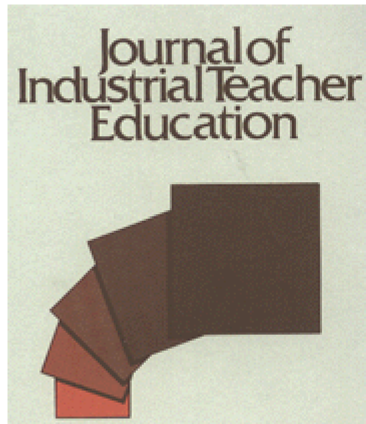

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The Status of Technology Education: A National Report on the State of the Profession

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Technology education has progressed through several iterations over the past 100 years and continues to evolve as the primary medium for preparing children and youth in technological literacy. The recently published *Standards for Technological Literacy* emphasize the importance of technological literacy for all citizens by stating that:

> Technology has been going on since humans first formed a blade from a piece of flint, harnessed fire, or dragged a sharp stick across the ground to create a furrow for planting seeds, but today it exists to a degree unprecedented in history. Planes, trains, and automobiles carry people and cargo from place to place at high speeds. Telephones, television, and computer networks help people communicate with others across the street or around the world. Medical technologies, from vaccines to magnetic resonance imaging, allow people to live longer, healthier lives. Furthermore, technology is evolving at an extraordinary rate, with new technologies being created and existing technologies being improved and extended. (International Technology Education Association, 2000, p. 2)

It is both logical and imperative that the preparation of students for an advanced technological world should be of paramount importance in our society (Eurich, 1990; MacKenzie, 1983). Over the past 20 years, technology education has worked diligently to move from a subject field where students primarily manipulated materials (industrial arts) to one of systematic instruction about technological systems and enterprises (technology education). The *Standards for Technological Literacy* more clearly define an operational agenda for the advancement of technological literacy for our nation's school-age youth. These national standards are based on six years of discussion, planning, validation, consensus building, and documented needs assessment information profiled from around the nation and world (ITEA, 2000).

This study is the third in a series of national surveys that have systematically assessed the status of technology education in the United States and Canada. The first two studies (Chinien, Oaks & Bouten, 1995; Oaks, 1991) were conducted to determine the progress in the United States on the progressive movement from industrial arts to technology education and the establishment of a national census on technology education in Canada. Those two research studies provided the profession in our contiguous nations with informative data and insights regarding both the status and evolution of technology education and perspectives regarding societal expectations of children in technological literacy.

A recently published study on the status of technology education in the United States (Newberry, 2001) also provided data and information on the status of technology education based on the impact of the reform movement and its impact on the profession. The Newberry study featured three questions focused on whether technology education was included in each state's educational framework, whether technology education was required in each state, and how many technology teachers were working in each state. Information from this study was very informative and useful in providing a perspective on key elements of the status of the profession.

This study, a more recent analysis of the overall status of technology education, has been expanded significantly beyond the Oaks (1991), Chinien and Oaks (1995), and Newberry (2001) studies to include more indepth information regarding the general health and wellness of technology education in the United States. Eleven of the most critical issues and trends in technology education were selected and examined based on current literature, information from state technology education supervisors, and information profiled in the previous published articles. From a synthesis of these eleven topical areas, five major areas of focus emerged:

1. The status technology education holds at the state level and in schools.
2. The change in technology education program demographics during the last five years.
3. The degree to which extant curricular designs reflect current educational reform (the standards movement) and the evolution of technology education from industrial arts.
4. The current and future trends of technology educator supply and demand.
5. The diversity of school populations as reflected in technology education programs.

These five major areas became the focus of a comprehensive analysis of the profession, which began with the design and method of the research.

Methodology

Subjects

In the first comprehensive "state of the profession" study conducted by Oaks (1991), three nationally recognized technology educators, including the president of the International Technology Education Association (ITEA) and deans of two nationally recognized schools of technology, were asked to serve as advisors and to recommend the appropriate group to poll regarding progress in the transition from industrial arts to technology education. The research advisory group concurred that the state supervisors of technology education/industrial arts were best positioned to respond based on their depth of knowledge of technology education in their respective states.

For this study, the researchers asked representative school administrators, teachers, department heads, state supervisors, and higher education and state technology association leaders to identify the single most appropriate group having knowledge of information specified in the survey questions. The unanimous consensus was that supervisors have the primary responsibility for oversight of technology programs and that they were the single most qualified group to provide information requested in the survey instrument. Based on this recommendation, the state supervisors of technology education (or their designees) were selected. Next, a representative group of state supervisors was contacted to confirm that, based on information requested in the survey, they were the only individuals in their state who had recent data and information requested in the survey.

It was acknowledged that although these professionals were deemed the most appropriate to respond to a survey, certain limitations were inherent in their selection. For example, each supervisor's political, philosophical, administrative, and personal perceptions regarding technology education would vary, especially in light of the current sociopolitical and economic constraints placed upon state departments of education. The role(s) and responsibilities of this group varied somewhat with many supervisors "wearing several professional hats." Due to the sensitive nature of their responses, some individual state supervisors requested that confidentiality be maintained. That request was honored. Although limitations were acknowledged, representatives of the state supervisors' national group also affirmed that they were the single group of professionals who were most often called upon to speak to all topics addressed in the survey. Group members agreed to participate as the primary data collection agents.

Survey Instrument

Once the state supervisors agreed to participate, a questionnaire was designed specifically for state-level technology education supervisors' responses. It was based on instruments used by Oaks in the initial study (Oaks, 1991) that assessed the degree of change from industrial arts to technology education in the United States and by Chinien, Oaks, and Boutin (1995) in their study of the state of technology education in Canada. Those two instruments were analyzed, significantly expanded to collect new and to update previously analyzed data, and validated for content and usability by a representative group of state supervisors. The document was then further reviewed, analyzed, and suggestions made by a representative group of K-12 technology educators for accuracy and content appropriateness. The survey instrument was then reviewed by the Social and Economic Science Research Center, a nationally recognized survey agency located on the Washington State University (Pullman) campus. Finally, the state supervisor group examined the document for summary review and approval prior to mailing.

Data Collection

A mail survey was used for data collection. Questionnaires were sent to the technology education supervisor or designee in the state education offices of all 50 states. A cover letter, the research instrument, and a prepaid, self-addressed envelope were mailed to respondents. Three weeks after initial mailing, a telephone follow-up was conducted to personally encourage non-respondents to complete and return the instrument. Those supervisors who did not respond were contacted a third time and encouraged to return their surveys by fax or traditional mail. Six weeks later, a final attempt was made to contact non-respondents by phone and email. The ultimate return rate was 39 of 50 states responding, or 78%.

Data Analysis

Data generated by the instrument were entered into a database and a descriptive analysis including means, percentages, and frequency distributions was conducted. Data were summarized by the identified research topics guiding the study and further organized into five areas of study. Extensive qualitative feedback provided by respondents was also reported, to provide contextual richness and depth to the study results.

Findings

Importance of Technology Education

The first series of survey questions addressed the recognition and status of technology education within each state. The purpose of these questions was to establish a clear picture of how technology education was perceived at the state level. As illustrated in Table 1, there were wide differences in responses from the 39 reporting states.

Table 1
Recognition of Technology Education (TE) within States (n = 39)

	Definitely Yes		**Somewhat Yes**		**Probably Not**		**Definitely Not**	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
1. Within schools and communities of your state, is there a clear understanding	2	5	21	54	9	2	7	18

among Industrial Arts, TE, VocEd and Instructional or Educational Technology?								
2. Is TE valued and recognized in your state?	11	28	24	62	2	5	1[a]	3
3. Does TE hold high status in the state office of education?	9	23	26	67	4	14	0	0
4. Do current TE initiatives (Tech Prep, Work-Based Learning, M/S/T, etc.) have a positive impact on recognition of TE in your state?	11	28	17	44	0	0	11	28
5. Is TE required in your state?	8	21	0	0	0	0	30[a]	77

[a]Cell total does not equal 39 due to respondent omission on a single item.

Although 35 of 39 (90%) state supervisors reported that the field of technology education held relatively high status in state offices of education and was valued and recognized in their state, they also reported that only 8 of 39 states (21%, or 16% of all 50 states) required technology education in their school curricula. Twenty-eight respondents (72%, or 56% of all 50 states) also believed that Career and Technology Education (CTE) initiatives and programs such as Tech Prep, Work-Based Learning, Career Pathways, Eisenhower, etc., had a positive effect on recognition of technology education. Eleven of 39 state supervisors (28% or 22% of all 50 states), however, reported that initiatives had no effect on recognition of technology education.

Demographic Change in Technology Education

When examining the evolving field of technology education we determined a baseline of demographic information as a context for understanding change needed to be established. This component of the research instrument was designed to provide data illustrating the current state of technology education programs in the United States. The first question in this section of the survey asked, "Has your state changed the term 'industrial arts' to a different name?" Respondents indicated that the nomenclature transition from industrial arts to technology education (or other titles) had occurred in 31 of 39 states reporting on this item. Only 4 of 39 reporting states used the term "industrial arts" to identify their new technology-based curriculum. The next question asked was, "If yes, what is the current name for what was formerly known as industrial arts?" All responses fell within a range of commonly known titles, including Technology Education, Industrial Technology, Industrial and Technology Education, Industrial Technology Education, Introduction to Technology, and Professional Technical Education.

Data from the two earlier technology education census studies (Chinien, Oaks & Boutin, 1995; Oaks, 1991) revealed that the transition from industrial arts to technology education was taking effect. When questioned as to whether or not traditional industrial arts and technology education were both currently operating in the state, however, 34 states indicated yes and five indicated no. In terms of percentages, supervisors were asked to approximate what percentage of programs was industrial arts and what percentage was technology education. Though answers ranged from 10% to 85%, an aggregate average determined that approximately 48% of programs reported were operating as industrial arts and 52% as technology education, with three supervisors of the 39 states indicating they did not know either percentage.

Data indicated that the number of programs in technology education over the past five-year period had increased at all levels—elementary, middle, and high school. Ten states reported a decrease in number of programs. Table 2 illustrates those changes.

Table 2

Changes in State Technology Education Program Numbers over Past 5 Years (n = 39)

	Elementary		**Middle**		**High**	
	n	**%**	**n**	**%**	**n**	**%**
Increased by 10 or more programs	13	33	18	46	20	35
Increased by 1-9 programs	4	10	2	5	7	18
Remained the same	4	10	12	31	3	8
Decreased by 1-9 programs	1	3	1	3	3	8
Decreased by 10 or more programs	0	0	2	5	5	13

The number of K-12 technology education programs within a given state varied greatly. Numbers of programs in each state varied from zero to 1500 at the elementary level, zero to 1000 at the middle level, and less than 50 to 850 at the high school level. Of states that maintained more than 250 Technology Education programs (n = 15), the mean number of programs ranged from 586 to 650. Of states that reported less than fifty programs, seventeen occurred at the elementary level, four at the middle level, and two at the high school level.

Survey data revealed that a wide range of resource levels existed for technology education programs (0 to $14 million). Despite this, the overall status of technology education programs within states was reported to have increased in 17 states, decreased in 6 states, and remained approximately the same in 11 states. Some states and districts spent very little on technology education if it was not self-supporting. Although some states chose to fund their programs in ways that supported the growth of technology education, others had limited their funding support for technology education.

Curriculum Models

State supervisors reported a variety of curricular models utilized at the elementary, middle, and high school levels. Traditional topics in production, materials and manufacturing, transportation, energy, and safety were present and newer topics such as biotechnology, pre-engineering and computer technology were also described.

At the time the survey was administered, 31 of 39 state supervisors reported that their states had either curriculum guides or plans for technology education in use. However, only 17 of 39 reporting states (44%, or 34% of all 50 states) were aligned with current educational reform and had established standards for technology education, reporting that they used established standards and benchmarks to assess curricular effectiveness. Of that number, only eight state supervisors were certain whether or not those standards and benchmarks had a positive effect: five reported some positive effects; two supervisors reported no discernable effect; one reported a negative effect; and one reported being unsure of any effect. Several states reported that standards were not yet developed but were in the process of being developed. A listing of the titles of those standards is not provided in the context of this article since titles of standards varied widely, with most states' titles being unique to those states.

Another major national curricular trend was the integration of technology education into disciplines such as math and science.

When state supervisors were questioned on the integration of technology education with other disciplines, survey data indicated that only 6 of the 39 (15%) reporting states were actively engaged in interdisciplinary curriculum development. Twelve states (31%) classified the technology curriculum as a specialty area, and 21 states (54%) reported technology education curriculum as both integration and specialty areas. Supervisors indicated integration was occurring at the elementary (28%), middle (38%), and high school (54%) levels. These number totals exceed 100% because some states indicated that integration was occurring at more than one level.

Teacher Supply/Demand & Teacher Education Programs

The majority of respondents had fewer than 500 Technology Education teachers in their states. Seventy-two percent of reporting states (n = 39) had fewer than 50 teachers at the elementary level categorized as technology education teachers. Twenty-eight states (71%, or 56% of all 50 states) reported fewer than 500 technology education teachers at the middle level and 26 states (67%, or 52% of all 50 states) reported having less than 500 teachers at the high school level.

Study data concerning technology teacher education programs show the imbalance between the number of technology teachers in states, the number of technology teachers produced by states, and the projected numbers of technology education teachers needed over the next five years. Thirty-five of the reporting 39 states (90%, or 70% of all 50 states) reported that they had between one and five technology education teacher preparation programs, while only one state indicated that it had more than five programs (between 6 and 10). Three states reported no teacher preparation programs. The change in number of teacher preparation programs from five years ago was not significantly different. However, as is evident from Table 3, the demand for technology education teachers has increased significantly. Only two states showed a change—and that was a decrease—in the number of teacher preparation programs for technology education. In terms of numbers of college graduates exiting technology teacher education programs, 21 states (54%, or 42% of all 50 states) graduated between 1 and 10 new technology education teachers per year, 7 states (18%, or 14% of all 50 states) graduated 11-20 teachers, 4 states (10%, or 8% of all 50 states) graduated 21-30, one state (3%) graduated 31-40 teachers, and two states (5%) graduated between 41 and 50 teachers per year.

The demand for technology education teachers increased, yet almost all states reported a shortage in the preparation of new technology education teachers. That shortage ranged from as low as two teachers in states that reported an adequate current supply (but projected to soon become inadequate) to as high as 200 in those states that reported a current shortage. The current demand was much lower than the projected demand over the next five years. Table 3 illustrates those projections.

Table 3
National Supply and Demand of Technology Education Teachers over Next Five Years (n = 39)

	Increased		**Decreased**		**About the Same**	
	n	**%**	**n**	**%**	**n**	**%**
Technology Education Teacher Supply	3	8	28	69	8	21
Technology Education Teacher Supply	38	97	0	0	1	3

Student Organizations and Leadership

Of the 39 state supervisors who responded, 31 indicated that their state had a person who was designated as the state's technology education student leadership supervisor. The sometimes-blurred boundaries between technology education and vocational education become clearer here. When asked about student membership in organizations such as TSA, VICA/Skills USA, Young Astronauts, JETS, or other choices, respondents identified such programs as HOSA, DECA, FBLA, and FFA. Specific to technology education, 28 states (72%) indicated that TSA was available for student leadership opportunities, 22 (56%) reported VICA/Skills USA, 2 (5%) had Young Astronauts, 5 (13%) had JETS, and 2 (5%) reported the others mentioned above.

Respondents were then asked to provide the numbers of student organization chapters in their state. Most respondents focused on VICA/Skills USA and TSA, but some included other organizations as well. The number of chapters broke down fairly uniformly up to a point with five states (13%) reporting they had 1-10 chapters, five with 11-20, five with 21- 30, and two (5%) with 31-40 chapters. Seventeen states (44%) indicated that they had more than 40 chapters, ranging from 55 to 305, and two states were unable to report how many chapters existed.

Elementary Technology Education Programs

Only 10 of the 39 respondents (26%, or 20% of all 50 states) indicated that their states recognized technology education as part of the elementary curriculum. Twenty-one of 39 reporting states (54%, or 42% of all 50 states) said their state did not recognize technology education as part of the elementary education curriculum, and two did not know. Within the ten states whose elementary programs include technology education, two included it as a separate topic—that is, providing students with a technology experience that was not part of the core curriculum; five integrated it into specific areas, and eight infused it across the curriculum.

Diversity in Technology Education

For technology education to reflect the growing diversity in American schools, a baseline of current, minority teacher employment numbers needed to be developed. This study separated questions concerning numbers of women in technology education from questions about numbers of racial/ethnic minorities in order to ascertain accurately what the status of minority groups in technology education was.

The Status of Women Teaching in Technology Education

The national initiative to increase the number of women teachers in technology education was not reflected by the survey of state technology education supervisors. Survey results from states offered wide ranges (from 0 to 250) in numbers of women currently teaching technology education at the three levels (grades K-6, from 0 to 50 females; grades 7-9, from 1 to 250 or more females; grades 10-12, from 1 to 175 females). When state supervisors were asked if their state had policies, recruitment plans or incentive programs for increasing women technology education teachers, 35 of 39 reporting states (90%, or 70% of all 50 states) answered that they did not, three (8%, or 6% of all 50 states) reported that they did, and one supervisor did not know. The projected number of women graduating from technology education teacher training programs over the next five years was expected to increase in 16 of 39 states (41%, or 32% of all 50 states), to decrease in one state (3%), and to remain about the same in 13 states (33%, or 26 % of all 50 states).

The Status of Minorities Teaching in Technology Education

Data regarding the status of racial/ethnic minorities were similar to those for women technology teachers. The ranges of minorities in technology teaching varied from 0 to 10 to more than 350 in certain states. Just as with recruitment of women, 29 out of 39 reporting state supervisors (74%, or 58% of all 50 states) reported that their state did not have policies, recruitment plans, or incentive programs for attracting minorities into technology education teacher training programs. One state supervisor indicated that an attempt to increase the number of minority technology education teachers was being made through a recruitment plan, and six state supervisors did not know if their states had any such incentive programs. State supervisors projected that the number of minority technology education teachers enrolled in training programs would increase in 13 of 39 reporting states (33%, or 26% of all 50 states), decrease in two states, and remain the same in 12 states (31%, or 24% of all 50 states). This closely paralleled the data for women technology teachers. Table 4 illustrates a side-by-side comparison of the two categories.

Special Education and Technology Education

The national movement to include students with special needs into regular education classrooms was verified for technology education by survey data. Ninety-seven percent of respondents (n = 39) confirmed that students with special needs participated in technology education in their states (the remaining 3% did not know). All reporting states had their students participating through inclusion models, while three states supplemented these programs with separate technology education classes. Thirteen states had students with special needs participating at the elementary level; 28 states had students participating at the middle level; and 30 states had students participating at the high school level. Congruent with the high rate of inclusion of students with special needs into technology education programs, 16 of 39 state supervisors (41%, or 32% of all 50 states) reported that their teachers received pre-service training, inservice training, or other professional development in preparation for working with this student group. Interestingly, 17 of 39 state supervisors (44%, or 34% of all 50 states) reported that their teachers received no training concerning students with special needs, while six state supervisors reported they did not know.

Table 4
Projected Enrollment of Underutilized Groups over Next Five Years (n = 39)

	Increased		**Decreased**		**Remain about the Same**	
	n	**%**	**n**	**%**	**n**	**%**
Projected enrollments of women in Technology Education training programs in next five years	16	41	1	3	13	33
Projected enrollments of racial/ethnic minorities in Technology Education training programs in next five years	13	33	2	5	12	31

Discussion

Overall Status of Technology Education

Consistent with earlier studies regarding the continued evolution of technology education programs, this study illustrates that there is still some confusion in the titular (and probably philosophical) orientation of technology orientation. Though no states reported using the term "industrial arts or industrial education" for technology education, when asked if traditional industrial arts and technology education operated concurrently, 34 of 39 states reported yes. Additionally, some uncertainty existed between technology education and educational technology. One state supervisor reported that "Ed. Tech. versus Tech. Ed. is still a problem," and another indicated, "TE and ET are most confusing." The indiscriminate mixing of technology education, industrial arts, and other vocational programs was further borne out in terms of describing student leadership organizations operating within the state. Supervisors reported student organizations such as HOSA, DECA, FBLA, and FFA as part of technology education, further underscoring the wide range of interpretations used by states in defining technology education. Indeed, some states subsume technology education under the umbrella of vocational education and those supervisors seemed most likely to list non-technology organizations as part of technology education.

A sharp dichotomy existed between those states that continued to invest in technology education and those states that did not. Interestingly, most supervisors (35 of 39 respondents) agreed that technology education was somewhat or definitely valued by their states. Survey data did not strongly support this proposition, however, as 31 of 39 (79%) states did not require technology education as part of the school curriculum. Funding also played a critical role in this situation.

The varied levels of funding of technology education programs across states clarified what happens when the resources available are limited and programs must compete for dollars. Comments from state supervisors regarding how their programs must be self-sufficient in order to exist illustrated the challenges faced by technology education programs in some states. One state supervisor noted that for school programs, "over 90% of program dollars go to salaries," leaving few allocations for program growth and development. This is in direct contrast to the number of new programs being developed at the elementary, middle, and high school levels. Twothirds of reporting states noted an increase in programs, while less than onethird claimed a decrease in programs. The increase was based on recognition by school districts of the need for technology education rather than on the funding provided to increase programs. Technology education "is recognized and valued in the teachers' home districts [but not at the state level]," wrote one supervisor.

These same funding challenges impact technology teacher training institutions as well. One participant noted that in his state there were three technology teacher education programs, two of which were closing. Political, programmatic, state, and budgetary constraints are eliminating university teacher preparation programs and creating an increased demand for new technology education teachers (Newberry, 2001; Oaks & Loepp, 1989). Perusal of the *Industrial Teacher Education Directory* (Bell, 2001) produced by the Council on Technology Teacher Education (CTTE) and the National Association of Industrial and Technical Teachers (NAITTE) shows this to be true. This directory illustrates the reduction in technology education programs over programs listed in directories from the previous ten years. Conversely, data from this study demonstrated that the demand for new technology education teachers at the K-12 level is increasing. Over half of the 39 reporting states (54%) indicated that their technology teacher preparation programs graduate between one and ten new teachers per year. This supply is far outstripped by the demand for new teachers. Projections for the next three years show that supply of new technology teachers even in states producing the most teachers (40-50 per year) was lower than the demand for new technology teachers. Projections by the U.S. Department of Education and others (Fideler & Haselkorn, 1999; Yasin, 1999) have indicated that, nationally, the need for new teachers in all fields over the next decade will be as great as two million. Weston (1997) estimated that nationally, over the last five years, 13,000 vacancies in technology education had occurred. Clearly, technology education is already experiencing the demand projected, and will be hard pressed in the next five years to meet the further growing demand.

Equally critical to the future of technology education is the need for increased teacher diversity (Johnstone & Parker, 1987). According to this study, 35 reporting states (n = 39) do not have programs to attract more females into the technology teaching profession. In 1994, Pedras, Oaks, and Vail reported, "the issue of women in Technology Education is indeed not promising" (p. 41). Other studies have confirmed this trend (Dugger, French, Peckham, & Starkweather, 1991; Miller, 1990; Wright & Devier, 1989). Furthermore, 29 of 39 reporting states (74%, or 58% of all 50 states) do not have programs for recruitment of minority teachers. The ability to attract minorities into the teaching profession as a whole has been difficult on a national scale, as minority students often choose other undergraduate majors (Burge, 1990). 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.

Curricular Models and State Standards

The standards-based reform movement in education has affected technology education, though not as strongly as some more traditional core disciplines (e.g., social studies and mathematics education). Despite considerable discussion about standards and their implementation in social studies and mathematics, "there is no single legitimate version of social studies education or even mathematics education" (Eisner, 2002, p.4). Technology education seems to follow a similar path. Thus, when only 8 of 39 state technology education supervisors (21%, or 16% of all 50 states) reported that their standards based approach was having a positive effect, the information is of concern, but not alarming. This low rate may be because the national standards, though available, had not yet been adopted or implemented or that the state standards, while operational, were not required. Standards may well have been adopted, but in many cases, the standards thus far have had limited impact. Therefore, the "trickle-down effect" has not had the positive impact that will be expected in the future. It is also possible that state personnel who supervise technology education may not have the same depth of information as their colleagues in some professional associations. Just as in the national standards movement, what occurs at the national level does not always translate into action or is not easily adopted at the state level for some time. The influences of curricular reform efforts take time to become recognized and accepted. In fact, as the ITEA (2000) standards document notes, "getting these standards accepted and implemented in grades K-12 of every school will certainly be far more challenging than developing them" (p. 205).

As this study demonstrates, some states have neither reformed their technology education practices nor implemented standards. One supervisor wrote, "We have benchmarks, but they are not mandatory." Another supervisor noted, "Our state curriculum guide [is] a few years old and [followed only on] a volunteer basis." This should change as state technology education programs continue to evolve and become aligned with the national reform effort and the ITEA *Standards for Technological Literacy*.

Although each state's curricular models were similar at the topical level (manufacturing, construction, communication, biotechnology, etc.), they remained highly individualized in terms of titles. Despite the fact that the standards have been published, they now need to be applied to curriculum development, teacher preparation and continued development, and student and teacher assessment. Newberry (2001) reported that this process has begun in earnest as the common standards provide the impetus for alignment. Unfortunately, just as Petty (1991) observed years ago, the current teacher shortage will also slow or prohibit the implementation of programs in some states.

The integration of technology education into other disciplines was cited as a growing curricular trend as well. Although technology was still regarded as primarily a specialized field and taught as a specialty course, it was increasingly used to augment elementary, middle, and high school curriculum through an integrated or contextual approach. This change can be further accelerated if, as Lovedahl (2001) suggests, a technology education course becomes a requirement for all teacher education programs.

Implications for the Profession and Society

Results of this research study offer significant insights into the national state of technology education and technological literacy. For example, less than 5 of 39 reporting states believed that their programs were well funded and growing while others reported the closing of technology education teacher preparation programs and the halting or reduction of funding. As one state supervisor commented in response to the question regarding funding, "The program was going strong until the dissolution of it!" The supply of new technology teachers is dwindling while demand is rising. 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.

If the United States continues to emphasize the role of technology in society, then a dissonance exists between what is seen as valuable and what is actually valued (Pearson & Young, 2002) through monetary support provided. Schools continue to develop programs with little support from state or federal governments. Some schools have begun to require a credit in technology education for high school matriculation. The effect of this "unfunded mandate" is evident in the 33% of states that are closing technology teacher education programs and eliminating technology education at the K-12 level. These program closings illustrate the disparity between educational needs and the heavy reliance of the U.S. on technology in the next century that Wash, Lovedahl, and Paige (2000) have documented. This myopic view will surely have repercussions on Americans' comprehension of technology, now and in the future.

A decreasing number of people in America understand the key concepts of technology or are able to think critically about technology (Pearson & Young, 2002; Lewis, 2000). The California energy crisis exemplifies this trend. Citizens complain bitterly about power prices, buy energy saving appliances, then use more power than they would have if they had maintained the original equipment, all the while devising conspiracy theories about power generating companies. Moreover, the U.S. has moved further towards the service sector as manufacturing jobs move offshore in order to save money for corporations. According to the U.S. Department of Commerce Bureau of Economic Analysis, the *U.S. National Income* by Industry tables illustrate that adding the income earned from mining, construction, manufacturing, transportation and public utilities totals $100 million less than that of the service and finance sectors (McGeveran, 2001)—a visible change in the direction of this nation's economic interests.

Final Thoughts

Twenty years ago, Ernest Boyer (1983) stated that schools need to strongly emphasize technology education. The survey data from this study suggest that some of Boyer's charge has come true. Significant growth and progress has been made in pursuit of that goal but some regression has also occurred in the past ten years, as noted by DeMiranda & Folkestad (2000). On the other hand, as this study and Newberry's study (2001) demonstrate, technology education is more fully recognized in some states now than when the previous study (Oaks, 1991) was conducted. The change to a true technology-based curriculum has continued, albeit at a slow pace and with some regression to previous curricula. New national technology standards focus the curriculum and promote indicators of program quality for children and youth. The population of students with special needs is being served in greater numbers. Though these positive trends provide hope for the future of technology education, Pearson and Young (2002) still sound an urgent call for more technological literacy in America in their report, *Technically Speaking*.

Eleven less populous states were not included in the results of this study. Although they are not identified, the fact that the person designated to provide leadership in technology education could not be located is of great concern. The cause for this could be as simple as restructuring with no apparent forwarding system, or as major as a decision to de-emphasize technology education in those states. Regardless, this absence has an effect on how technology education is advocated for and directed within a state. Thirty-nine (39) states did provide solid information and insight regarding the national status of technology education that is useful in understanding more in-depth information on the "state" of the profession.

Study data illuminate key areas of major concern that have not improved or in some cases have regressed over the past ten years. These key issues must be addressed if the profession is to continue to grow and expand. First, technology education needs to be more fully recognized and validated in each state for the key role it plays in the education of all children and youth in an increasingly technological society. In our nation's standards-based movement, too frequently the role of technology education is not fully valued as one of the primary competencies students must have to succeed in our society. Finland provides a strong example of this, where courses in technology education are compulsory for boys and girls (Alamaki, 2000). Taiwan, with its new elementary "living technology" curriculum, is another good example (Huang & Wei, 2001). However, it must be acknowledged that standards, to some degree, also imply that 45 million students attending school in America have uniformity in their life experience, socio-economic status, and education (Eisner, 2002). Therefore, a set of standards should serve as a guideline rather than absolutes for curricular and programmatic change. Second, for the profession to grow, high numbers of quality teachers will need to be recruited and trained, and those teachers need to represent the diverse populations they will serve. Third, the continued trend of closing teacher preparation and K-12 technology education programs must be reversed. The profession cannot continue with the depleted numbers of teachers being prepared and the subsequent closure of increasing numbers of technology classrooms and programs. Fourth, significantly higher levels of funding must be secured and recognition by all states that technology education is a funding priority must be advanced. Fifth, further inquiry into technology education as a recognized cognate field of study needs to continue and accelerate.

Continued research on the status of technology education can now proceed to include perspectives and information from K-12 students and teachers, families, community-based organizations, state and federal agencies, and professional associations. Ultimately, data and information from this study verify that these five key topics are all critical issues that must be addressed if technology education is to continue to move forward as a valued member of the educational community.

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