Technology Alignment of Benchmarks and Indicators
Grade 6

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: Analyze information relative to the characteristics of technology and apply in a practical setting.

Grade Six

Technology Development

1. Recognize that there are multiple factors associated with developing products and systems.

2. Suggest alternative technological solutions for everyday problems that occur in the school or classroom.

3. Follow procedures for identifying and solving system and equipment problems that may occur.

4. Cite examples of how characteristics of technology are evident in daily life:

a. Technology is human knowledge;

b. Technology involves tools, materials and systems;

c. Application of technology results in artifacts (things or items); and

d. Technology is developed by people to control natural and human-made environments.

Benchmark B: Apply the core concepts of technology in a practical setting.

Grade Six

Systems

1. Describe the relationship among input, process, output and feedback as components of a system.

Requirements

2. Define requirements as the parameters placed on the development of a product or system.

Controls

3. Recognize that controls are mechanisms or particular steps that people perform when using information about the system that causes systems to

change.
Benchmark C: Analyze the relationships among technologies and explore the connections between technology and other fields of study.
Grade Six
Technology Interaction
1. Identify technological systems that interrelate (e.g., computer peripherals, the engine and transmission of an automobile).
2. Understand that products, systems and environments that have been developed for one setting may be applied to another setting.
3. Recognize that knowledge from other fields of study impacts the development of technological systems and products.

<u>Standard 2 Technology and Society Interaction</u>
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: Analyze technologically responsible citizenship.
Grade Six
1. Discuss how new technologies have resulted from the demands, values and interests of individuals, businesses, industries and societies.
Technology and Citizenship
2. Describe how the use of technology affects humans in various ways including their safety, comfort, choices and attitudes about technology's development and use.
Benchmark B: Describe and explain the impact of technology on the environment.
Grade Six
Technology and the Environment
1. Describe and give examples of why and how the management of waste produced by technological systems is an important societal issue.
2. Explain how technologies can be used to repair damage caused by natural disasters.
3. Identify an existing, or an area needing a riparian buffer, between a developed area and a natural stream or waterway.
Benchmark C: Describe how design and invention have influenced technology throughout history.

Grade Six

Technology and History

1. Describe how some inventions have evolved by using a deliberate and methodical process of tests and refinements.

2. Describe how in the past an invention or innovation was not always developed with the knowledge of science.

Benchmark D: Articulate intellectual property issues related to technology and demonstrate appropriate, ethical and legal use of technology.

Grade Six

Intellectual Property

1. Understand the concept of intellectual property (e.g., author's ownership of work).

2. Compare key concepts of intellectual property including ownership of technology, copyright, patent, trademark, trade name, and discuss consequences of violating others intellectual property rights.

3. Distinguish original work from work that is plagiarized.

Acceptable Use

4. Follow policies presented in the district Acceptable Usage Policy (AUP) and discuss consequences of inappropriate use of technology.

Benchmark E: Assess the impact of technological products and systems.

Grade Six

Technology Assessment

1. Employ the use of measuring instruments to collect data.

2. Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.

<u>Standard 3 Technology for Productivity Applications</u>

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: Demonstrate an understanding of concepts underlying hardware, software and connectivity.

Grade Six

Understanding Concepts

1. Use vocabulary related to computer and multimedia technology systems (e.g., network, local area network—LAN, wide area network—WAN, wireless, connectivity).

Understanding Operations

2. Describe how computers connect to the Internet (e.g., what is the information super highway/World WideWeb and how can you connect to it?).

Benchmark B: Select appropriate technology resources to solve problems and support learning.

Grade Six

Understanding Operations

1. Explain the purpose of software programs.

Communication Tools

2. Present independent research findings in a multimedia format.

Research Tools

3. Investigate technology tools used to organize and represent data collected in problem situations.

Keyboarding

4. Demonstrate proper keyboarding techniques, assess keyboarding accuracy and develop speed.

Benchmark C: Use productivity tools to produce creative works, to prepare publications and to construct technology-enhanced models.

Grade Six

Research Tools

1. Use content-specific tools, software and simulations to support learning and research (e.g., thermometers, applets, interactive geometric programs, model robots).

2. Apply technology resources to create an educational project (e.g., use a spreadsheet to organize the data that represents the results from an experiment).

<u>Standard 4 Technology and Communication Applications</u>

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: Communicate information technologically and incorporate principles of design into the creation of messages and communication products.

Grade Six

Communications

1. Explain that information is communicated for specific purposes.

Principles of Design

2. Define principles of design used to create print, multimedia andWeb communications or products (e.g., color, contrast, repetition, alignment, proximity).

3. Produce information products that incorporate principles of design.

Benchmark B: Develop, publish and present information in a format that is appropriate for content and audience.

Grade Six

Publication

1. Create and publish information in printed form (e.g., use software to produce homework assignments, reports, flyers, newsletters).

2. Develop and publish information in electronic form (e.g., slide presentations, multimedia products, Web materials).

Benchmark C: Select appropriate technology communication tools and design collaborative interactive projects and activities to communicate with others.

Grade Six

Use of Communications

1. Use e-mail functions including:

a. Sending;

b. Receiving;

c. Replying;

d. Adding a hyperlinked address in message;

e. Organizing mail folders; and

f. Adding attachments to message.

2. Participate in discussion lists, message boards, chat and other means of appropriate electronic communication (e.g., ask-an-expert, pen pals).

3. Investigate assigned topics using online learning resources (e.g., weblogs, Web cast, video-conferencing and other distance learning opportunities).

<u>Standard 5 Technology and Information Literacy</u>

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.

Grades 6-8

Benchmark A: Evaluate the accuracy, authority, objectivity, currency, coverage and relevance of information and data sources.

Grade Six

Evaluating Sources

1. Select relevant information by identifying main ideas and supporting facts that help answer questions.

2. Determine that information located can be used legally and choose

appropriately (e.g., locate copyright information for print and graphic information, check for copyright restrictions).
3. Check copyright and publication dates to determine currency of information.
4. Investigate the authority of an online information source to determine the author's qualification to be an expert about a topic (e.g., famous scientist versus a sixth-grader's Web site; well-known organization versus a personal Web site).
Benchmark B: Use technology to conduct research and follow a research process model which includes the following: develop essential question; identify resources; select, use and analyze information; synthesize and generate a product; and evaluate both process and product.
Grade Six
Decide
1. Generate questions to be answered or a position to be supported when given a topic.
Find
2. Recognize that finding and using more than one source can produce a better product.
Use
3. Use a variety of technology resources for curriculum needs and personal information needs: library catalog, online encyclopedia, Web sites.
4. Examine information in different types of subscription resources—fee-based, pay-to-use to locate information for a curricular need (e.g., magazine database, picture archive, online encyclopedia).
5. Identify relevant facts, check facts for accuracy, record appropriate information and create an information product to share with others.
6. List information sources used in a district-adopted or teacher-prescribed format (e.g., MLA, APA).
Check
7. Review how the information found for the project was used and discuss the quality of the product.
Benchmark C: Develop search strategies, retrieve information in a variety of formats and evaluate the quality and appropriate use of Internet resources.
Grade Six
Internet Concepts
1. Explain the function of a Web browser (e.g., what is the difference between the browser software and a page on the Internet?).
2. Explain the difference between a subscription (fee-based database) and the free Internet.
Search Strategies
3. Identify keywords which describe the information need and use keywords as search terms (e.g., review search engine "help" page to determine methods for entering search terms).
4. Use phrase searching in appropriate search engines to improve results.

5. Incorporate place searching when searching for information using assigned directories and search engines.
Evaluating Sources
6. Evaluate Web information for:
a. Author's expertise (authority);
b. Accuracy of information presented;
c. Parameters of coverage (including objectivity and bias); and
d. Currency of information.
7. Compare the range of information available from multiple information databases (e.g., examine the purpose and scope of each database and how it would be used for a particular assignment).
Benchmark D: Select, access and use appropriate electronic resources for a defined information need.
Grade Six
Electronic Resources
1. Demonstrate search techniques: author, title, subject for subscription (fee-based) databases.
2. Use online library catalog to choose and locate a variety of resources on a topic.

<u>Standard 6 Design</u>
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: Evaluate the aesthetic and functional components of a design and identify creative influences.
Grade Six
Design Process
1. Describe how design is a creative planning process that leads to useful products and systems.
Requirements
2. Identify appropriate materials (e.g., wood, paper, plastic, aggregates, ceramics, metals, solvents, adhesives) based on specific properties and characteristics (e.g., weight, strength, hardness and flexibility) for the

design.

Design Application

3. Apply a design process to solve a problem in the classroom specifying criteria and constraints for the design (e.g., criteria include function, size and materials). Constraints include costs, time and user requirements.

Optimization and Trade-offs

4. Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.

5. Make the product or systems and document the design.

Redesign

6. Recognize that any design can be improved (e.g., old style scissors work but new ones with plastic on the finger holes are more comfortable and give more surface area for leverage).

Technical Communication

7. Diagram how design is iterative and involves a set of steps, which can be performed in different sequences and repeated as needed (e.g., identify need, research problem, develop solutions, select best solution, build prototype, test and evaluate, communicate, redesign).

Technical Careers

8. Investigate how products are created and communicate findings (e.g., interview an architect, industrial designer, contractor about the processes they follow).

Inventors/Inventions

9. Identify inventors and designers around the world who contributed to the development of each of the technological systems.

Benchmark B: Recognize the role of engineering design and of testing in the design process.

Grade Six

Engineering Design

1. Describe how engineering design is a subset of the overall design process concerned with the functional aspect of the design.

2. Examine how modeling, testing, evaluating and modifying are used to transform ideas into practical solutions (e.g., making adjustments to a model race vehicle to improve performance).

Technical Careers

3. Describe what an engineer does (e.g., analyze information found on engineering society Web sites).

Benchmark C: Understand and apply research, innovation and invention to problem-solving.

Grade Six

Technical Problem-solving

1. Examine how troubleshooting is a problem-solving method used to identify the cause of a malfunction in a technological system (e.g., if after installing a switch in a circuit the light does not come on, how would you determine the problem?).

Design Application

2. Determine best use of recycled plastics in the manufacture of new products (e.g., using seven different plastic packaging resin code marked products).

Technology Assessment

3. Recognize the patterns of the technological evolution of an invention (e.g., steam engines were invented, went through a period of rapid improvement, then a period of fine tuning and eventually were replaced by diesel/electric technology).

Redesign

4. Modify an existing product or system to improve it (e.g., something to improve storage in your locker).

<u>Standard 7 Designed World</u>

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, and be able to, select and use physical technologies.

Grade Six

Energy and Power

1. Describe and use different energy storage devices.

2. Describe how power systems are used to drive and provide propulsion to other technological products and systems.

Transportation

3. Describe how transporting people and goods involve an interdependence of individuals and vehicles (e.g., flying from Orlando to Cleveland involves transportation to the departure airport, transportation

through the airport, the flight, and transportation from the destination airport).
4. Identify and compare examples of transportation systems and devices that operate on each of the following: land, air, water and space.
Manufacturing
5. Produce a product using mechanical processes that change the form of materials through the processes of separating, forming, combining and conditioning them (e.g., build a solar cooker).
6. Classify manufactured goods at home as durable and nondurable (e.g., appliances, furniture, clothing, fabrics).
7. Explain and give examples of the impacts of interchangeable parts, components of mass-produced products, and the use of automation (e.g., robotics).
Construction
8. Describe why it is important that structures rest on a solid foundation.
9. Describe and explain parts of a structure (e.g., foundation, flooring, decking, wall, roofing systems).
11. Identify the components of various building subsystems (e.g., on pictures of classroom or various places in the school, label the electrical, lighting, HVAC, plumbing, communication and structural subsystems).
12. Identify and construct a type of structure (e.g., a model bridge including arch, beam and suspension) and their appropriate uses (e.g., site, span, resources and load).
Benchmark B: Develop an understanding of, and be able to, select and use informational technologies.
Information and Communication
Grade Six
1. Describe how information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.
2. Demonstrate the importance of a common language to express ideas through the use of symbols, measurements and drawings.
Benchmark C: Develop an understanding of how bio-related technologies have changed over time.
Grade Six
Medical
1. List advances and innovations in medical technologies that are used to improve health care (e.g., prevention, diagnosis, treatment, rehabilitation).
2. Describe why it is important for medical personnel to constantly update their knowledge and skills.
3. Explain that there are a variety of diagnostic methods and treatments for a medical problem.
4. Describe how advances in a variety of technological systems influence the development of medical devices.
Agriculture and Related Biotechnolgies
5. Describe how technological advances in agriculture directly affect the

time and number of people required to produce food for a large population.
6. Describe how biotechnology applies the principles of biology to develop commercial products or processes.