



# TECHNOLOGY FOR ALL AMERICANS

A PROJECT OF THE INTERNATIONAL TECHNOLOGY  
EDUCATION ASSOCIATION TO DEVELOP STANDARDS  
FOR K-12 TECHNOLOGY EDUCATION

January 1997

1997 South Main Street, Suite 701 Blacksburg, VA 24061-0353

## Technology for All Americans Project Receives Phase II Funding

The International Technology Education Association is pleased to announce additional funding for the next three years for Phase II of the Technology for All Americans Project from the National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA). The Phase II research effort will involve the development, consensus building, and validation of standards for technology education. These standards will focus on what every student must know and be able to do in achieving technological literacy. The standards will be designed for implementation in grades K-12 with specific organizational benchmarks to be created for grades K-2, 3-5, 6-8, and 9-12.

The project has just completed Phase I with the publication titled *Technology for All Americans: A Rationale and*

*Structure for the Study of Technology*. This document represents the combined work of over 500 people over the past two years and was disseminated to over 10,000 people.

The major thrust of current educational reform in the United States is based on having high quality standards in each of the subject areas in the schools. We all live in a technological world and technological literacy is crucial for everyone in the next millennium. The promise of the future lies not just in technology alone, but in people's ability to use, manage, and understand it. This is the fundamental basis for technological literacy. The standards for technology education will provide a shared vision for how everyone can achieve technological literacy in the future.

---

## *Technology for All Americans: A Rationale and Structure for the Study of Technology*

### Executive Summary

Many national associations and agencies, including ITEA, have recently called for technology education. As envisioned by all of these groups, technology education is a dynamic problem-solving and design-based program that enables students to gain experience working with a wide variety of technological devices and processes.

What does every student need to know about and do with technology? How should the articulated program in technology from kindergarten through 12th grade be organized? Is there a structure for teaching technology that can withstand the accelerating changes in our technological environment? These issues were the driving force behind the development of the Technology for All Americans Project, which over the

past two years has developed a rationale and structure to assist states and local communities who have struggled with the content for the study of technology.

Phase I of the Technology for All Americans Project was funded by NSF and NASA to answer those critical issues for technology education. The project developed a document targeted for technology educators, policy makers, and all those concerned with our national level of technological literacy, entitled *Technology for All Americans: A Rationale and Structure for the Study of Technology*.

The project utilized a National Commission for Technology Education, as well as a group of experts who were consulted to provide help and advice on the content of the docu-

(continued on page 2)

ment. After undergoing an extensive review process, the final product provides a new vision for the study of technology.

There are a number of definitions for the concept of technology. The concept is complex and used in a variety of different contexts; nonetheless, a working definition was necessary to convey the desired meaning of technology. After extensive discussion and review, the project adopted the following definition that guided the development of the rationale and structure:

*Technology is human innovation in action.  
This involves the generation of knowledge  
and processes to develop systems that solve  
problems and extend human capabilities.*

This document discusses the power and the promise of technology and the need for technological literacy. Universals for the study of technology are presented. The document also describes how technology should be integrated into the core of the curriculum from kindergarten through high school and beyond. Finally, a challenge is made to all concerned to take action to establish standards for technology education and make technological literacy a national priority.

## **The Power and the Promise of Technology**

Technology is a fundamental aspect of human activity. The acceleration of technological change is a constant in everyone's life today. The power and the promise of technology is based on the need for technological literacy—the ability to use, manage, and understand technology. Technological literacy is considered to be critical to the success of individuals, entire societies, and to the Earth's ecological balance.

## **A Structure for the Study of Technology**

Agreement on the need for technological literacy is just the beginning. The more difficult problem is determining how to develop this literacy. What experiences, abilities, and knowledge are needed? What exactly should a person know about and be able to do with technology? What should be the content of this literacy effort? The specific answers change with a

person's location, as well as individual aspirations, career, and capabilities. In addition, the answers change rapidly with time.

The structure developed for the study of technology focuses on *universals* of technology that are considered to be significant and timeless, even in an era dominated by uncertainties and accelerated change. As the definition indicates, there is a knowledge and process base for technology that is quantifiable and universal. The technological knowledge includes the nature and evolution of technology, linkages, and technological concepts and principles.

The processes are those actions people undertake to create, invent, design, transform, produce, make, control, maintain, and use systems. The processes include the human activities of designing and developing technological systems; determining and controlling the behavior of technological systems; utilizing technological systems; and assessing the impacts and consequences of technological systems. Both the knowledge and processes are critical to the existence and advancement of technology. One cannot exist without the other, for they are mutually dependent. With technological knowledge people engage in the processes, yet it is through the processes that technological knowledge is developed.

People develop technological knowledge and processes in order to create and use systems that solve problems and extend their capabilities. Invariably this involves physical, biological, or informational systems to manipulate the natural world. In other words, people develop technological processes and knowledge within the context of adaptive systems, which are the means that people use to modify nature.

Knowledge, processes, and contextual systems, then, have been identified in this document as the universals of technology, and are considered the foundation of the structure for the study of technology. Each of the universals is discussed in detail within the document.

## **Teaching Technology**

School systems across the country must establish effective technological literacy efforts, beginning in kindergarten and continuing each year through high school. By using the structure outlined in the document, communities can incorporate

The *Technology for All Americans Project* (TAA) is a project of the International Technology Education Association (ITEA) and funded by the National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA). All inquiries should be addressed to:



Technology for All Americans Project  
1997 South Main Street, Suite 701  
Blacksburg, VA 24061-0353  
Phone: (540) 953-0203  
Fax: (540) 953-0014  
Email: [tfaa@bellatlantic.net](mailto:tfaa@bellatlantic.net)  
URL: <http://scholar.lib.vt.edu/TAA/TAA.html>



the necessary concepts and experiences so all students have the opportunity to develop the necessary knowledge and abilities. By incorporating the universals of technology throughout the curriculum and in technology courses, schools can provide experiences that instill insight and problem-solving capabilities. Technology should be a required subject for every student at every level. This vision necessitates curriculum development, teacher enhancement, and in some cases, restructuring building space. However, it is an effort that will reap rewards for every community in the country. The study of technology during the elementary school years, middle school years, high school years, and beyond should become a national priority.

### Taking Action

To help achieve technological literacy at a national level, standards for technology education should be developed based on the universals and structure described in the *Technology for All Americans: A Rationale and Structure for the Study of Technology* document.

ITEA and the Technology for All Americans Project provide the support, knowledge-base, and opportunity for groups, agencies, and associations to become involved in the promotion of technology education as an essential core subject in our nation's schools.

---

Copies of *Technology for All Americans: A Rationale and Structure for the Study of Technology* may be purchased for \$10.00 for members and \$15.00 for nonmembers from:



**INTERNATIONAL  
TECHNOLOGY  
EDUCATION  
ASSOCIATION**

1914 Association Drive  
Reston, VA 20191-1539

Phone (703) 860-2100

Fax (703) 860-0353

Email: [itea@iris.org](mailto:itea@iris.org)

URL: <http://www.iteawww.org>

### **ITEA 59th Annual Conference March 23-25, 1997 Tampa, Florida**

Sunday, March 23, 1997

10:30 a.m. to 11:45 a.m.

Convention Center, Room 11

Progress of the  
Technology for All Americans Project

## **The Next Step--Developing Standards for Technology Education**

The Technology for All Americans Project plans to develop technology content standards for grades K-12 in Phase II. The time frame for accomplishing this is three years (from October, 1996 to September, 1999). There will be assessment checkpoints or benchmarks at grades 2, 5, 8, and 12.

The Technology for All Americans Project defines standards as "descriptive statements established by key professionals that can be used as criteria for assessing the degree to which technology content, teacher enhancement and teacher preparation, student progress, and programs meet qualitative and quantitative characteristics of excellence."

The project staff will coordinate the total project and work with an Advisory Group, a Standards Team, and the profession in developing, consensus building, and validating the standards. The staff will work with ITEA, NSF, and NASA in the overall operation of the project, as well as a third-party evaluator—Phi Delta Kappa. The staff will be responsible for the writing, generating, and consensus building process for the standards. The staff will also have the responsibility of research as related to the standards. Another task of the staff is to assure that the standards for technology education are compatible with other educational standards that are being developed or already exist, especially those in science, mathematics, social studies, and the humanities.

The Advisory Group will advise the best practice in standards development and determine ways for the study of technology to be integrated within the total school curriculum. Representatives of the National Council for Teachers of Mathematics, the National Science Teachers Association, the American Association for the Advancement of Science Project 2061, the National Research Council, and a representative from engineering will form an Advisory Group for the Technology for All Americans Project. They will meet semiannually to provide specific advice on the development of the standards and how technology education can be integrated within other school subjects, especially science and mathematics.

The Standards Team will propose, evaluate, and recommend the content of the standards. The team is made up of classroom teachers, supervisors, and teacher educators from technology education, as well as elementary administrators and representatives from mathematics, science, and engineering. The Standards Team is comprised of three sub-teams (one team for grades K-2 and 3-5, one team for grades 6-8, and one team for grades 9-12). The leaders of the three sub-teams will be involved in providing input to the Technology for All Americans Project staff.

(continued on page 4)



Technology for All Americans Project  
1997 South Main Street, Suite 701  
Blacksburg, VA 24061-0353

Non-Profit Org. U.S.  
Postage  
PAID  
Permit No. 458  
Roanoke, VA

*Please contact us with any corrections to your name and/or address. Thank you.*

**I**t is not the intent of the Technology for All Americans Project to develop curriculum. The standards for technology education will provide a general framework from which states and local school systems can develop technology curriculum that is best suited for their students. The ultimate goal of both quality standards and a well-designed and implemented curriculum should be technological literacy for all students.

Content standards will specify what students should know and be able to do in technology. They will indicate the knowledge and skills—the ways of thinking, working, communicating, reasoning, and investigating, and the most important and enduring idea, concepts, issues, dilemmas, and knowledge essential to technology—that should be taught and learned in school. Curriculum is an operational plan for instruction or the way content is delivered: it includes the structure, organization, balance, and presentation of the content in the classroom. It will be the responsibility of the state or locality to develop the curriculum.

It is very important that standards be set high enough to ensure that all students can participate fully in society. Special considerations must be made in the standards to assure that all learners benefit from technology education. Technology educators must hold high expectations for each student and every school. Standards, by themselves, cannot erase the results of poverty or ethnic and cultural discrimination. It is essential that all students have equal opportunities to study technology and that inequalities in school resources be addressed. It is also important that safe and supportive environments be provided for the teaching of technology and that schools have an adequate supply of knowledgeable teachers who are motivated and qualified to provide exceptional learning experiences.

During the first year of the project, the focus of the work will be on developing the hierarchical structure of the standards and then adding content to that structure from grades K-12. During this time, the project staff will work closely with the Standards Team in generating the standards around the universals that were developed in Phase I of the project. The

first meeting of the Standards Team was held on October 25-28, 1996 at the Xerox Document University in Leesburg, Virginia. At this meeting, the universals of technology were utilized to generate the organizational or broadest level of the standards by benchmark grade level. After this was accomplished, the teams worked on developing first drafts of the more specific or detailed standards, which are concerned with what each student needs to know and be able to do in order to be technologically literate. In some cases, the teams went one step further and developed the most specific level in the hierarchy of standards.

**T**he Standards Team leaders will meet in March, 1997 to review the draft standards. In late spring, 1997, the standards will be reviewed by a select number of people from technology education, as well as science, mathematics, engineering, and others. In the summer of 1997, the Standards Team will meet again to review and refine the standards. During the time from fall, 1997 to the end of 1998, the standards will go through a consensus building and further refinement process. Hundreds of people from the technology education profession, as well as science, mathematics, engineering, and others, will review the standards by mail or by electronic document review. Consensus hearings for additional reviews will be held at national, regional, and state conferences. In the spring of 1999, the standards will be field tested in selected schools in the United States. From all of the input received in many developmental drafts and field testing, the standards will go through a final editing and will be published in the summer of 1999 (in time to be implemented for the 1999-2000 school year). The project plans to develop extensive promotion and dissemination activities on the standards in 1998-1999 so that technology education professionals, as well as educators in general, will know what the standards for technology education are and how they can assist in improving technological literacy for all children.

— William E. Dugger, Jr., Director  
Technology for All Americans Project