The Standards for Technological Literacy

Intro

Content for the Study of Technology (Technology Content Standards) has been funded by the National Aeronautics and Space Administration (NASA) and the National Science Foundation (NSF).

The Minnesota Technology Education Association has endorsed the standards and is currently training a cadre of teachers in an effort to facilitate the implementation of the standards state wide.

This presentation is designed to help you understand where the standards have come from, and the direction they will take in the future.

Background

The *Standards for Technological Literacy* have been developed by personnel from technology education, science, mathematics, and engineering disciplines with the support

The Standards for Technological Literacy were based on an ITEA project titled "Technology for All Americans Project" which was funded by the National Aeronautics and Space Administration (NASA) and the National Science Foundation (NSF).

This project:
• Reviewed national standards from other fields;
• Analyzed national standards for inclusion of technology;
• Coordinated with NSES Standards and AAAS Benchmarks;
• Reviewed state standards;
• Interviewed state supervisors on standards.
• The Rationale and Structure (Phase I of the project) took place from the Fall of 1994 to Fall of 1996. It created a framework for what every student should know and be able to do in order to be technologically literate.

Content for the Study of Technology

Content for the Study of Technology (Technology Content Standards) was published by the International Technology Education Association (ITEA) and its Technology for All Americans Project (TfAAP) in April 2000. Funding again was provided by the National Aeronautics and Space Administration (NASA) and the National Science Foundation (NSF).

It defines what students should know and be able to do in order to be technologically literate and provides standards that prescribe what the outcomes of the study of technology in grades K-12 should be. However, *it does not put forth a curriculum to achieve these outcomes.*

These <u>Technology Content Standards</u> will help ensure that all students receive an effective education about technology by setting forth a consistent content for the study of technology.

Content standards for grades K-12 (Phase II of the project) took place from the Fall of 1996 to November 1999. The resulting document, Standards for Technological Literacy: Content for the Study of Technology includes assessment checkpoints at specific grade levels (K-2, 3-5, 6-8, and 9-12)

Technology is the modification of the natural environment in order to satisfy perceived human needs and wants.

To determine what those needs and wants are and to figure out how to satisfy them, one must consider a wide range of factors simultaneously. For this reason, although the study of technology may sometimes be a separate subject, it can never be an isolated subject cut off from the rest of the curriculum.

Glossary of *Technology Content Standards*

Technology – 1. Human innovation in action that involves the generation of knowledge and processes to develop systems that solve problems and extend human capabilities. 2. The innovation, change, or modification of the natural environment to satisfy perceived human needs and wants.

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

> The ability to use technology involves successful operation of the important systems of the time. This includes knowing the components of existing macrosysytems, or human adaptive systems, and how systems behave.

> The ability to manage involves ensuring that all technological activities are efficient and appropriate.

> Understanding technology involves more than facts and information but also the ability to synthesize the information into new insights.

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

> A 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.

Contrast	Technology Education students learn about:	Technology Education vs. Technological Studies
	• Designing, developing, and utilizing technological systems • Open-ended, problem-based design activities • Cognitive, manipulative, and affective learning strategies • Applying technological knowledge and processes to real world experiences using up-to-date resources • Working individually as well as in a team to solve problems	• **Technology Education** teaches <u>about</u> technology, a school subject • **Technological Studies** <u>teaches</u> information technology. Ultimate goal: Technological literacy **Note** -- Often the term technology education is misunderstood or not completely recognized as the study of technology as presented here and in Standards for Technological Literacy. ***Therefore, the use of the term "technological studies" is to help bring clarity to the study of technology that happens in the technology education laboratory-classroom.*** The use of technological studies has proven to be effective and helps explain the subject matter that is being taught. It is not meant to replace the words "technology education."
Why were standards and benchmarks created	• They offer a common set of expectations for what students should learn in the study of technology. • They are developmentally appropriate for students. • They provide a basis for developing meaningful, relevant, and articulated curricula at the local, state, and provincial levels. • They promote content connections with other fields of study in grades K-12. • They encourage active and experiential learning Technology Content Standards specifies what each student should know and be able to do in order to be technologically literate. It also offers criteria to judge progress toward a vision of technological literacy for all students.	
There are 20 individual standards	There are 20 individual standards which fall into two types. •What students should know and understand about technology. •What they should be able to do.	

Benchmarks in Technology Content Standards provide the fundamental content elements for the broadly stated standards. Benchmarks, which are statements that provide knowledge and abilities that enable students to meet a given standard, are provided for each of the 20 standards at the K-2, 3-5, 6-8 and 9-12 grade levels

The Nature of Technology
Std. 1: Students will develop an understanding of the characteristics and scope of technology.
Std. 2: Students will develop an understanding of the core concepts of technology.
Std. 3: Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.

Technology and Society
Std. 4: Students will develop an understanding of the cultural, social, economic, and political effects of technology.
Std. 5: Students will develop an understanding of the effects of technology on the environment.
Std. 6: Students will develop an understanding of the role of society in the development and use of technology.
Std. 7: Students will develop an understanding of the influence of technology on history.

Design...
Std. 8: Students will develop an understanding of the attributes of design.
Std. 9: Students will develop an understanding of engineering design.
Std. 10: Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

Abilities for a Technological World
Std. 11: Students will develop the abilities to apply the design process.
Std. 12: Students will develop the abilities to use and maintain technological products and systems.
Std. 13: Students will develop the abilities to assess the impact of products and systems.

The Designed World...
Std. 14: Students will develop an understanding of and be able to select and use medical technologies.
Std. 15: Students will develop an understanding of and be able to select and use agricultural and related biotechnologies.
Std. 16: Students will develop an understanding of and be able to select and use energy and power technologies.
Std. 17: Students will develop an understanding of and be able to select and use information and communication technologies.

Std. 18: Students will develop an understanding of and be able to select and use transportation technologies.

Std. 19: Students will develop an understanding of and be able to select and use manufacturing technologies.

Std. 20: Students will develop an understanding of and be able to select and use construction technologies.

Anatomy of a Standard	"Students will…" All standards start with students will and this is a statement of equity…meaning ALL students…in addition, the benchmarks are provided in grade level bands of K-2, 3-5, 6-8, and 9-12 for the opportunity to be creative to design many different curriculum scenarios and presentations…many options are possible.

"…develop an understanding of…" this brings home the idea of the need for a structured approach to developing technological literacy. Students cannot acquire technological literacy without having many experiences and activities over time.

"…the core concepts of technology." THIS IS THE CONTENT OF THE STANDARD. This phrase (or entire standard) is not intended to be used as a statement that appears in a lesson or activity…it DEFINES the CONTENT that the lesson or activity should address. However, you may list the content standards that a lesson or lesson-activity is addressing. **The main goal is to be sure you are not just using the words, but are actually teaching the CONTENT being discussed.**

The related benchmarks and underlying ideas elaborate on the content and are used to help shape what is expected for each student to learn and be able to do. The Core concepts of technology are: systems, resources, requirements (criteria & constraints), optimization & trade-offs, processes, and controls.

The Minnesota Plan…	**Phase I: Planning And Awareness July 2001 – July 2003** **The purpose of Phase I is to promote awareness of STL.**

"Investigate"

SciMath MN has provided $30,000 for Phase I implementation and $30,000 to purchase copies of STL for distribution.

1. Establish a forum for MTEA leadership to create bridges with math and science organizations.
2. Develop a plan to fully embed STL in all Minnesota schools by 2015.
3. Focus the 2001 and 2002 Conferences on STL.
4. Make every Minnesota technology educator aware of the Standards.
5. Make targeted leaders in every Minnesota school district aware of the standards.
6. Select and train a group of MN technology educators to serve as standards experts and staff developers for STL.
7. Identify partners and communicate the standards to them.

8. Develop a tool to assess the extent to which a school's curriculum currently addresses STL.
9. Provide regional staff development opportunities for MN technology educators to receive overview training on the standards
10. Develop an implementation checklist for schools to use as they initiate the standards implementation process

"Replicate"
"Train the trainer" model where an initial group is selected to be trained, in turn, train others on standards understanding and implementation.
22 individuals involved so far.

What can you do?
- Read the Standards for Technological Literacy.
- Help create public awareness of the standards.
- Become an active member of ITEA.
- Develop standards based units of instruction within your program.
- Share your standards based units of instruction with other technology educators.