

## TECHNOLOGY STANDARDS

### Grade 5

#### **Standard 1 Nature of Technology**

Students develop an understanding of technology, its characteristics, scope, core concepts\* and relationships between technologies and other fields. Students learn that technology extends human potential by allowing people to do things more efficiently than they would otherwise be able to do. Students learn that useful technological development is a product of human knowledge, creativity, invention, innovation, motivation and demand for new products and systems. They learn that the natural and human-made designed worlds are different, and that tools and materials are used to alter the environment. Students learn that the development of emerging technology is exponential, driven by history, design, commercialization, and shaped by creative/inventive thinking, economic factors and cultural influences.\*The core concepts of technology include systems, resources, requirements, optimization and trade-offs, processes and controls.

*Benchmark A: Compare and discuss the characteristics of technology in our community.*

Grade Five

#### **Natural or Human-made**

1. Create a human-made product from natural materials (e.g., process natural materials into new products).

#### **Tools, Materials, Skills**

2. Use tools, materials and processes to produce products and carry out tasks efficiently and effectively.

3. Demonstrate the use of technology in daily life, noting the advantages and disadvantages those uses provide.

#### **Creating Technology**

4. List companies or businesses related to each of the seven technological systems (e.g., hospitals, farms, gas stations, radio stations, airlines, toy manufacturers and home builders).

*Benchmark B: Identify, describe and discuss the core concepts of technology.*

Grade Five

#### **Processes**

1. Select and use tools to design, make, modify and assess technology.

2. Test the properties of materials.

3. Demonstrate how tools and machines extend human capabilities.

#### **Requirements**

4. Recognize that requirements are the limits to designing or making a product or system.

*Benchmark C: Compare and discuss the relationships among technologies, and the connections between technology and other fields of study.*

Grade Five

#### **Connections**

1. Compare services provided in each of the seven technological systems and identify specialized tools used in each system.

#### **Standard 2 Technology and Society Interaction**

Students recognize interactions among society, the environment and technology, and understand technology's relationship with history. Consideration of these concepts forms a foundation for engaging in responsible and ethical use of technology. Students learn that the interaction between society and technology has an impact on their lives, that technology may have unintended consequences which may be helpful or harmful. They learn that interaction of technology will affect the economy, ethical standards, environment and culture. Students evaluate the impact of products or systems by gathering and synthesizing information, analyzing trends and drawing conclusions. Students analyze technological issues and the implications of using technology. They acquire technological understanding, and develop attitudes and practices that support ethical decision-making and lifelong learning.

*Benchmark A: Define responsible citizenship relative to technology.*

Grade Five

#### **Technology and Citizenship**

1. Identify and show cooperative and collaborative strategies to work with others when using technology systems.
2. Analyze common uses of technology in daily life and the advantages and disadvantages those uses provide (e.g., how technology helps us communicate).
3. Distinguish basic issues related to responsible use of technology and information, and relate personal consequences of inappropriate use.

*Benchmark B: Investigate and explain the interrelationships between technology and the environment.*

Grade Five

Technology and the Environment

1. Investigate alternative methods for the protection of the environment.

*Benchmark C: Explain and demonstrate the influence of technology throughout history.*

Grade Five

Technology and History

1. Discuss and create alternative solutions to the ways that people have made tools to provide food, make clothing and provide protection.
2. Explain how technology and invention have changed economic and social development.

*Benchmark D: Practice responsible use of technology, understand school district guidelines for technology use, and explore technology ownership.*

Grade Five

Intellectual Property

1. Discuss patent, copyright, trade name/trademark protection and the rights of the owner of the work (e.g., inventor, manufacturer, software developer, company, Web site creator, author of information).

Acceptable Use

2. Discuss basic issues related to responsible use of technology and describe personal consequences of inappropriate use (e.g., plagiarism, intellectual property, and the conditions of the district AUP).
3. Use technology to collaborate with others and credit all participants for their contribution to the work.

*Benchmark E: Identify development patterns and examine the influence of technology on the world.*

Grade Five

Technology and Assessment

1. Compare, contrast and classify collected information in order to identify patterns of technology development.
2. Investigate and assess the influence of a specific technology on the environment.
3. Examine the trade-offs of using a product or system and decide when it should be used (e.g., determine the amount of supplies/luggage and mode of transportation needed for traveling various lengths of days and distances).

### Standard 3 Technology for Productivity Applications

Students learn the operations of technology through the usage of technology and productivity tools. Students use computer and multimedia resources to support their learning. Students understand terminology, communicate technically and select the appropriate technology tool based on their needs. They use technology tools to collaborate, plan and produce a sample product to enhance their learning, and solve problems by investigating, troubleshooting and experimenting using technical resources.

*Benchmark A: Understand computer and multimedia technology concepts and communicate using the correct terminology.*

Grade Five

Basic Concepts

1. Define and use new technology terminology based on the computer and multimedia technology resources being used.

*Benchmark B: Use appropriate tools and technology resources to complete tasks and solve problems.*

Grade Five

Basic Concepts

1. Describe how networks are used to access, share and store information (e.g., software, printers, folders, files).

### **Basic Operations**

2. Select the appropriate device to store needed information and independently save and access stored information from portable devices (e.g., how large is the saved information? do others need to use the information? What device will best store this information?).

### **Productivity Tools**

3. Collect information for projects using still and video digital cameras, scanners and electronic resources.

4. Create a presentation using multimedia software that incorporates, graphics, video and sound to present the findings of a group research project.

### **Research Tools**

5. Investigate technology tools used for researching problems and acquiring information and data.

### **Keyboarding**

6. Use appropriate hand/finger positions to key all letters (e.g., demonstrate ability to appropriately keyboard and assess accuracy).

*Benchmark C: Use productivity tools to produce creative works and prepare publications.*

### **Grade Five**

#### **Productivity Tools**

1. Select and use appropriate software applications to complete content-specific tasks (e.g., use desktop publishing software to create a newsletter, use drawing programs to create artwork).

#### **Communication Tools**

2. Investigate technology resources for individual and collaborative writing, communication and publication of creative works (e.g., video editing, desktop publishing).

3. Use technology resources for presenting information (e.g., distance learning and interactive boards).

### **Standard 4 Technology and Communication Applications**

Students use an array of technologies and apply design concepts to communicate with multiple audiences, acquire and disseminate information and enhance learning. Students acquire and publish information in a variety of media formats. They incorporate communication design principles in their work. They use technology to disseminate information to multiple audiences. Students use telecommunication tools to interact with others. They collaborate in real time with individuals and groups who are located in different schools, communities, states and countries. Students participate in distance education opportunities which expand academic offerings and enhance learning.

*Benchmark A: Identify the concepts and operations of communication systems.*

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#### **Design Elements**

1. Implement basic design components (contrast, size, arrangement) in print or electronic media productions.

#### **Use of Communications**

2. Determine ways in which people collaborate in real time with individual and groups located in different school districts, communities, states and countries.

3. Describe and participate in different types of online learning environments (e.g., online classes, distance learning, video conferencing and productions).

*Benchmark B: Develop, publish and present information in print and digital formats.*

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#### **Multimedia Applications**

1. Produce a slide show from storyboard, using text, graphics and sound with appropriate transitions and effects.

2. Collaborate in a class video project (e.g., act as camera operator, actor or director in a video project as part of a unit of study).

3. Use a simple authoring tool to create class Web page.

4. Evaluate and modify a presentation or document for different audiences (e.g., one person or a group of people).

5. Use advanced software features to publish information in printed form (e.g., card, calendar, banner, one-page report, flyer, newsletter).

*Benchmark C: Use technology communications to participate in online group collaborative interactive projects and activities.*

Grade Five

Use of Communications

1. Demonstrate how to use e-mail to communicate with another student in a remote location.
2. Communicate in a monitored, online discussion (e.g., discuss books being read, share local history).
3. Gather and share information in online learning activities (e.g., examine historical journals and share observations).

**Standard 5 Technology and Information Literacy**

Students engage in information literacy strategies, use the Internet, technology tools and resources, and apply information-management skills to answer questions and expand knowledge. Students become information-literate learners by utilizing a research process model. They recognize the need for information and define the problem, need or task. Students understand the structure of information systems and apply these concepts in acquiring and managing information. Using technology tools, a variety of resources are identified, accessed and evaluated. Relevant information is selected, analyzed and synthesized to generate a finished product. Students evaluate their information process and product.

*Benchmark A: Describe types of information: facts, opinions, primary/secondary sources; and formats of information: number, text, sound, visual, multimedia; and use information for a purpose.*

Grade Five

Understanding Information

1. Develop a systematic plan for organizing information using a basic organizing concept (e.g., subject, chronology, date).
2. Choose a variety of formats for presenting information (e.g., pictures, texts, slides).
3. Understand that there are conditions where information cannot be used (e.g., copyright restrictions on the use of cartoon characters, copying a classmate's project).
4. Distinguish between relevant and irrelevant information in an information source (e.g., information matches question to be answered, facts apply to the topic).

Primary/Secondary Sources

5. Apply primary and secondary sources to investigate a person, place, thing or event, and identify each source as primary or secondary.

*Benchmark B: Use technology to find information by applying a research process to decide what information is needed, to find sources, to use information and to check work.*

Grade Five

Decide

1. Identify questions related to an assigned topic or personal information need.
2. Determine the best sources to use for the assigned topic or personal information need.

Find

3. Select and access information resources: online library catalog, Web sites and electronic formats (e.g., CD-ROM, DVD, audio files).

Use

4. Record and use selected information to create a product for the assigned topic or personal information need.
5. Cite sources used: author, title of resource, publisher or source of information, and copyright date.

Check

6. Describe how information about a topic was gathered (e.g., discuss the information process).

*Benchmark C: Use the Internet to find, use and evaluate information.*

Grade Five

Internet Concepts

1. Explain the elements and meaning of a Web site URL: name of the site, domain, and extensions for specific pages.

Beginning Searching

2. Perform a search in an age-appropriate search engine or a Web directory by typing in one or more search terms.

3. Read list of results from the search and select potential relevant Web sites.

#### Web Site Evaluation

4. Identify information on the Web site: URL extensions, author, title, date produced, special features (images, puzzles, activities), products, services, resources, etc.

5. Examine the information retrieved from the Web site for the author's expertise, the accuracy of the information presented and the bias.

*Benchmark D: Identify, access and use electronic resources from both free and fee-based Internet sources.*

#### Grade Five

##### Electronic Resources

1. Use a username and password to access an information source (e.g., an online library catalog, a fee-based Web site requiring user information to access the site, district network requiring student login).

2. Examine coverage of information in magazine databases, online biography sources and subject guide sources.

3. Distinguish different types of online information databases (free or fee-based) and select the best resource based on curricular need.

#### Standard 6 Design

Students will apply a number of problem-solving strategies demonstrating the nature of design, the role of engineering and the role of assessment. Students recognize the attributes of design; that it is purposeful, based on requirements, systematic, iterative, creative, and provides solution and alternatives. Students explain critical design factors and/or processes in the development, application and utilization of technology as a key process in problem-solving. Students describe inventors and their inventions, multiple inventions that solve the same problem, and how design has affected their community. They apply and explain the contribution of thinking and procedural steps to create an appropriate design and the process skills required to build a product or system. They critically evaluate a design to address a problem of personal, societal and environmental interests. Students systematically solve a variety of types of problems using different design approaches including troubleshooting, research and development, innovation, invention and experimentation.

*Benchmark A: Describe and apply a design process to solve a problem.*

#### Grade Five

##### Design Process

1. Arrive at a solution to a technological problem and fabricate a prototype model for the solution.

2. Use data to test and evaluate the prototype solution.

3. Make sketches with a list of parts required for a solution to a technological problem.

##### Optimization and Trade-offs

4. Analyze the requirements for a design including such factors as the desired elements and features of a product or system, and the limits that are placed on the design (e.g., if the class were to prepare and deliver food to the homeless or to a nursing home, what are the desired features and what limits are there to what can be done?).

##### Redesign

5. Improve the designed prototype solution where tests indicate need.

##### Inventors/Inventions

6. Identify American inventors and designers who contributed to the development of each of the technological systems.

*Benchmark B: Describe how engineers and designers define a problem, creatively solve it and evaluate the solution.*

#### Grade Five

##### Innovation and Invention

1. Demonstrate steps used in the engineering design process including defining the problem, generating ideas, selecting a solution, testing the solution(s), making the item, evaluating the solution, and presenting the results (e.g., engineer a design to solve a storage problem at the school).

2. Describe how models are used to communicate and test design ideas and processes (e.g., car models, building models).

3. Build models which can be used to communicate and test design ideas and processes (e.g., tornado shelters).

*Benchmark C: Understand the role of troubleshooting in problem-solving.*

Grade Five

Technical Problem-solving

1. Show that invention and innovation are creative ways to turn ideas into real things (e.g., provide examples of multiple solutions to the same problem—many models of cars, varieties of apples, chess set figures).

2. Describe how the acceptance of a product can vary because of the size of the market for the product (e.g., why is the commercialization of some products successful and others not?).

### Standard 7 Designed World

Students understand how the physical, informational and bio-related technological systems\* of the designed world are brought about by the design process. Critical to this will be students' understanding of their role in the designed world: its processes, products, standards, services, history, future, impact, issues and career connections. Students learn that the designed world consists of technological systems\* reflecting the modifications that humans have made to the natural world to satisfy their own needs and wants. Students understand how through the design process the resources: materials, tools and machines, information, energy, capital, time and people are used in the development of useful products and systems. Students develop a foundation of knowledge and skills through participation in technically oriented activities for the application of technological systems. Students demonstrate understanding, skills and proficient use of technological tools, machines, instruments, materials and processes across technological systems in unique and/or new contexts. Students identify and assess the historical, cultural, environmental, governmental and economic impacts of technological systems in the designed world. \*The technological systems areas include energy and power technologies, transportation technologies, manufacturing technologies, construction technologies, information and communication technologies, medical technologies, agricultural and related biotechnologies.

*Benchmark A: Develop an understanding of how physical technologies enhance our lives.*

Grade Five

Energy and Power

1. List tools, machines, products and systems that use energy in order to do work.

2. Describe how personnel in energy and power technologies are trained (e.g., technician training, engineering school).

Transportation

3. Describe how the value of goods and services vary by their location.

4. Describe how personnel in transportation technology are trained (e.g., apprenticeship, flight school, maritime school).

Manufacturing

5. Describe examples of how manufacturing enterprises exist because of a consumption of goods (e.g., clothing wears out, seasons change and styles change so more must be manufactured).

Construction

6. Describe the guidelines (e.g., zoning and building codes; that impact the construction of houses in your community).

*Benchmark B: Recognize appropriate modes of technical communication across technological systems.*

Grade Five

Information and Communication

1. Use communication technology to transfer messages among people and/or machines locally and over distances through the use of technology.

2. Describe how personnel in information and communication technologies are trained.

*Benchmark C: Develop an understanding of how bio-related technologies improve our lives.*

Grade Five

Medical

1. Describe tools and devices that have been designed to help provide clues about health and provide a safe environment.

2. Describe how medical personnel are trained.

**Agriculture and Related Biotechnologies**

- 3. List processes used in agriculture that require different procedures, products or systems.**
- 4. Describe how personnel in agricultural and related biotechnologies are trained.**