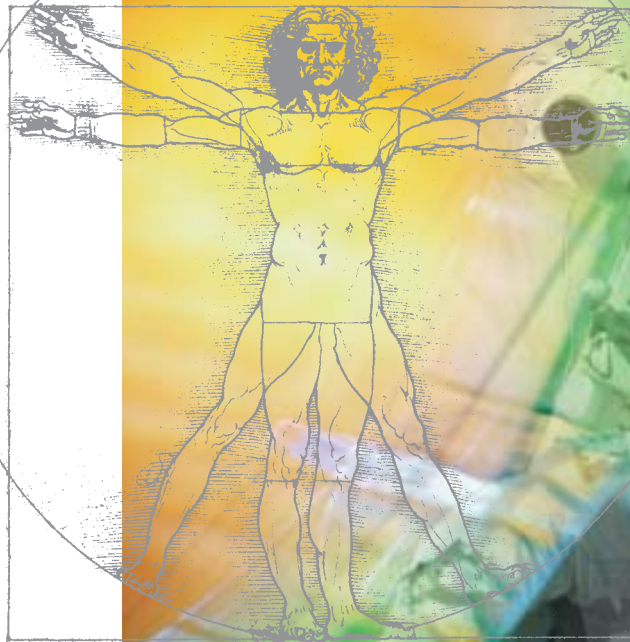


Standards for Technological Literacy:

*Content for
the Study of
Technology*

Second Edition



International Technology
Education Association

and its



Technology for
All Americans Project

TABLE 2.1 Listing of Standards for Technological Literacy

CHAPTERS	STANDARDS
<p>3</p> <p>Students will develop an understanding of The Nature of Technology. This includes acquiring knowledge of:</p>	<p>1 The characteristics and scope of technology.</p> <p>2 The core concepts of technology.</p> <p>3 The relationships among technologies and the connections between technology and other fields.</p>
<p>4</p> <p>Students will develop an understanding of Technology and Society. This includes learning about:</p>	<p>4 The cultural, social, economic, and political effects of technology.</p> <p>5 The effects of technology on the environment.</p> <p>6 The role of society in the development and use of technology.</p> <p>7 The influence of technology on history.</p>
<p>5</p> <p>Students will develop an understanding of Design. This includes knowing about:</p>	<p>8 The attributes of design.</p> <p>9 Engineering design.</p> <p>10 The role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.</p>
<p>6</p> <p>Students will develop Abilities for a Technological World. This includes becoming able to:</p>	<p>11 Apply the design process.</p> <p>12 Use and maintain technological products and systems.</p> <p>13 Assess the impact of products and systems.</p>
<p>7</p> <p>Students will develop an understanding of The Designed World. This includes selecting and using:</p>	<p>14 Medical technologies.</p> <p>15 Agricultural and related biotechnologies.</p> <p>16 Energy and power technologies.</p> <p>17 Information and communication technologies.</p> <p>18 Transportation technologies.</p> <p>19 Manufacturing technologies.</p> <p>20 Construction technologies.</p>

B

Listing of the *STL* Standards

THE NATURE OF TECHNOLOGY

STANDARDS

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

TECHNOLOGY AND SOCIETY

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

DESIGN

- 8 Students will develop an understanding of the attributes of design.
- 9 Students will develop an understanding of engineering design.
- 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

STANDARDS

- 11 Students will develop the abilities to apply the design process.
- 12 Students will develop the abilities to use and maintain technological products and systems.
- 13 Students will develop the abilities to assess the impact of products and systems.

THE DESIGNED WORLD

- 14 Students will develop an understanding of and be able to select and use medical technologies.
- 15 Students will develop an understanding of and be able to select and use agricultural and related biotechnologies.
- 16 Students will develop an understanding of and be able to select and use energy and power technologies.
- 17 Students will develop an understanding of and be able to select and use information and communication technologies.
- 18 Students will develop an understanding of and be able to select and use transportation technologies.
- 19 Students will develop an understanding of and be able to select and use manufacturing technologies.
- 20 Students will develop an understanding of and be able to select and use construction technologies.

Compendium of Major Topics for *Standards for Technological Literacy*

Standards	Benchmark Topics Grades K-2	Benchmark Topics Grades 3-5	Benchmark Topics Grades 6-8	Benchmark Topics Grades 9-12
CHAPTER 3 NATURE OF TECHNOLOGY				
1 The Characteristics and Scope of Technology	<ul style="list-style-type: none"> Natural world and human-made world People and technology 	<ul style="list-style-type: none"> Things found in nature and in the human-made world Tools, materials, and skills Creative thinking 	<ul style="list-style-type: none"> Usefulness of technology Development of technology Human creativity and motivation Product demand 	<ul style="list-style-type: none"> Nature of technology Rate of technological diffusion Goal-directed research Commercialization of technology
2 The Core Concepts of Technology	<ul style="list-style-type: none"> Systems Resources Processes 	<ul style="list-style-type: none"> Systems Resources Requirements Processes 	<ul style="list-style-type: none"> Systems Resources Requirements Trade-offs Processes Controls 	<ul style="list-style-type: none"> Systems Resources Requirements Optimization and Trade-offs Processes Controls
3 The Relationships Among Technologies and the Connections Between Technology and Other Fields	<ul style="list-style-type: none"> Connections between technology and other subjects 	<ul style="list-style-type: none"> Technologies integrated Relationships between technology and other fields of study 	<ul style="list-style-type: none"> Interaction of systems Interrelation of technological environments Knowledge from other fields of study and technology 	<ul style="list-style-type: none"> Technology transfer Innovation and Invention Knowledge protection and patents Technological knowledge and advances of science and mathematics and vice versa
CHAPTER 4 TECHNOLOGY AND SOCIETY				
4 The Cultural, Social, Economic, and Political Effects of Technology	<ul style="list-style-type: none"> Helpful or harmful 	<ul style="list-style-type: none"> Good and bad effects Unintended consequences 	<ul style="list-style-type: none"> Attitudes toward development and use Impacts and consequences Ethical issues Influences on economy, politics, and culture 	<ul style="list-style-type: none"> Rapid or gradual changes Trade-offs and effects Ethical implications Cultural, social, economic, and political changes
5 The Effects of Technology on the Environment	<ul style="list-style-type: none"> Reuse and/or recycling of materials 	<ul style="list-style-type: none"> Recycling and disposal of waste Affects environment in good and bad ways 	<ul style="list-style-type: none"> Management of waste Technologies repair damage Environmental vs. economic concerns 	<ul style="list-style-type: none"> Conservation Reduce resource use Monitor environment Alignment of natural and technological processes Reduce negative consequences of technology Decisions and trade-offs
6 The Role of Society in the Development and Use of Technology	<ul style="list-style-type: none"> Needs and wants of individuals 	<ul style="list-style-type: none"> Changing needs and wants Expansion or limitation of development 	<ul style="list-style-type: none"> Development driven by demands, values, and interests Inventions and innovations Social and cultural priorities Acceptance and use of products and systems 	<ul style="list-style-type: none"> Different cultures and technologies Development decisions Factors affecting designs and demands of technologies

Compendium of Major Topics for *Standards for Technological Literacy (Continued)*

Standards	Benchmark Topics Grades K-2	Benchmark Topics Grades 3-5	Benchmark Topics Grades 6-8	Benchmark Topics Grades 9-12
CHAPTER 4 TECHNOLOGY AND SOCIETY (Continued)				
7 The Influence of Technology on History	<ul style="list-style-type: none"> • Ways people have lived and worked 	<ul style="list-style-type: none"> • Tools for food, clothing, and protection 	<ul style="list-style-type: none"> • Processes of inventions and innovations • Specialization of labor • Evolution of techniques, measurement, and resources • Technological and scientific knowledge 	<ul style="list-style-type: none"> • Evolutionary development of technology • Dramatic changes in society • History of technology • Early technological history • The Iron Age • The Middle Ages • The Renaissance • The Industrial Revolution • The Information Age
CHAPTER 5 DESIGN				
8 The Attributes of Design	<ul style="list-style-type: none"> • Everyone can design • Design is a creative process 	<ul style="list-style-type: none"> • Definitions of design • Requirements of design 	<ul style="list-style-type: none"> • Design leads to useful products and systems • There is no perfect design • Requirements 	<ul style="list-style-type: none"> • The design process • Design problems are usually not clear • Designs need to be refined • Requirements
9 Engineering Design	<ul style="list-style-type: none"> • Engineering design process • Expressing design ideas to others 	<ul style="list-style-type: none"> • Engineering design process • Creativity and considering all ideas • Models 	<ul style="list-style-type: none"> • Iterative • Brainstorming • Modeling, testing, evaluating, and modifying 	<ul style="list-style-type: none"> • Design principles • Influence of personal characteristics • Prototypes • Factors in engineering design
10 The Role of Troubleshooting, Research and Development, Invention and Innovation, and Experimentation in Problem Solving	<ul style="list-style-type: none"> • Asking questions and making observations • All products need to be maintained 	<ul style="list-style-type: none"> • Troubleshooting • Invention and innovation • Experimentation 	<ul style="list-style-type: none"> • Troubleshooting • Invention and innovation • Experimentation 	<ul style="list-style-type: none"> • Research and development • Researching technological problems • Not all problems are technological or can be solved • Multidisciplinary approach
CHAPTER 6 ABILITIES FOR A TECHNOLOGICAL WORLD				
11 Apply the Design Process	<ul style="list-style-type: none"> • Solve problems through design • Build something • Investigate how things are made 	<ul style="list-style-type: none"> • Collect information • Visualize a solution • Test and evaluate solutions • Improve a design 	<ul style="list-style-type: none"> • Apply design process • Identify criteria and constraints • Model a solution to a problem • Test and evaluate • Make a product or system 	<ul style="list-style-type: none"> • Identify a design problem • Identify criteria and constraints • Refine the design • Evaluate the design • Develop a product or system using quality control • Reevaluate final solution(s)
12 Use and Maintain Technological Products and Systems	<ul style="list-style-type: none"> • Discover how things work • Use tools correctly and safely • Recognize and use everyday symbols 	<ul style="list-style-type: none"> • Follow step-by-step instructions • Select and safely use tools • Use computers to access and organize information • Use common symbols 	<ul style="list-style-type: none"> • Use information to see how things work • Safely use tools to diagnose, adjust, and repair • Use computers and calculators • Operate systems 	<ul style="list-style-type: none"> • Document and communicate processes and procedures • Diagnose a malfunctioning system • Troubleshoot and maintain systems • Operate and maintain systems • Use computers to communicate

Compendium of Major Topics for *Standards for Technological Literacy (Continued)*

Standards	Benchmark Topics Grades K-2	Benchmark Topics Grades 3-5	Benchmark Topics Grades 6-8	Benchmark Topics Grades 9-12
CHAPTER 6 ABILITIES FOR A TECHNOLOGICAL WORLD (Continued)				
13 Assess the Impact of Products and Systems	<ul style="list-style-type: none"> • Collect information about everyday products • Determine the qualities of a product 	<ul style="list-style-type: none"> • Use information to identify patterns • Assess the influence of technology • Examine trade-offs 	<ul style="list-style-type: none"> • Design and use instruments to collect data • Use collected data to find trends • Identify trends • Interpret and evaluate accuracy of information 	<ul style="list-style-type: none"> • Collect information and judge its quality • Synthesize data to draw conclusions • Employ assessment techniques • Design forecasting techniques
CHAPTER 7 THE DESIGNED WORLD				
14 Medical Technologies	<ul style="list-style-type: none"> • Vaccinations • Medicine • Products to take care of people and their belongings 	<ul style="list-style-type: none"> • Vaccines and medicine • Development of devices to repair or replace certain parts of the body • Use of products and systems to inform 	<ul style="list-style-type: none"> • Advances and innovations in medical technologies • Sanitation processes • Immunology • Awareness about genetic engineering 	<ul style="list-style-type: none"> • Medical technologies for prevention and rehabilitation • Telemedicine • Genetic therapeutics • Biochemistry
15 Agricultural and Related Biotechnologies	<ul style="list-style-type: none"> • Technologies in agriculture • Tools and materials for use in ecosystems 	<ul style="list-style-type: none"> • Artificial ecosystems • Agriculture wastes • Processes in agriculture 	<ul style="list-style-type: none"> • Technological advances in agriculture • Specialized equipment and practices • Biotechnology and agriculture • Artificial ecosystems and management • Development of refrigeration, freezing, dehydration, preservation, and irradiation 	<ul style="list-style-type: none"> • Agricultural products and systems • Biotechnology • Conservation • Engineering design and management of ecosystems
16 Energy and Power Technologies	<ul style="list-style-type: none"> • Energy comes in many forms • Energy should not be wasted 	<ul style="list-style-type: none"> • Energy comes in different forms • Tools, machines, products, and systems use energy to do work 	<ul style="list-style-type: none"> • Energy is the capacity to do work • Energy can be used to do work using many processes • Power is the rate at which energy is converted from one form to another • Power systems • Efficiency and conservation 	<ul style="list-style-type: none"> • Law of Conservation of Energy • Energy sources • Second Law of Thermodynamics • Renewable and non renewable forms of energy • Power systems are a source, a process, and a load
17 Information and Communication Technologies	<ul style="list-style-type: none"> • Information • Communication • Symbols 	<ul style="list-style-type: none"> • Processing information • Many sources of information • Communication • Symbols 	<ul style="list-style-type: none"> • Information and communication systems • Communication systems encode, transmit, and receive information • Factors influencing the design of a message • Language of technology 	<ul style="list-style-type: none"> • Parts of information and communication systems • Information and communication systems • The purpose of information and communication technology • Communication systems and sub-systems • Many ways of communicating • Communicating through symbols

Compendium of Major Topics for *Standards for Technological Literacy (Continued)*

Standards	Benchmark Topics Grades K-2	Benchmark Topics Grades 3-5	Benchmark Topics Grades 6-8	Benchmark Topics Grades 9-12
CHAPTER 7 THE DESIGNED WORLD (Continued)				
18 Transportation Technologies	<ul style="list-style-type: none"> •Transportation system •Individuals and goods •Care of transportation products and systems 	<ul style="list-style-type: none"> •Transportation system use •Transportation systems and subsystems 	<ul style="list-style-type: none"> •Design and operation of transportation systems •Subsystems of transportation system •Governmental regulations •Transportation processes 	<ul style="list-style-type: none"> •Relationship of transportation and other technologies •Intermodalism •Transportation of services and methods •Positive and negative impacts of transportation systems •Transportation processes and efficiency
19 Manufacturing Technologies	<ul style="list-style-type: none"> •Manufacturing systems •Design of products 	<ul style="list-style-type: none"> •Natural materials •Manufacturing processes •Consumption of goods •Chemical technologies 	<ul style="list-style-type: none"> •Manufacturing systems •Manufacturing goods •Manufacturing processes •Chemical technologies •Materials use •Marketing products 	<ul style="list-style-type: none"> •Servicing and obsolescence •Durable or non-durable goods •Manufacturing systems •Interchangeability of parts •Chemical technologies •Marketing of products
20 Construction Technologies	<ul style="list-style-type: none"> •Different types of buildings •How parts of buildings fit 	<ul style="list-style-type: none"> •Modern communities •Structures •Systems used 	<ul style="list-style-type: none"> •Construction designs •Foundations •Purpose of structures •Buildings systems and sub-systems 	<ul style="list-style-type: none"> •Infrastructure •Construction processes and procedures •Requirements •Maintenance, alterations, and renovation •Prefabricated materials