is even more concerning as, "The ranges of minorities in technology teaching varied from 0 to 10 to more than 350 in certain states" (Akmal, et al, 2002, p. 9). Furthermore, 58% of states, "Reported that their state did not have policies, recruitment plans, or incentive programs for attracting minorities into technology education training programs" (Akmal, et

al, 2002, p. 9). Akmal et al. further discussed the lack of minorities entering TTEP by noting, "The lack of effort to recruit, however, is alarming since it indicates that states place limited value on the recruitment of minority pre-service teachers into technology education" (p. 11). With females and minorities underrepresented it is not hard to fathom that unless recruitment practices change the public will continue to be view TE as a field suitable only for White males.

The lack of diversity in TE is an even greater concern when one realizes how that lack of diversity could affect recruitment. Wright and Custer (1998) discovered that high school students are most likely to enroll in a TTEP if they received, "Encouragement from high school IA/TE teacher" (p. 8). Wright and Custer's finding coupled with Sanders (2001) notion that, "As technology education continues of search for solutions to the growing teacher shortage, female and minority technology education students offer obvious and untapped potential" (p. 52) indicates that females and minorities are still lacking in TTEP. It is likely that secondary students might be more receptive to enrolling in a TTEP if they received encouragement from a TE teacher who understands the essence of being underrepresented. Recruiting, enrolling, and retaining undergraduate female and minority TE students would not entirely erase the problem of lacking diversity, but would ensure TE is more representative of the American culture.

The addition of females and minorities as faculty members in TTEP would also help legitimize TE at the collegiate level as, Wright and Custer (1998) found TE majors believed, "Personal interaction with university faculty," (p. 8) was a deciding factor when students decided to enter at TTEP. It is only logical to assume that if more female and minority students enter TTEP then more will continue to the graduate level. Once female and minority graduate students become faculty members in TTEP they could interact with secondary students to ensure consistent numbers of females and minorities enter TTEP. The addition, at the secondary and post-secondary level, of females and minority TE educators would also help female and minority recruitment by addressing a suggestion offered by Wright and Custer, "If university faculty and high school

teachers were to unite in their recruitment efforts; their combined effort would likely have a substantial impact" (p. 8).

TE's historical failure to recruit students from more than one cross-section of the American population needs to be addressed because it is likely a reason that some females and minorities have avoided TE as a profession. Because of the failure to recruit female and minority undergraduate students TE has neglected to erase the stereotype that it is a discipline limited only to White males.

The Perception of Technology Education Among Professional Educators

Finally, before it can overcome the stereotypes that persist among the public, TE must address the perception it has within the educational community. There are many TE teachers in the United States who are following the STL and working diligently to ensure that females and minorities begin to view TE as a viable career. Nonetheless, TE teachers may be the victims of stereotypes within their own schools and communities.

It may not matter how secondary TE teachers apply the STL because the location of their classroom may have the greatest influence on how non-TE teachers perceive TE. Cardon (2002) found in Michigan, "That woodworking laboratories were indicated as the most prevalent laboratories used in the field at 67.9%" (p. 145). The fact that in one state, and probably more, TE is conducted in a room that for a number of years was the "industrial arts" or "wood shop" room makes it a logical assumption that some non-TE teachers might believe the only thing TE has changed is its name. Thus, many teachers, students, and members of the local community may believe TE is still a "shop" class.

The confusion non-TE teachers have about the content of TE is well documented. In 1992 Daugherty and Wicklein noted, "There seems to be persistent confusion outside of the discipline, particularity in the disciplines of mathematics and science, as to what characteristics exemplify technology education" (p. 1). TE often aligns itself with math and science but as little as 14 years ago TE was misunderstood by those members of the educational community.

In an era of increased accountability if the perceptions of the past are not addressed then TE will continue to be misunderstood and may stand to be eliminated in many schools.

In retrospect, the arguments presented by Daugherty and Wicklein are very similar to some of the arguments still prevalent in TE. Does TE wish to have a universal name and curriculum and join the educational community or remain splintered and risk elimination? In 1992, Daugherty and Wicklein demonstrated that math and science teachers who did understand TE noted connections must be made between TE, math, and science, as it was discovered, "Technology education teachers, the mathematics, and science teachers perceived a strong need for the technology education discipline to develop strategies to overcome stereotypical perceptions often held by associated faculty member" (1992, p. 10). Overall Daugherty and Wicklein's study also found that TE teachers tend to believe to a greater degree they were covering topics of math and science than did math and science teachers. An argument could be made that as a direct result of the type of perception displayed in Daugherty and Wicklien's (1992) study many TE programs have adopted a pre-engineering focus. Twelve years after Daugherty and Wicklien's study Lewis (2004) reasoned that many TE programs had adopted a pre-engineering moniker because, "The pool of engineering students is too small, programs are vulnerable beyond middle grades, and increasing pressure on schools to have their students meet normative s academic criteria" (p. 8). Even if TE teachers do not adopt a pre-engineering curriculum it is important TE teachers stress TE's connections to math and science. Daugherty and Wicklein (1992) noted how integrating math and science standards in the TE curriculum would help the subject by stating, "Coordinated planning that includes professionals from mathematics, science, and technology education is a critical component for the future of integrated curriculum among the three disciplines" (p. 10).

To demonstrate how non-TE teachers failure to understand TE can perpetuate stereotypes Daugherty and Wicklein (1992) noted, "Technology education potential can not be fully reached until there is a clear understanding across disciplinary boundaries as to what characteristics exemplify technology education" (p. 10). Yet, after 14

years it can be argued the suggestions of Daugherty and Wicklein (1992) have not been realized. The failure of TE to address the perception problems of more than a decade has resulted in continued stereotyping of the discipline among professional educators.

Conclusion

Technology and the job of educating students about technology has been changing and evolving since the dawn of humanity. Many TE teachers have readily adapted to recent changes and seek to educate a diverse group of students about the ever changing world of technology. However, there are some within the TE community that have been slow to react to curricular, social, and perceptual changes of the past two decades. If TE is ever to overcome the stereotypes with which the general public has branded it, then corrective action must be taken. First, TE must unify under one name and one curriculum, the chosen name and curriculum must be cognizant of future technological evaluations. Secondly, TE must erase the stereotype that only White males enter the discipline by actively recruiting and retaining female and minority secondary and post-secondary instructors and students. Finally, TE must stress its connections to math and science if it is to overcome stereotypes within the educational community. If TE successfully addresses these important issues then it is possible future generations will know TE as the curriculum CBS stated, "Says a lot about the potential of our young people" (Hartman, 2006). Should TE fail to address the current stereotypes then the American public, as CBS did, will continue to identify students in TE as the "Bad news bears of auto shop" (Hartman, 2006).

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