

The Status of Technology and Engineering Education in the United States: A Fourth Report of the Findings From the States (2011-12)

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Ninety-three percent of the reporting supervisors indicated that they include some form of technology and engineering education in their state frameworks.

Technology and engineering education continues to evolve as it becomes more apparent that students need this information to become more successful in college and careers. (Custer & Wright 2009; Ritz & Moye, 2011). The International Technology and Engineering Educators Association (ITEEA) has tracked the status of technology education in the United States in three separate studies over the past decade with the research undertaken by its Technology for All Americans Project staff (Newberry, 2001; Meade & Dugger, 2004; and Dugger, 2007). This 2011-12 study provided a fourth inquiry into that research, with engineering education being added as a curriculum area along with technology education.

Study Methodology

ITEEA used the Zoomerang online survey platform to send questionnaires to each state supervisor (or representative) in November 2011. A follow-up request for supervisors to take the survey was sent in December. In December and January 2012, the researchers conducted follow-up telephone calls to nonrespondents.

This study contained 14 questions—some were from previous studies, and some were new. Questions 2, 3, and 7 were used in the Newberry (2001) study. Questions 8 and 9 first appeared in the Meade and Dugger (2004) study. Dugger first used questions 4 and 10–13 in the 2007 study. The new questions presented in this study were 1, 5, 6, and 14.

Next, you will find the narrative and a summation for the responses to the 14 questions. Because of space limitations for this article, a more detailed state-by-state report on each of the questions can be found by going to the Appendix table at

www.iteea.org/TAA/PDFs/SupervisorResponsesbyState-20.pdf. Also, additional details on the Zoomerang responses can be found at: www.zoomerang.com/Shared/SharedResults-SurveyResultsPage.aspx?ID=L2BBQLLQGB2G.



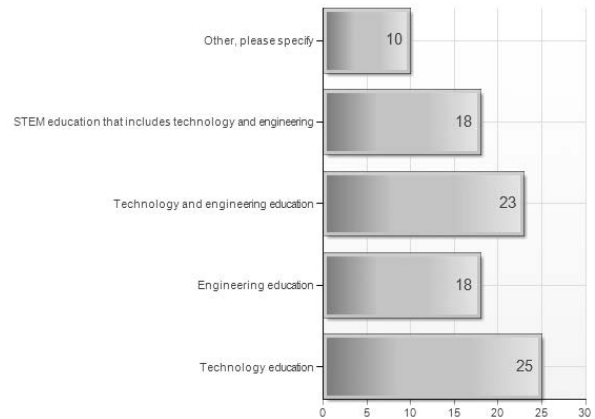
Question 1: Please provide the following contact information: name, state, and telephone number.

Forty-two of the 50 state supervisors (84%) responded to the study. The nonresponding states were Alaska, Louisiana, Michigan, Montana, New Mexico, Oklahoma, Vermont, and Washington. For more detailed results (state-by-state), including a complete listing of state supervisors and their responses, refer to the Appendix table at www.iteea.org/TAA/PDFs/SupervisorResponsesbyState-20.pdf.

Question 2: Is technology and engineering education in your state framework? (Check all that apply: technology education; engineering education; technology and engineering education; STEM education that includes technology and engineering; and other [please specify].)

All 42 supervisors responded to this question. Thirty-nine (93%) reported that they include one or more of the following in their state frameworks: technology education (25), technology and engineering education (23), engineering education (18), STEM education that includes technology and engineering (18), and/or other similar information (10). In the 2007 study, it was found that 40 of the 46 (87%) reporting states said that they included technology education in their state framework. In 2004, 38 of 50 (76%) states did, and in 2001, 30 of the 50 (60%) states included technology education in their frameworks (Newberry, 2001; Meade & Dugger, 2004).

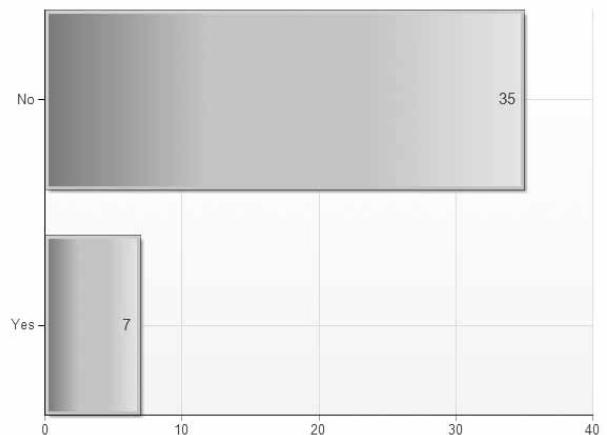
Is technology and engineering education in your state framework? Check all that apply.



Question 3: Is technology and engineering education required in your state?

All 42 of the reporting states (100%) answered the question. Seven states (17%) responded “yes,” and 35 (83%) said “no.” The Dugger (2007) study found that 12 states (26%)—and the Technology for All Americans Project (2004) study also found that 12 states (23%)—required technology education. In 2001, Newberry found that 14 (27%) states required technology education.

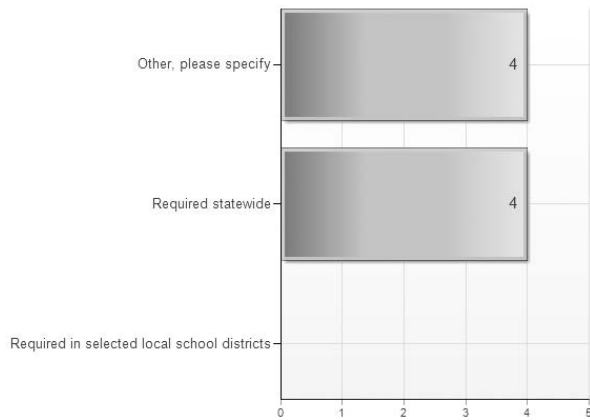
Is technology and engineering education required in your state?



Question 4: If you answered “Yes” to question #3, indicate the geographic level of the requirement. (Check all that apply: required in selected local school districts; required statewide; or other.)

Eight states responded to this question; four indicated that technology and engineering education was required state-wide.

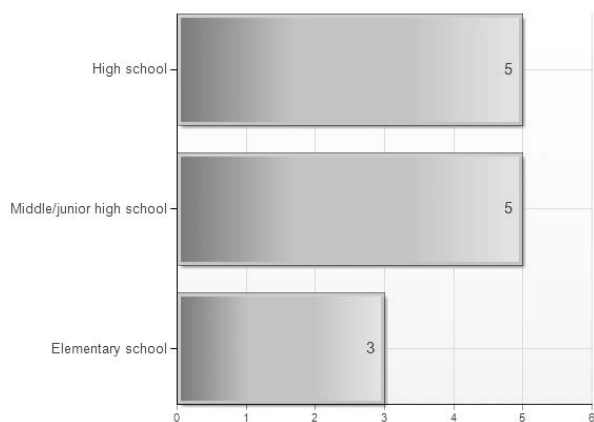
If you answered yes to question #3, indicate the geographic level of the requirement. Check all that apply.



Question 5: If you answered “Yes” to question #3, indicate the grade level required. (Select all that apply: elementary school; middle/junior high school; and high school.)

Although seven supervisors said, “yes” to question three, only six responded to this question. Based on those six responses, three states require technology and engineering education at the elementary level, five at the middle/junior high level, and five at the high school level.

If you answered yes to question #3, indicate the grade level required. Check all that apply.



Question 6: Please give an estimated number of elementary schools (K-5/6) in your state that are teaching technology and engineering activities.

Twenty-one of the 42 supervisors (50%) indicated that 787 elementary schools offer technology and engineering education in their states. Refer to the Appendix table at www.iteea.org/TAA/PDFs/SupervisorResponsesbyState-20.pdf.

Use this QR code for the complete listing of state supervisors and their responses.

Question 7: Please give an estimated number of technology and engineering teachers in your state during this school year at the following levels: Grades 6-8; Grades 9-12; and Total.

Thirty-two of the 42 reporting supervisors (76%) said that there were approximately 6,200 middle school and 9,666 high school teachers in their states. Two additional states provided the total number of technology and engineering education teachers they had in their states: 1,100 and 175 respectively. In total, the 34 reporting supervisors indicated that there were approximately 17,141 technology and engineering education teachers in their states. It is very disheartening that only 34 states provided data on the number of middle and high school teachers in this study. Unfortunately, with the data collected in this study, there is no way to project or guess what the actual total numbers of technology and engineering teachers were in 2011-12.

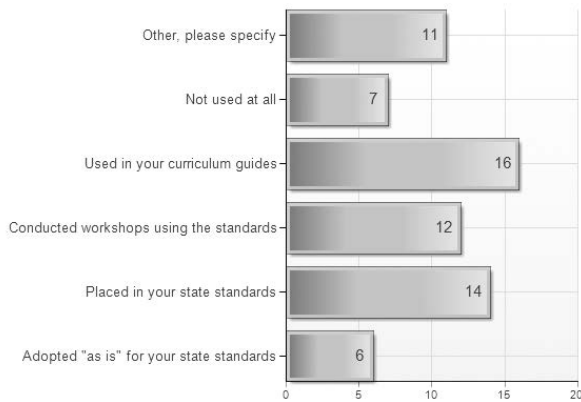
In previous studies, Moyer (2009) found that, with all 50 states reporting, there were approximately 12,146 middle and 16,164 high school (total: 28,310) technology education teachers in the U.S. The Dugger (2007) study did not break out the specific number of middle and high school teachers, but with 40 states reporting there were approximately

25,258 total middle and high school technology teachers. The Meade/Dugger (2004) study found that 49 states reported an approximation of 35,909 technology education teachers. Ndahi and Ritz (2003), reported that in 49 states, there were approximately 36,261 technology teachers in 2001. Newberry (2001) reported that 48 states indicated that there were approximately 38,537 in 2001, and Weston (1997) found that there were approximately 37,968 technology education teachers in 49 of the United States. Dugger (2007) cited that the difference between the Ndahi and Ritz (2003), and the Newberry (2001) totals could potentially be that “this inconsistency is due to the sources used” (p. 16). Refer to the Appendix table at www.iteea.org/TAA/PDFs/SupervisorResponsesbyState-20.pdf.

Question 8: Have you used Standards for Technological Literacy: Content for the Study of Technology (STL) in any of the following ways? (Select all that apply: adopted “as is” for your state standards; placed in your state standards; conducted workshops using the standards; used in your curriculum resources; not used at all; or other STL “provides an ambitious framework for guiding student learning” (ITEEA 2000/2003/2007, p. v.)

Forty of the 42 state supervisors (95%) responded to this question; 33 (83%) indicated that STL was being used in some manner in their states. Seven supervisors (18%) said that the STL standards were not used at all in their states. Six of the 40 supervisors (15%) stated that STL was adopted “as is” for their standards. Fourteen supervisors (35%) responded that they had placed STL in their state standards. Twelve supervisors (30%) conducted workshops using the standards in their states. Sixteen states (40%) use STL in their curriculum

Have you used the Standards for Technological Literacy: Content for the Study of Technology (STL) in any of the following ways? Click all that apply.



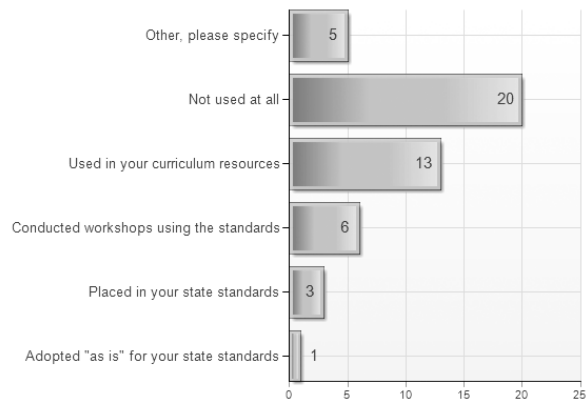

Use this QR code for the complete listing of state supervisors and their responses.

guides. Eleven (28%) provided “other” comments explaining how STL was used within their state.

Question 9: Have you used Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards (AETL) in any of the following ways? (Select all that apply: adopted “as is” for your state standards; placed in your state standards; conducted workshops using the standards; used in your curriculum resources; not used at all; other.)

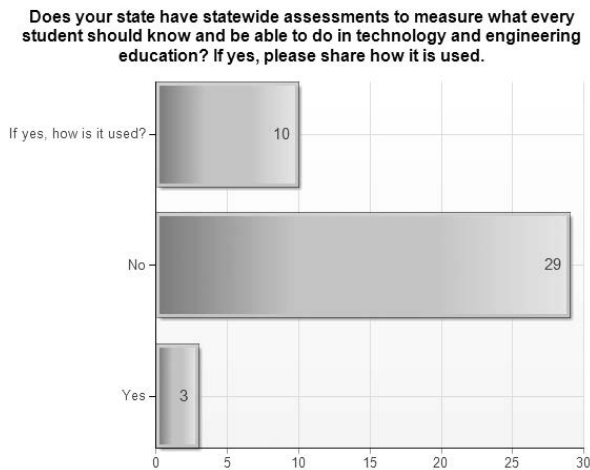
As in previous studies, this study found that the use of AETL was less than that of STL. Twenty states (50%) reported that they have not used AETL. One of the 42 states (2%) indicated that AETL was adopted “as is” for state standards. Three (8%) indicated that they had placed AETL in their state standards. Six (15%) had conducted workshops using the standards. Thirteen (32%) use AETL as a curriculum resource. Five (12%) identified “other” ways they use AETL.

Have you used Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards (AETL) in any of the following ways? Click all that apply.



Question 10: Does your state have statewide assessments to measure what every student should know and be able to do in technology and engineering education? (Yes or No—If yes, please share how it is used.)

Three of the 42 reporting states (7%) perform *STL* assessments in their state, and 29 (69%) do not. The 2007 study found that 7 of the 46 states (15%) were performing assessments.



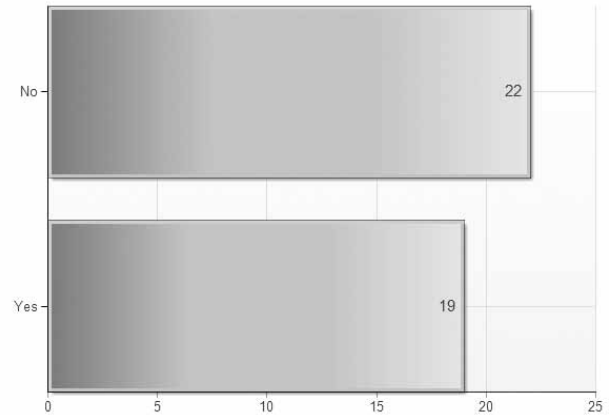
Question 11: What course title(s) best describe the secondary school level technology and engineering education being taught in your state?

As in the Dugger (2007) study, the responses varied. Five of the 42 supervisors (12%) did not provide any specifics, and 37 (88%) responded with one or more types of course titles in their state. The most frequent response was engineering (24 times), followed by technology education (23 times), Project Lead the Way (10), and Engineering byDesign™ (3). Refer to the Appendix table at www.iteea.org/TAA/PDFs/SupervisorResponsesbyState-20.pdf.

Question 12: Do you have a technology and engineering education state curriculum guide(s)? (Yes or No).

Forty-one of the 42 responding supervisors (98%) answered the question. Nineteen (46%) indicated that they had technology education state curriculum guides. Twenty-two (54%) said that they did not. The Dugger (2007) study asked the same question and found that 27 states (59% of those reporting) answered that they had technology education curriculum guides, and 19 states (41%) reported that they did not.

Do you have a technology and engineering education state curriculum guide(s)?



Question 13: What best describes where technology and engineering education program funding comes from in your state (i.e., local, state, national funding, or combination)?

All 42 of the reporting states (100%) responded to this question. Their responses were very similar to the 2007 study, in which sources of funding were “a combination of local, state, and federal (Perkins) funds for their technology [and engineering] education programs” (Dugger, 2007, p. 19). Thirty-six of the 42 states (86%) indicated that their funding came from a combination of sources, three (7%) came solely from national, one (2%) from state, and one (2%) from local sources. One supervisor stated, “Tech ed is not funded.” Refer to the Appendix table at www.iteea.org/TAA/PDFs/SupervisorResponsesbyState-20.pdf.

Question 14: What percentage of funding sources are obtained for technology and engineering programs in your state? (STEM; Career and Technical Education [CTE]; specialized technology and engineering sources [i.e.: grants or special projects]; other, please specify.)

Thirty-six of the 42 states (86%) responded to the question. However, only 22 (52%) provided actual percentages. States had the option to identify more than one source of funding, and 15 of the 36 supervisors (42%) indicated that they received funding from more than one source. The majority of funding came from CTE (19), followed by specialized technology and engineering sources (14), other (8), and STEM (6). Responses to the “other” funding category appeared to be the equivalent to local funding. Refer to the Appendix table at www.iteea.org/TAA/PDFs/SupervisorResponsesbyState-20.pdf.

Discussion

It was disappointing that only 42 of the 50 state supervisors (84%) responded to this study. The researchers, however, were able to collect information that provides a snapshot of the status of technology and engineering education in the United States.

Thirty-nine (93%) of the 42 reporting supervisors indicated that they include some form of technology and engineering education in their state frameworks. This is an increase over the 87% found in 2007, 76% found in 2004, and to the 60% found in 2001. Seven supervisors indicated that their states require technology and engineering education. In 2007 and 2004, that figure was 12, and in 2001 it was 14. Three supervisors reported that their state requires technology and engineering education at the elementary level, 5 at the middle/junior high level, and 5 at the high school level. Eighteen of the 42 supervisors (43%) said that technology and engineering education was offered in 787 elementary schools in their states. With 32 supervisors reporting on the question that asked the number of technology and engineering teachers in their state, there were approximately 6,200 middle and 9,666 high school technology and engineering education teachers in those states. Two additional supervisors provided the total number of teachers (not specified as to whether they were middle school or high school) in their states (1,275). Therefore, there were a total of approximately 17,141 technology and engineering education teachers in those 34 states.

Researchers have compiled data concerning the number of technology and engineering education teachers over the years; however, since different supervisors could have responded during each study, it is difficult to report an exact trend. The existing data indicate that the number of technology and engineering education teachers may continue to decline. When comparing data from past studies, it appears that fewer states are using ITEEA's *Standards for Technological Literacy* and *Advancing Excellence in Technological Literacy*. Based on the responses of the few supervisors reporting, it appears that there may also be a decrease in the number of states that measure what every student should know and be able to do in technology and engineering education.

This study revealed that the course titles most frequently used were associated with engineering education and/or technology education. The 2007 study indicated the most frequent course titles were identified as technology education. Supervisor inputs to this study suggest that the number of states that have technology and engineering education

curriculum guides may have decreased. Nineteen state supervisors indicated that their state had technology and engineering curriculum guides, and 22 said that they did not. In 2007, 27 said they did, and 19 did not. Concerning funding resources, 86% of the reporting supervisors indicated that their funding came from a combination of sources (federal, state, and local).

Recommendations

The answers to the questions asked in this study are very important to the technology and engineering education profession. It is recommended that state supervisors take note of the questions asked and be more prepared to participate in the next study in approximately five years. Accurate and complete data will ensure a clearer picture of the status of the profession. Supervisors should also review the status of their states to determine what needs to be developed or improved. ITEEA has many resources to help evaluate and improve technology and engineering education. Please feel free to contact ITEEA or the researchers for information concerning these resources.

Observations

First, we would like to thank the state supervisors who responded to the survey. However, we noted situations while collecting data that bear mentioning for future studies because they affected the results of this study. Specifically, we were not able to find numerous supervisors or administrators who were responsible for the guidance or leadership of technology and engineering education at the state level. We were often directed toward other people within the state departments who did not have ready access to the information requested. Supervision and administration of this subject area either was nonexistent or was the responsibility of a person assigned multiple tasks as a part of his/her job description and who was overwhelmed with those responsibilities or simply didn't take the initiative to provide the data to us. We believe that we were often given estimates in response to our questions because no real data existed in certain states. In other words, there was no one who could give us an accurate teacher count along with other data within some states. We suspect that this may be true within other subject areas, but we did not research other subjects.

We have concluded that there is no accurate count of technology and engineering teachers from all 50 states, including this study. Even with previously conducted studies, we have not been able to obtain an accurate count. However, in this

survey it was much more difficult to gain data from all states than with all previous surveys. As with most educational data collection, what is measured is what is treasured. Technology and engineering teachers are not being counted in major state STEM initiatives, for they are nonexistent or loosely counted in many state databases. Unfortunately, in those selected states, "STEM" is what mathematics and science teachers do and does not include technology and engineering education. We should make sure that our teachers are also included in that group. It will be difficult for them to be counted if we don't know the count ourselves. 🌐

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Complete survey responses can be viewed online at www.iteea.org/TAA/PDFs/SupervisorResponsesby-State-20.pdf.

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