Refining the Standards for Technology Education

With comments and critiques in-hand, the Standards Team leaders and recorders and the Technology for All Americans Project (TfAAP) staff have embarked upon the important process of revising the Standards for Technology Education (Standards).

“The Standards Team leaders and recorders appreciated the comments from the first draft review,” said Brigitte Valesey, recorder, grades 6-8. “We are confident the next draft will be rich in the content and processes that will help prepare people to meet the technological demands of the twenty-first century.”

Background
The goal of the International Technology Education Association’s (ITEA) TfAAP is to promote excellence in technology education by defining the intellectual domain of technology, advancing the study of technology, and creating standards. TfAAP, funded by the National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA), is creating a document entitled Standards for Technology Education in the second phase of the project.

The standards will specify what students from grades K-12 should know and be able to do in technology and will identify the knowledge and processes essential to technology that should be taught and learned in school. Standards are not a federal policy or mandate, a test, or a curriculum; rather, standards are written statements about what is valued in a field of study that can be used for making a judgment of quality.

Consensus building
From October to December 1997, the first draft of the Standards was reviewed by more than 1,000 people. During the standards hearings, 222 participants at 12 regional and state conferences across the country, both individually and as a group, commented upon the strengths and weaknesses of the content standards and suggested revisions.

The entire document was mailed to 210 individuals (11 focus groups, the project’s Advisory Group and Standards Team, and other selected individuals) for their input. In-depth meetings with the National Academy of Engineering (NAE) Review Committee, the Advisory Group, and the Standards Team leaders and recorders were also held.
Finally, input was received from the project’s World Wide Web home page where the entire draft was available for review and comment during November 1997. During the month, 653 individuals reviewed the draft and/or provided input.

The refining process

The Standards Team leaders and recorders met in St. Louis on January 15-18 to consider the comments and suggestions. After long discussions, the group unanimously decided to modify the structure of the Standards and refine the individual content standards for each benchmark grade level.

“The group worked diligently to respond to the concerns raised by the various reviewers,” said Rod Custer, Standards Team leader, grades 9-12. “The easy approach would have been to simply correct the relatively minor, grammatical details. The group instead chose to take the more responsible approach of addressing the substantive issues, such as developmental age appropriateness of the standards at each benchmark level (K-2, 3-5, 6-8, and 9-12), the separation of knowledge base from process, and concerns about the contexts component of the universals.”

The results of the revision process

Based upon the suggestions received, the Standards Team leaders and recorders refined the dimensions in order to more clearly identify the content to be covered in technology education.

The group incorporated the Technological Concepts and Principles dimension throughout the remaining dimensions. “A large number of reviewers suggested the value of interlacing the concepts and principles within each dimension,” said Pam Newberry, senior research associate for TF AAP. “The group recognized the strength in this approach and chose to modify the content standards accordingly.”

A second major theme addressed throughout the comments received on the first draft was to ensure that the content standards built steadily starting in kindergarten and continuing through the twelfth grade and that the standards were developmentally appropriate for each grade. Several steps were taken to address these comments. The first was to change the titles of each dimension to reflect what the students should be learning at each benchmark level. As a result, in grades K-2 and 3-5, the Design dimension was combined with the Make dimension, and the Manage dimension being introduced in the third grade. The dimensions for each benchmark level are shown in Figure 1.

Each dimension was also charted by grade level to ensure that the major themes of each dimension progressed steadily throughout each grade level. The concern that certain topics and examples were too advanced for the various benchmark levels was also addressed. As a result, certain concepts, such as the interaction of technology with the environment, were not introduced until later grades. In addition, examples and wordings were simplified in the lower grades.

During the January 26, 1998 meeting in Washington, DC, the Advisory Group and the TF AAP staff discussed the phrasing of each content standard. It was decided that the content standards should not be behavioral statements, but declarative or action statements. In the second draft, the stems that introduce the process or knowledge standards reflect this decision. The knowledge stem in grades K-2 states, “As a result of learning experiences in grades K-2, students will know that...” and the process stem states, “As a result of activities in grades K-2, students will be able to...”

Also discussed was the importance of each standard being the same level of importance and containing approximately the same amount of information. The staff referred to Project 2061’s Benchmarks for Science Literacy (pp. 314-315) definition of ‘grain size’ for help in this area.

The written structure of each dimension also evolved into a new format. At the beginning of each benchmark level’s dimension, there is an introduction that identifies what students should know coming into the benchmark level, what they will be learning at this particular level, what knowledge they will be leaving the benchmark level with, and why it is important for them to be learning this information. The introduction is followed by a listing of the process and knowledge content standards. The final section describes where and how this dimension should play out in students’ laboratory experiences.

Suggestions are given on how the standards may be implemented in the classroom and how they may be combined with other dimensions and other fields of study. Vignettes and examples are included in this section to give a snapshot of the classroom. Figure 2 illustrates a sample content standard.

The consensus building continues

For the review of the second draft, attention will be focused on receiving comments on the content standards for grades K-12. “During the first review process, the individuals who reviewed the entire document generally spent more time reading the first chapters and less on the content standards,” said William Dugger, Jr., director of TF AAP. “The main core of the document is the content standards, and it is important that we devote all our
energies at this time on perfecting them during this second level of review."

The second stage of the consensus building process concluded in early May 1998. During this process, standards hearings were conducted, and the document was mailed to selected individuals for review. In addition, the document was available during the month of April 1998 for electronic review on the Web.

After this input is analyzed and synthesized, the document will be further developed and refined into a third draft. In the fall of 1998, the entire document will be mailed to selected individuals one last time for their review and will be field tested in selected schools across the country. The goal of the field testing is to provide feedback from a variety of schools on the draft and how the standards fit into the school's current technology education program. The schools will have approximately a month for review and reply.

After revising the third draft in November and December 1998 and January 1999, the Standards will be printed in February. The Standards will then be released at the ITEA Conference in Indianapolis, Indiana in March 1999.

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References


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Indianapolis Conference Presenters

Don’t forget to submit your Application for Conference Participation by June 15th, 1998. If you need an application, please call ITEA at 703-860-2100, or fax your request to 703-860-0353.
An impact is concerned with the effect of one thing on another.

**Technology** plays an important part in children's lives. They depend on the use of technology for such things as shelter, information, toys, clothing, and food. It is important that children, as both current and future consumers of technology, have the ability to assess the impacts and consequences of technology. An impact is concerned with the effect of one thing on another (e.g., the effect of television on how a child spends their free time). Consequences are something that logically or naturally follows an action or condition (e.g., an oil spill in the ocean will cause damage to wildlife).

Assessment involves evaluating the importance, size, or value of something and determining whether or not it works. Students at this age level should begin using criteria to assess a product. This criteria may include things, such as: does the product work well; is it affordable; does the product do what it is advertised to do; what are the safety factors that should be considered; how long will the product last; and how much will the consumable items (e.g., paper, film, or batteries) cost over a period of time.

Collecting information about technology is important in correctly making judgments and evaluating its effectiveness. The concept of data collection as a means of decision making should be introduced in grades K-2. Students should also begin exploring different ways to collect data...

**Content Standards**
Describes what students should be able to do and know as a result of the study of technology.

**Explanation of Content Standards**
Describes where and how this dimension should play out in students’ laboratory experiences. Suggestions are given on how the standards may be implemented in the classroom and how they may be combined with other dimensions and other fields of study.

**Assess the Impacts and Consequences of Technology**

**Processes**
- As a result of activities in grades K-2, students will be able to
  - Gather information about everyday products (e.g., toys, food, games, health products, school supplies, and clothes) and then evaluate them according to set criteria.
  - Ask questions about technological systems, such as: what are they, why are they important, where do they fit into everyone’s lives, and where can you use them.
  - Make a list and discuss the impacts of technology on their daily lives, as well as, on those in their family.

**Knowledge**
- As a result of learning experiences in grades K-2, students will know that
  - Technology has impacts and consequences on daily life.
  - Collecting information about a technological product or system is necessary to evaluate its effectiveness.
  - Data collected can be used to help make decisions about how to make changes in a system.

**EXPLANATION OF CONTENT STANDARDS**
From experiences in designing, making, and using, children should learn how to evaluate a design based on criteria, to fix a problem, to determine whether the design works, and to improve a design. They should also have experiences in constructing a product. Students should use many of these same skills when assessing the positive and negative impacts and consequences of technology.

Students can categorize and compare different technologies by compiling easily observable criteria (e.g., number, shape, texture, weight, and motion). The data...

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**Figure 2. Sample Content Standards**