



*International  
Technology  
Education  
Association*

**Issues and Solutions**

**for**

**Technology Education**

**in the**

**United States**

**2004 – 2005**

## **Introduction**

This policy document has been developed through a collaborative process involving the International Technology Education Association (ITEA) Board of Directors, ITEA affiliate councils, and numerous educators, administrators, and stakeholders from across the nation. The document is designed to make parents, business leaders, and policy makers that govern public education aware of the fundamental requirements needed to create a technologically literate citizenry in the 21<sup>st</sup> century. We invite the readers of this document to engage in purposeful dialogue that will establish quality technology education programs for all students in elementary school through higher education.

International Technology Education Association  
1914 Association Drive  
Suite 201  
Reston, VA 20191-1539

[www.itea.org](http://www.itea.org)  
[itea@iris.org](mailto:itea@iris.org)

## **Policy Issues in Brief**

1. ITEA seeks legislation (federal and state) for the adoption of the *Standards for Technological Literacy* as the recognized content for the study of technology to ensure that all K-12 students develop technological literacy.
2. ITEA seeks funding for the implementation of technology education in federal and state initiatives.
3. ITEA supports the inclusion of technology education in funding initiatives to meet the requirements of No Child Left Behind (NCLB) and other educational policies.
4. ITEA encourages the inclusion of the Technology Student Association (TSA), as well as design and engineering student organizations, in national and state funding initiatives.
5. ITEA supports legislation that identifies and supports technology education as the K-12 subject area for teaching engineering and technological concepts.
6. ITEA seeks to prepare students for postsecondary education and ensure that the nation has a quality technological workforce.

## **Policy Issue 1**

**ITEA seeks legislation (federal and state) for the adoption of the *Standards for Technological Literacy* as the recognized content for the study of technology to ensure that all K-12 students develop technological literacy.**

### ***Rationale***

Extensive research was the foundation of *Technology for All Americans: A Rationale and Structure for the Study of Technology* (ITEA, 1997). Never before had such an extensive effort occurred to serve as a basis for studying technology. This research, funded by the National Aeronautics and Space Administration and the National Science Foundation, was a stepping-stone for the creation of the *Standards for Technological Literacy* (STL) (ITEA, 2000). STL was created by an international team of technology education professionals and through a formal review by the National Academy of Engineering and the National Research Council of the National Academies. This combined effort used some of the best minds around the world to create a basis and outline for a study about technology. The fruits of this research are available for the educational system in the United States and throughout the world. The challenge is to use these resources to build curriculum and courses that will properly reflect the study of technology.

### ***Recommended Action***

ITEA proposes the following recommendations to strengthen the nation's public school programs for all students.

- 1.1 State Boards of Education should ensure the integration of the use and study of technology throughout the elementary curriculum. At this level, children learn about the fundamentals of technology and how it relates to their families, neighborhoods, and careers. Through planning, drawing, designing, problem solving, building, and testing, children become involved in the kind of active learning that they need and enjoy. These experiences enable them to apply their technological knowledge to real-life experiences and to develop critical thinking skills that contribute to a life-long understanding of technology.
- 1.2 State Boards of Education should ensure that middle schools provide technology education experiences that assist students in developing an understanding of the breadth of technology in their society. They should study technology from a systems perspective by applying resources to create processes to solve a problem or meet a need; by simulating, modeling, or creating real technological solutions; and by learning to rely on principles of engineering, design, problem solving, and knowledge to synthesize a technological understanding. Studying the breadth of technology allows the early adolescent to begin forming ideas about work, careers, and consumerism. Middle school students should have experiences in units of study such as *Exploring Technology*, *Inventions and Innovations*, and *Technological Systems*.
- 1.3 State Boards of Education should ensure that students at the high school level are provided an opportunity to develop the capacity to make responsible judgments about the uses of technology and careers of interest. Curriculum options should allow individual students to extend their technological knowledge in specific processes and technological systems, through courses such as *Technology Transfer*, *Engineering Design*, or *Technology Assessment*.

## **Policy Issue 2**

### **ITEA seeks funding for the implementation of technology education in federal and state initiatives.**

#### ***Rationale***

Participating in the concerns of society requires a basic understanding of the world in which we live. Our 21<sup>st</sup> century world is technological, with virtually every aspect of our lives affected by technology. Intelligent and thoughtful interaction with technology requires an ability to use, manage, assess, and understand it—to be technologically literate. A technologically literate population can help maintain and sustain economic progress. *The Standards for Technological Literacy: Content for the Study of Technology* and *Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards* provide the guidelines to achieve technological literacy in our K-12 schools.

#### ***Recommended Actions***

ITEA proposes the following recommendations to ensure all students receive an effective education about technology.

- 2.1 State Boards of Education should ensure that all students have opportunities to develop technological literacy through the study of technology as a core content area at all grade levels.
- 2.2 State Boards of Education should commit to the promotion and implementation of technology education by providing the necessary support including instructional resources, equipment and teacher inservice.
- 2.3 Congress, State Boards of Education, and State Departments of Education should support the study of technology through effective criteria outlined in the *Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards* to deliver quality curriculum through a prepared teacher workforce.
- 2.4 Congress, State Boards of Education, and State Departments of Education should support the study of technology as a core content area, using *The Standards for Technological Literacy: Content for the Study of Technology* to develop an economically competitive nation.
- 2.5 State Boards of Education should guide schools by requiring a curriculum that gives students a basic understanding of the technological society in which they live.
- 2.6 State Boards of Education should require technology courses as a part of general education requirements that are based on the content outlined in the STL. Secondary school courses, using nationally developed standards as models for educators, have already been created and can be implemented. Activities designed to enhance student learning at the elementary school level will assist teachers and students in integrating technology experiences into the current academic offerings.

## **Policy Issue 3**

**ITEA supports the inclusion of technology education in funding initiatives to meet the requirements of No Child Left Behind and other educational policies.**

### ***Rationale***

Current national efforts to implement No Child Left Behind (NCLB) legislation and other federal initiatives have created policies and regulations for education that will continue for years to come. A major problem exists for technology educators because their subject area is not specifically identified as a funded component of this legislation. One reason for the omission may be the perception of lawmakers that technology is simply a tool, such as a computer, rather than a content body of knowledge and processes for developing systems that solve problems and extend human capabilities.

The *Standards for Technological Literacy* (ITEA 2000) supplied educators with research-based technology content that assists students in understanding and using knowledge as they move through grades K-12. Because of these standards, the relationship of mathematics, science, and technology has never been more evident or assessable.

The content standards were followed by the development of other standards dealing with assessment, professional development, and programs, titled *Advancing Excellence through Technological Literacy*. These standards set the stage in terms of excellence in teaching and learning about technology and provide a basis for various forms of student assessment that were not possible in the past. Informed assessments can help teachers identify student strengths and weaknesses in science, technology, engineering, and mathematics (STEM). These assessments may also assist higher education institutions in their efforts to provide quality professional development to technology education teachers.

ITEA realizes that many teachers need additional technological experiences, proven assessment models, and successful teaching techniques to measure student achievement. Having these would enhance the quality of technology education programs.

The challenge is to make technology education more visible within legislation to create program funding. There seems to be no legitimate reason to exclude technology when mathematics, science, and other subject areas are included.

### ***Recommended Action***

ITEA proposes the following recommendations to strengthen the nation's public school programs for all students as efforts are made to implement NCLB initiatives.

- 3.1 State Boards of Education should endorse the Standards for Technological Literacy and work to standardize the curriculum and require technology course opportunities for all middle and high school students as a part of enhancing the STEM subjects.
- 3.2 Congress and State Boards of Education should require student assessments that address technology and strengthen program quality at the elementary, middle, and high school levels.

- 3.3 State Boards of Education should make technology education a core subject. Providing all students with technological literacy will ensure that our nation will remain a leader in world economics.
- 3.4 Boards of Education should strengthen the technology offerings of science, technology, engineering, and mathematics, using standards-based student assessments to guide the development of instructional materials and teacher professional development.
- 3.5 Congress should include technology education in any listing of NCLB-funded subject areas.
- 3.6 State Boards of Education should include technology education in their NCLB listing of eligible subject areas and in other education funding.

## **Policy Issue 4**

**ITEA encourages the inclusion of the Technology Student Association (TSA), as well as design and engineering student organizations, in national and state funding initiatives.**

### ***Rationale***

As society enters the 21<sup>st</sup> century, technology is dictating the way children live and learn. What a child knows about technology and can do with it will have a significant impact on his or her ability to navigate through life. Children must learn to be technologically literate. The Technology Student Association provides educational experiences that enrich student development of technological literacy and provides a forum for students to demonstrate their technological capability. Such experiences include the opportunity to study technology and work on technological problems, innovations, and inventions. Every student deserves the opportunity to develop leadership and competitive abilities in solving technological problems. The Technology Student Association provides these experiences.

### ***Recommended Action***

ITEA proposes the following recommendations to strengthen the involvement of student organizations in the study of technology.

- 4.1 Congress and State Boards of Education should provide funding for the development and implementation of technology student organization instructional materials that integrate curricular experiences in mathematics, science, English, history, technology, and engineering.
- 4.2 State Boards of Education and State Departments of Education should provide incentives (e.g., scholarships, internships, foreign exchanges) for student achievement in the study of technology.
- 4.3 Congress and State Boards of Education should establish programs that recruit high school students and career switchers to pursue teaching technology education as a career.

## **Policy Issue 5**

### **ITEA supports legislation that identifies and supports technology education as the subject area for teaching engineering and technological concepts in grades K-12.**

#### ***Rationale***

There are fewer engineers graduating from college today than in the past, and the need for technically knowledgeable people is growing. A shortage in the engineering and technical workforce is projected to be 15 million by 2020.

Technology education, as a pre-engineering curriculum, applies academic concepts and skills to problem solving by using tools, materials, and processes in a design and systems approach. The result is challenging, contextual, project-based learning. Technology education programs should receive legislative support because stakeholders in the community recognize the value of pre-engineering education for their children, their state, and their nation. Technology education, which supports pre-engineering, should become a new course of study—a core subject—in our nation’s schools.

Technology extends into every aspect of our lives; therefore, it is critical for our schools to convey an understanding of it to young people. While most states have frameworks for English, history, math, and science, few have implemented frameworks for technology as a core subject.

*Standards for Technological Literacy: Content for the Study of Technology* (ITEA, 2000) provides the content for developing state and local framework guides. Engineering is part of this framework that reflects a changing world in which it is critical to daily life. By exposing students to simple problem solving and design methods, as well as hands-on experiences with technology, engineering assists students in dealing with technological issues of modern life.

#### ***Recommended Action***

ITEA proposes the following recommendations to strengthen the nation’s public school program for all students in the area of engineering education.

- 5.1 Congress should develop policies and programs to increase the number of science, technology, engineering, and mathematics (STEM) teachers by establishing scholarships and student loan forgiveness programs for these prospective teachers.
- 5.2 State Boards of Education and State Departments of Education should consider effective alternative teacher certification options for scientists, engineers, mathematicians, designers, and other technically trained professionals who hold a bachelor’s degree in their area of concentration and wish to add an endorsement for teaching technology education.
- 5.3 State Boards of Education and State Departments of Education should provide funding for pre-service and in-service training of teachers through initiatives that integrate the Standards for Technological Literacy into the K-12 curriculum.
- 5.4 State Boards of Education should provide funding for the development and implementation of student assessments to measure technological literacy.

5.5 State Boards of Education should ensure that teacher education programs are available to train future technology education teachers.

## **Policy Issue 6**

**ITEA seeks to prepare students for postsecondary education and ensure that the nation has a quality technological workforce.**

### ***Rationale***

Technology education was first included in federal legislation in 1965 when it was known by its former name, industrial arts. The subject area was then identified through performance or skill-based objectives of the industrial era. Today, many states still use these same funding pipelines for their organizational structures, even though the subject area has become content-based rather than skill-based and has developed a closer relationship with the subjects of mathematics, science, and engineering.

The nature of the workforce has also changed over the years. What was once the smokestack industry is now technological in nature. What was once industry-oriented is now technology-oriented, making technology education even more pertinent to a quickly advancing society. Therefore, it is imperative for all students to study technology as the foundation in preparing for a career in the technological workforce of the future.

### ***Recommended Action***

ITEA proposes the following recommendations to strengthen our nation's workforce.

- 6.1 Congress and State Boards of Education should endorse and fund programs that focus on technology-related career paths and their many opportunities for developing knowledge and skills related to science, technology, engineering, and mathematics.
- 6.2 State Legislatures and State Boards of Education should increase categorical funding to local school districts for the purchase of equipment to ensure that students have access to state-of-the-art resources.

## Definitions

**Educational Technology** is the use of multimedia technologies or audiovisual aids as a tool to enhance the teaching and learning process.

**Engineering** is the profession of or work performed by an engineer. Engineering involves the knowledge of the mathematical and natural sciences (biological and physical) gained by study, experience, and practice that are applied with judgment and creativity to develop ways to utilize the materials and forces of nature for the benefit of mankind.

**Design** is an iterative decision-making process that produces plans by which resources are converted into products or systems that meet human needs and wants or solve problems

**Mathematics** is the science of patterns and order and the study of measurement, properties, and the relationships of quantities through the use of numbers and symbols.

**Science** is the study of the natural world through observation, identification, description, experimental investigation, and theoretical explanations.

**Technological Literacy** is the ability to use, manage, understand, and assess technology.

**Technology** is human innovation in action that involves the generation of knowledge and processes to develop systems that solve problems and extend human capabilities. Technology is also the innovation, change, or modification of the natural environment to satisfy perceived human needs and wants.

**Technology Education** is the study of technology, which provides an opportunity for students to learn about the processes and knowledge related to technology that are needed to solve problems and extend human capabilities.

**The International Technology Education Association (ITEA) exists to provide leadership in the design and development of quality instruction, research and service in technology education. ITEA also supports excellence in marketing and assists in the international integration, implementation, and acceptance of technology education.**

**Four councils function within ITEA. These councils provide leadership and service to a specific segment of the membership. The councils are:**

**Council for Supervisors (ITEA-CS)**

**Council on Technology Teacher Education (CTTE)**

**Technology Education for Children Council (TECC)**

**Technology Education Collegiate Association (TECA)**