



Ohio's Learning Standards

Technology

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Introduction to Ohio's Learning Standards for Technology

The State Board of Education approved Ohio's Learning Standards for Technology for grades K-12 in April 2017, per [Ohio law](#). This standards document includes the revised technology standards for grades K-12.

The 2017 Ohio Learning Standards for Technology are the work of Ohio educators. Education professionals from across the state made up the advisory committee and working group responsible for revising the 2003 standards. This collaboration brought together representatives from K-12 and higher education, educational service centers, state technology agencies and associations; participants from urban, rural and suburban areas; and a range of educators, including curriculum directors, administrators, teachers, technology coordinators, technology coaches and library media specialists. Feedback on the revisions was received from regional focus groups open to all Ohio educators. Additional feedback was received and via an online survey open to the public. The process produced a rigorous set of technology learning standards that reflect the varied perspectives of Ohio residents.

The standards are organized by grade bands so students at the end of each grade band have acquired the content and skills outlined. The grades K-2 and 3-5 standards complement what educators already are teaching as part of Ohio's Learning Standards in English Language Arts, Mathematics, Science and Social Studies. The technology standards connect these content areas and offer students ways to apply in the real world the skills and content they already are learning.

The standards for each grade band provide a clear progression of content knowledge and skills that are appropriate for students at that level. Teachers can incorporate the standards in the middle grades and high school into standalone courses or integrate them into other appropriate courses.

GUIDING ASSUMPTIONS

Ohio's Learning Standards for Technology define what students need to know and be able to do to succeed in a technological world.

PHILOSOPHY OF OHIO'S LEARNING STANDARDS: TECHNOLOGY

Ohio's Learning Standards for Technology incorporate the following strands across the grade bands: Information and Communications Technology, Society and Technology, and Design and Technology.

These strands provide three lenses through which kindergarten through grade 12 students consider and engage with technology. Together, they instill in students a broad, rich understanding of technology and its effective use and role in their world – an understanding they need to become technology-literate citizens.

WHAT OHIO'S LEARNING STANDARDS FOR TECHNOLOGY DO

Ohio's Learning Standards for Technology:

- Balance knowledge, conceptual understanding and skill development;
- Address significant understandings that are the basis for students to make sound technological decisions;
- Focus on important topics in technology; and
- Represent a progression across grade bands.

Each Child, Our Future

As proposed in Ohio's strategic plan for education, each child in Ohio is *challenged* to discover and learn, *prepared* to pursue a fulfilling post-high school path and *empowered* to become a resilient, lifelong learner who contributes to society.

The strategic plan also acknowledges a major education policy shift around technology. A student's ability to strategically use technology now is recognized as foundational and just as important as mathematics and English language arts, from which all other learning is built.

Four equal learning domains challenge, prepare and empower students for success beyond high school by giving them tools to become resilient, lifelong learners. Ohio's Learning Standards for Technology support each of the four domains.

FOUNDATIONAL KNOWLEDGE AND SKILLS

To be successful in Ohio's ever-changing economy, students must be equipped with foundational knowledge and skills that support lifelong learning. The Information and Communication Technology strand emphasizes students identifying and using digital learning tools and resources to locate, evaluate and use information as they construct knowledge.

WELL-ROUNDED CONTENT

Beyond foundational skills and knowledge, students need opportunities to explore a broader range of subjects and disciplines. These explorations enable students to discover connections and relationships

among ideas and concepts. The Society and Technology strand highlights the interconnectedness of technology, self, society and the natural world. Through this strand, students investigate the ethical, legal, political and global impact of technology. Through the Information and Communications Technology strand, students use digital tools and resources as they communicate their knowledge.

LEADERSHIP AND REASONING SKILLS

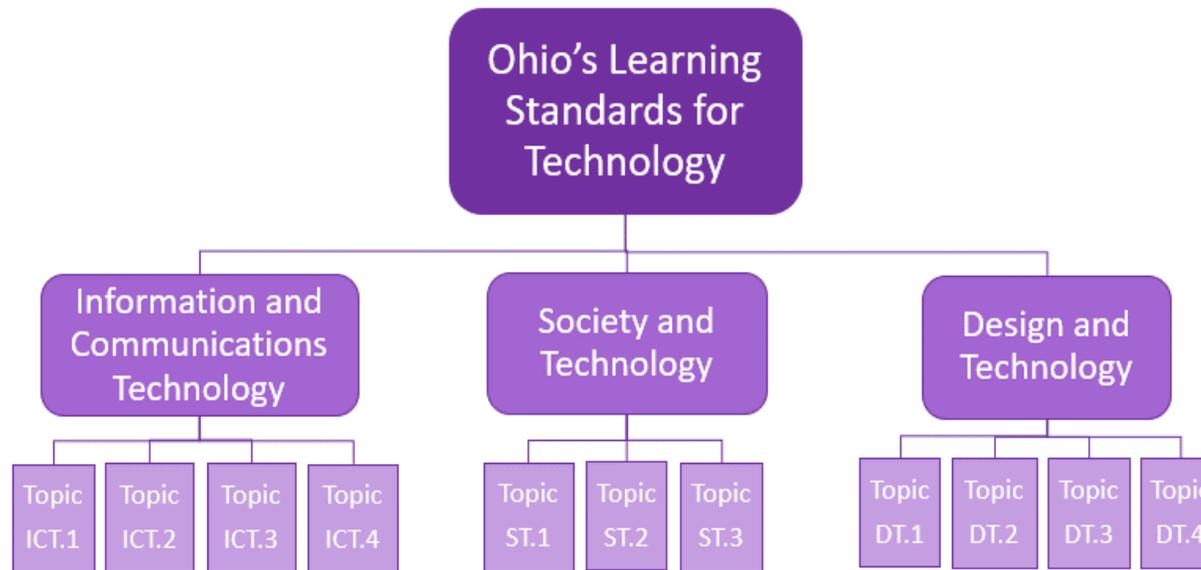
Future success will require students to exhibit both leadership and reasoning skills. These can include problem-solving, design thinking, creativity, and data analytics. In the Design and Technology strand, students begin in kindergarten identifying a problem and using an engineering design process to solve the problem. As they progress each year, their designs, products, and evaluation processes become more sophisticated.

SOCIAL-EMOTIONAL LEARNING

Living as part of a community involves understanding the importance of social interaction and personal feelings. Social-emotional learning includes competencies like self-management, social awareness, collaboration, empathy, relationship skills and responsible decision-making. The Society and Technology strand emphasizes communication and collaboration. This strand also addresses the impact technology and technology use can have on self and society. The Information and Communications Technology strand also asks students to reflect on what it means to use technology responsibly.

Organization of the Grade Band Standards

Ohio's Learning Standards for Technology address the same strands and topics in each grade band. The content statements provide the focus of instruction for the grade band.



Strands are overarching ideas and provide three lenses through which kindergarten through grade 12 students consider and engage with technology.

Topics organize and focus the instruction. Each strand is broken into several topics. Topic statements remain consistent from kindergarten to grade 12.

Content Statements further refine the topic statements to define what students should know and be able to do at each grade band.

These standards do not dictate curriculum or teaching methods. For example, while topic 1 appears before topic 2 in the standards for a given grade-band, teachers do not need to teach topic 1 before topic 2. A teacher might prefer to teach topic 2 before topic 1 or might choose to highlight connections by teaching topic 1 and topic 2 at the same time.

The lowercase letters do not indicate a preferred order. They do not show relationships from topic to topic. They are included in order to facilitate discussions, planning and implementation of the standards.

For example, the abbreviation K-2.ICT.1.a refers to grade band K-2, strand Information Communication Technology, Topic 1, Content Statement a.

Strand and Topic Descriptions

INFORMATION AND COMMUNICATIONS TECHNOLOGY

The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.

Topic 1: Identify and use appropriate digital learning tools and resources to accomplish a defined task.

Topic 2: Use digital learning tools and resources to locate, evaluate and use information.

Topic 3: Use digital learning tools and resources to construct knowledge.

Topic 4: Use digital learning tools and resources to communicate and disseminate information to multiple audiences.

SOCIETY AND TECHNOLOGY

The interconnectedness of technology, self, society and the natural world, specifically addressing the ethical, legal, political and global impact of technology.

Topic 1: Demonstrate an understanding of technology's impact on the advancement of humanity – economically, environmentally and ethically.

Topic 2: Analyze the impact of communication and collaboration in both digital and physical environments.

Topic 3: Explain how technology, society, and the individual impact one another.

DESIGN AND TECHNOLOGY

Addresses the nature of technology to develop and improve products and systems over time to meet human/societal needs and wants through design processes.

Topic 1: Define and describe technology, including its core concepts of systems, resources, requirements, processes, controls, optimization and trade-offs.

Topic 2: Identify a problem and use an engineering design process to solve the problem.

Topic 3: Demonstrate that solutions to complex problems require collaboration, interdisciplinary understanding and systems thinking.

Topic 4: Evaluate designs using functional, aesthetic and creative elements.

Kindergarten - Grade 2

INFORMATION AND COMMUNICATIONS TECHNOLOGY

The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.

Topic 1: Identify and use appropriate digital learning tools and resources to accomplish a defined task.

K-2.ICT.1.a. Develop basic skills for using digital learning tools and resources to accomplish a defined task.

K-2.ICT.1.b. With guidance, identify a goal and determine how digital learning tools can help accomplish that goal.

Topic 2: Use digital learning tools and resources to locate, evaluate and use information.

K-2.ICT.2.a. Develop basic skills for locating information using digital learning tools and resources.

K-2.ICT.2.b. Identify main ideas and details in information found with digital learning tools and resources.

Topic 3: Use digital learning tools and resources to construct knowledge.

K-2.ICT.3.a. Develop basic skills for gathering and organizing information from multiple digital learning tools and resources to build knowledge.

K-2.ICT.3.b. Use visuals found in digital learning tools and resources to clarify and add to knowledge.

K-2.ICT.3.c. Collect, record and organize observations and data during student explorations using digital learning tools and resources.

K-2.ICT.3.d. With guidance, create artifacts using digital learning tools and resources to demonstrate knowledge.

Topic 4: Use digital learning tools and resources to communicate and disseminate information to multiple audiences.

K-2.ICT.4.a. With guidance, discuss and identify communication needs considering the task, situation and information to be shared.

K-2.ICT.4.b. With guidance, use digital learning tools to add audio and/or visual media to clarify information.

K-2.ICT.4.c. With guidance, select appropriate digital learning tools and resources to produce and publish information.

SOCIETY AND TECHNOLOGY

The interconnectedness of technology, self, society and the natural world, specifically addressing the ethical, legal, political and global impact of technology.

Topic 1: Demonstrate an understanding of technology's impact on the advancement of humanity – economically, environmentally and ethically.

K-2.ST.1.a. Demonstrate appropriate and identify inappropriate uses of technology required to be a responsible user.

K-2.ST.1.b. Identify positive and negative impacts one's use of technology can have on oneself and one's family.

Topic 2: Analyze the impact of communication and collaboration in both digital and physical environments.

K-2.ST.2.a. Communicate and collaborate using several digital methods.

K-2.ST.2.b. Identify positive and negative ways of collaborating in digital and physical environments.

K-2.ST.2.c. Investigate how technology does (or does not) impact the way(s) one's family communicates.

Topic 3: Explain how technology, society and the individual impact one another.

K-2.ST.3.a. State the advantages and disadvantages of technology in one's life.

K-2.ST.3.b. Identify examples of how technology innovations/inventions can have multiple applications.

K-2.ST.3.c. Identify how the use of technology affects self and others in various ways.

K-2.ST.3.d. Define and discuss digital identity and digital footprints.

K-2.ST.3.e. Provide examples of how rules for respecting others' belongings apply to digital content and information.

DESIGN AND TECHNOLOGY

Addresses the nature of technology to develop and improve products and systems over time to meet human/societal needs and wants through design processes.

Topic 1: Define and describe technology, including its core concepts of systems, resources, requirements, processes, controls, optimization and trade-offs.

K-2.DT.1.a. Identify and discuss differences between the human-designed world and the natural world.

K-2.DT.1.b. Describe technology as something someone made to meet a want or need.

K-2.DT.1.c. Explain that systems have parts or components that work together to accomplish a goal.

K-2.DT.1.d. Give examples of how resources such as tools and materials are things that help people get a job done.

Topic 2: Identify a problem and use an engineering design process to solve the problem.

K-2.DT.2.a. Observe and describe details of an object's design.

K-2.DT.2.b. Demonstrate the ability to follow a simple design process: identify a problem, think about ways to solve the problem, develop possible solutions, and share and evaluate solutions with others.

K-2.DT.2.c. Explain that a design process is a plan to find solutions to problems.

K-2.DT.2.d. Demonstrate that there are many possible solutions to a design problem.

K-2.DT.2.e. Communicate design plans and solutions using drawings and descriptive language.

Topic 3: Demonstrate that solutions to complex problems require collaboration, interdisciplinary understanding and systems thinking.

K-2.DT.3.a. Describe how different technologies are used in various fields.

K-2.DT.3.b. Work as a team to identify possible problems to solve and their potential technological solutions.

Topic 4: Evaluate designs using functional, aesthetic and creative elements.

K-2.DT.4.a. Identify and discuss the use of aesthetics in everyday objects.

K-2.DT.4.b. Identify and discuss functional aspects of everyday objects.

K-2.DT.4.c. Identify and discuss examples of creativity found in everyday objects.

K-2.DT.4.d. Discuss and give examples of how changes in design can be used to strengthen or improve a product.

Grade 3 – Grade 5

INFORMATION AND COMMUNICATIONS TECHNOLOGY

The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.

Topic 1: Identify and use appropriate digital learning tools and resources to accomplish a defined task.

3-5.ICT.1.a. With guidance, identify and use digital learning tools or resources to support planning, implementing and reflecting upon a defined task.

3-5.ICT.1.b. Explain the use of selected digital learning tools and resources to support productivity and learning.

Topic 2: Use digital learning tools and resources to locate, evaluate and use information.

3-5.ICT.2.a. Identify questions related to a topic of interest to broaden or narrow the topic as needed.

3-5.ICT.2.b. Use appropriate search techniques to locate needed information using digital learning tools and resources.

3-5.ICT.2.c. Use multiple criteria developed with guidance to differentiate between relevant and irrelevant information found with digital learning tools and resources.

3-5.ICT.2.d. Explain basic ideas of plagiarism and copyright.

3-5.ICT.2.e. Use digital citation tools to cite sources with appropriate guidance.

Topic 3: Use digital learning tools and resources to construct knowledge.

3-5.ICT.3.a. Gather, organize and summarize information from multiple digital learning tools and resources to build knowledge of a topic.

3-5.ICT.3.b. Interpret images, diagrams, maps, graphs, infographics, videos, animations, interactives, etc., in digital learning tools and resources to clarify and add to knowledge.

3-5.ICT.3.c. Organize observations and data collected during student explorations to determine if patterns are present.

3-5.ICT.3.d. Create artifacts using digital learning tools and resources to demonstrate knowledge.

Topic 4: Use digital learning tools and resources to communicate and disseminate information to multiple audiences.

3-5.ICT.4.a. With guidance, discuss and identify communication needs considering goals, audience and content.

3-5.ICT.4.b. With guidance, select media formats appropriate to content and audience.

3-5.ICT.4.c. Evaluate the features of digital learning tools and resources based on the characteristics of a specific audience.

3-5.ICT.4.d. Produce and publish information appropriate for a target audience using digital learning tools and resources.

SOCIETY AND TECHNOLOGY

The interconnectedness of technology, self, society and the natural world, specifically addressing the ethical, legal, political and global impact of technology.

Topic 1: Demonstrate an understanding of technology's impact on the advancement of humanity – economically, environmentally and ethically.

3-5.ST.1.a. Demonstrate appropriate use of technology and explain the importance of responsible and ethical technology use.

3-5.ST.1.b. Identify positive and negative impacts one's use of personal technology and technology systems (e.g., agriculture, transportation, energy generation, water treatment) can have on one's community.

3-5.ST.1.c. Describe legal and responsible practices when utilizing technology.

Topic 2: Analyze the impact of communication and collaboration in both digital and physical environments.

3-5.ST.2.a. Create a plan and select collaboration and/or communication tools to complete a given task.

3-5.ST.2.b. Exercise digital etiquette when communicating and collaborating.

3-5.ST.2.c. Identify the positive and negative impact the use of technology can have on relationships, communities and self.

Topic 3: Explain how technology, society and the individual impact one another.

3-5.ST.3.a. Describe the advantages and disadvantages of technology (past, present, future) to understand the relationship between technology, society and the individual.

3-5.ST.3.b. Demonstrate how technology innovations/inventions can have multiple applications.

3-5.ST.3.c. Identify and discuss how the use of technology affects self and others in various ways.

3-5.ST.3.d. Identify the components of one's digital identity and one's digital footprint.

3-5.ST.3.e. Identify and discuss laws and rules that apply to digital content and information.

DESIGN AND TECHNOLOGY

Addresses the nature of technology to develop and improve products and systems over time to meet human/societal needs and wants through design processes.

Topic 1: Define and describe technology, including its core concepts of systems, resources, requirements, processes, controls, optimization and trade-offs.

3-5.DT.1.a. Demonstrate how applying human knowledge using tools and machines extends human capabilities to meet our needs and wants.

3-5.DT.1.b. Give examples of how requirements for a product can limit the design possibilities for that product.

3-5.DT.1.c. Describe a process as a series of actions and how it is used to produce a result.

3-5.DT.1.d. Identify and describe examples of technology products and processes.

3-5.DT.1.e. Explain how controls use information to cause systems to change, like a home thermostat turning on the heat based on the low temperature of a room.

Topic 2: Identify a problem and use an engineering design process to solve the problem.

3-5.DT.2.a. Critique needs and opportunities for designing solutions.

3-5.DT.2.b. Plan and implement a design process: identify a problem, think about ways to solve the problem, develop possible solutions, test and evaluate solution(s), present a possible solution, and redesign to improve the solution.

3-5.DT.2.c. Generate, develop and communicate design ideas and decisions using appropriate terms and graphical representations.

Topic 3: Demonstrate that solutions to complex problems require collaboration, interdisciplinary understanding and systems thinking.

3-5.DT.3.a. Design a product with multiple components and describe how the components interact to form a system.

3-5.DT.3.b. Explore and document connections between technology and other fields of study.

3-5.DT.3.c. Identify a product and describe how people from different disciplines combined their skills in the design and production of the product.

Topic 4: Evaluate designs using functional, aesthetic and creative elements.

3-5.DT.4.a. Use criteria developed with guidance to evaluate a new or improved product for its functional, aesthetic and creative elements.

3-5.DT.4.b. Examine a familiar product or process and suggest improvements to its design.

Grade 6 – Grade 8

INFORMATION AND COMMUNICATIONS TECHNOLOGY

The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.

Topic 1: Identify and use appropriate digital learning tools and resources to accomplish a defined task.

6-8.ICT.1.a. Develop criteria for selecting digital learning tools and resources to accomplish a defined task.

6-8.ICT.1.b. Select and use digital learning tools or resources to support planning, implementing and reflecting upon a defined task.

6-8.ICT.1.c. Evaluate the use of digital learning tools and resources to support learning and productivity.

Topic 2: Use digital learning tools and resources to locate, evaluate and use information.

6-8.ICT.2.a. Use advanced search techniques to locate needed information using digital learning tools and resources.

6-8.ICT.2.b. Use multiple criteria to evaluate the validity of information found with digital learning tools and resources.

6-8.ICT.2.c. Apply principles of copyright, use digital citation tools and use strategies to avoid plagiarism.

Topic 3: Use digital learning tools and resources to construct knowledge.

6-8.ICT.3.a. Analyze and integrate textual, visual and quantitative information (e.g., images, diagrams, maps, graphs, infographics, videos, animations, interactives) from multiple digital learning tools and resources.

6-8.ICT.3.b. Analyze data collected or retrieved from a variety of digital learning tools and resources to determine if patterns or trends are present.

6-8.ICT.3.c. Create artifacts using digital learning tools and resources to demonstrate knowledge.

Topic 4: Use digital learning tools and resources to communicate and disseminate information to multiple audiences.

6-8.ICT.4.a. Use digital learning tools and resources to identify communication needs considering goals, audience and content.

6-8.ICT.4.b. Select and use a variety of media formats to communicate information to a target audience.

6-8.ICT.4.c. Discuss and identify ways to communicate and disseminate information so that users with varied needs can access information.

6-8.ICT.4.d. Evaluate the effectiveness of a digital tool to communicate information with multiple audiences.

SOCIETY AND TECHNOLOGY

The interconnectedness of technology, self, society and the natural world, specifically addressing the ethical, legal, political and global impact of technology.

Topic 1: Demonstrate an understanding of technology's impact on the advancement of humanity – economically, environmentally and ethically.

6-8.ST.1.a. Advocate and exhibit ethical, legal and responsible practices when utilizing technology.

6-8.ST.1.b. Explore the advantages and disadvantages of widespread use, accessibility and reliance on technology in one's world.

6-8.ST.1.c. Review and demonstrate ethical considerations and legal requirements involved in the creation and use of digital technologies.

6-8.ST.1.d. Analyze an environmental concern and investigate technology solutions to that problem.

Topic 2: Analyze the impact of communication and collaboration in both digital and physical environments.

6-8.ST.2.a. Critique specific instances of how technology has impacted access to information, communications and collaboration.

6-8.ST.2.b. Explain the positive and negative impact the use of technology can have on personal, professional and community relationships.

6-8.ST.2.c. Investigate how social media impacts society and the digital identities of individuals and organizations.

6-8.ST.2.d. Apply appropriate interactions and digital etiquette in varying contexts, reflecting upon potential impacts in both digital and physical environments.

Topic 3: Explain how technology, society and the individual impact one another.

6-8.ST.3.a. Discuss and define how issues (e.g., economic, political, scientific and cultural) are influenced by the development and use of technology.

6-8.ST.3.b. Explain how new technology development is driven by factors such as commercialization, creative/inventive thinking and cultural/historical influence.

6-8.ST.3.c. Analyze how technological innovations and inventions can have multiple applications, both intended and unintended.

6-8.ST.3.d. Describe the impact of an individual's wants, values and interests on the development of new technologies.

6-8.ST.3.e. Manage components of one's digital identity and one's digital footprint.

6-8.ST.3.f. Evaluate current and past revisions to laws, rules and policies as society responds to technological advancements.

DESIGN AND TECHNOLOGY

Addresses the nature of technology to develop and improve products and systems over time to meet human/societal needs and wants through design processes.

Topic 1: Define and describe technology, including its core concepts of systems, resources, requirements, processes, controls, optimization and trade-offs.

6-8.DT.1.a. Explore and document how technology can impact efficiency.

6-8.DT.1.b. Analyze how tools, materials and processes are used to alter the natural and human-designed worlds.

6-8.DT.1.c. Define and categorize the requirements of a design as either criteria or constraints.

6-8.DT.1.d. Explain how optimization is the process of making a product as fully functional and effective as possible.

6-8.DT.1.e. Describe how trade-offs involve a choice of one quality over another.

6-8.DT.1.f. Give examples of how trade-offs must occur when optimizing a design in order to maintain design requirements.

Topic 2: Identify a problem and use an engineering design process to solve the problem.

6-8.DT.2.a. Apply a complete design process to solve an identified individual or community problem: research, develop, test, evaluate and present several possible solutions, and redesign to improve the solution.

6-8.DT.2.b. Describe how invention is a process of turning ideas and imagination into devices and systems.

6-8.DT.2.c. Explain how innovation is the process of modifying an existing system or system element(s) to improve it.

6-8.DT.2.d. Consider multiple factors, including criteria and constraints, (e.g., research, cost, time, materials, feedback, safety) to justify decisions when developing products and systems to solve problems.

6-8.DT.2.e. Identify and explain why effective designs develop from non-linear, flexible application of a design process.

Topic 3: Demonstrate that solutions to complex problems require collaboration, interdisciplinary understanding and systems thinking.

6-8.DT.3.a. Collaborate to solve a problem as an interdisciplinary team modeling different roles and functions.

6-8.DT.3.b. Explain ways that invention and innovation within one field can transfer into other fields of technology.

6-8.DT.3.c. Evaluate the effectiveness of the group's collaboration during the engineering design process and the contribution of the varying roles.

6-8.DT.3.d. Give examples of how changes in one part of a system can impact other parts of that system.

6-8.DT.3.e. Deconstruct a system into its component parts and describe how they interrelate.

Topic 4: Evaluate designs using functional, aesthetic and creative elements.

6-8.DT.4.a. Examine the progression of a product to identify how the functional, aesthetic and creative elements were applied.

6-8.DT.4.b. Analyze environments or products that are examples of the application of the principles of universal or inclusive design.

6-8.DT.4.c. Apply the design principle “form follows function” to develop a product.

Grade 9 – Grade 12

INFORMATION AND COMMUNICATIONS TECHNOLOGY

The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.

Topic 1: Identify and use appropriate digital learning tools and resources to accomplish a defined task.

9-12.ICT.1.a. Develop strategies for using digital learning tools and resources to plan, implement and reflect upon a complex task.

9-12.ICT.1.b. Based on project-specific requirements, develop criteria to select digital learning tools and resources to support the concurrent management of multiple projects.

9-12.ICT.1.c. Analyze and evaluate the ease of use and effectiveness of available features of selected digital learning tools and resources.

Topic 2: Use digital learning tools and resources to locate, evaluate and use information.

9-12.ICT.2.a. Use advanced search and filtering techniques to locate needed information using digital learning tools and resources.

9-12.ICT.2.b. Independently construct an evaluative process for information sources chosen for a learning task.

9-12.ICT.2.c. Analyze the complexities and discrepancies found in digital information to make informed decisions.

9-12.ICT.2.d. Apply principles of copyright, use digital citation tools and use strategies to avoid plagiarism when using the work of others as well as creating personal work.

Topic 3: Use digital learning tools and resources to construct knowledge.

9-12.ICT.3.a. Synthesize textual, visual and quantitative research and data (e.g., images, diagrams, maps, graphs, infographics, videos, animations, interactives) from a variety of digital learning tools and resources.

9-12.ICT.3.b. Analyze relationships and forecast outcomes using data collected by students or retrieved from a variety of digital learning tools and resources.

9-12.ICT.3.c. Create artifacts using digital learning tools and resources to demonstrate knowledge.

Topic 4: Use digital learning tools and resources to communicate and disseminate information to multiple audiences.

- 9-12.ICT.4.a.** Use digital learning tools and resources to identify communication needs considering goals, audience, content, access to tools or devices, timing of communication (e.g., time zones), etc.
- 9-12.ICT.4.b.** Based on communication needs, develop, implement and evaluate a communication plan to disseminate information to multiple audiences.
- 9-12.ICT.4.c.** Integrate accessibility principles to effectively communicate to, and meet the needs of, multiple audiences.
- 9-12.ICT.4.d.** Use digital learning tools to represent and model complex systems of information to a target audience.

SOCIETY AND TECHNOLOGY

The interconnectedness of technology, self, society and the natural world, specifically addressing the ethical, legal, political and global impact of technology.

Topic 1: Demonstrate an understanding of technology's impact on the advancement of humanity – economically, environmentally and ethically.

9-12.ST.1.a. Interpret, and practice, ethical considerations and legal requirements involved in the creation and use of digital technologies.

9-12.ST.1.b. Debate the advantages and disadvantages of widespread use, accessibility, and reliance on technology in one's world, in the workplace and in global society.

9-12.ST.1.c. Select a technology and analyze its global impact across multiple disciplines.

Topic 2: Analyze the impact of communication and collaboration in both digital and physical environments.

9-12.ST.2.a. Demonstrate and advocate effective collaboration strategies and techniques using technology.

9-12.ST.2.b. Describe and demonstrate professionalism and civility in communications and collaborative environments.

9-12.ST.2.c. Analyze how social media impacts society, individuals and organizations.

9-12.ST.2.d. Manage and adjust appropriate interactions and digital etiquette in varying contexts, in digital, physical and cultural environments.

Topic 3: Explain how technology, society and the individual impact one another.

9-12.ST.3.a. Debate how demand for technology and innovation have reshaped the social, cultural, political and/or economic landscape, citing references and examples.

9-12.ST.3.b. Discuss how technological innovation has resulted when ideas, knowledge or skills have been shared across multiple fields.

9-12.ST.3.c. Forecast the need to review, adapt, and innovate laws and policies applied to copyrights, patents, trademarks, and speech.

9-12.ST.3.d. Predict changes in society and intentional and unintentional consequences resulting from continued technological progress and defend the rationale within a given context.

9-12.ST.3.e. Analyze and influence one's digital identity and digital footprint while considering past, present and future implications.

DESIGN AND TECHNOLOGY

Addresses the nature of technology to develop and improve products and systems over time to meet human/societal needs and wants through design processes.

Topic 1: Define and describe technology, including its core concepts of systems, resources, requirements, processes, controls, optimization and trade-offs.

9-12.DT.1.a. Explore and document how systems theory includes the concepts of system dynamics, systems thinking and computational thinking.

9-12.DT.1.b. Discuss how a design process builds on the core concepts of technology, including the relationship between systems.

Topic 2: Identify a problem and use an engineering design process to solve the problem.

9-12.DT.2.a. Evaluate a design solution using conceptual, physical, digital and mathematical models at various intervals of a design process in order to check for proper design and note areas where improvements are needed (e.g., check the design solutions against criteria and constraints).

9-12.DT.2.b. Implement, document and present a design process as applied to a particular product, process or problem.

Topic 3: Demonstrate that solutions to complex problems require collaboration, interdisciplinary understanding and systems thinking.

9-12.DT.3.a. Evaluate a technological problem that has benefited from a multidisciplinary approach.

9-12.DT.3.b. Locate and evaluate past predictions about the development of technology.

9-12.DT.3.c. Describe techniques for making decisions about the future development of technology.

9-12.DT.3.d. Analyze the interactions within systems and between systems.

9-12.DT.3.e. Apply systems thinking to solve a complex problem.

Topic 4: Evaluate designs using functional, aesthetic and creative elements.

9-12.DT.4.a. Evaluate project/product solutions and communicate observations of the entire design process results.

9-12.DT.4.b. Interpret data/information related to product testing to determine revisions and modifications to a design's function and aesthetics.

9-12.DT.4.c. Critically evaluate a design solution at multiple points of a design process. Consider design requirements and adjust processes and outcomes as needed.

9-12.DT.4.d. Explain the interrelationship between technology, creativity and innovation.

Standards Organized By Strand

This section provides the standards organized by strand and topic. This structure gives a better view of how the content statements progress from one grade band to the next. (The content statements are the same as those provided in the previous section, only the layout is different.)

INFORMATION AND COMMUNICATIONS TECHNOLOGY

The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.			
Topic 1: Identify and use appropriate digital learning tools and resources to accomplish a defined task.			
<p>K-2.ICT.1.a. Develop basic skills for using digital learning tools and resources to accomplish a defined task.</p> <p>K-2.ICT.1.b. With guidance, identify a goal and determine how digital learning tools can help accomplish that goal.</p>	<p>3-5.ICT.1.a. With guidance, identify and use digital learning tools or resources to support planning, implementing and reflecting upon a defined task.</p> <p>3-5.ICT.1.b. Explain the use of selected digital learning tools and resources to support productivity and learning.</p>	<p>6-8.ICT.1.a. Develop criteria for selecting digital learning tools and resources to accomplish a defined task.</p> <p>6-8.ICT.1.b. Select and use digital learning tools or resources to support planning, implementing and reflecting upon a defined task.</p> <p>6-8.ICT.1.c. Evaluate the use of digital learning tools and resources to support learning and productivity.</p>	<p>9-12.ICT.1.a. Develop strategies for using digital learning tools and resources to plan, implement and reflect upon a complex task.</p> <p>9-12.ICT.1.b. Based on project-specific requirements, develop criteria to select digital learning tools and resources to support the concurrent management of multiple projects.</p> <p>9-12.ICT.1.c. Analyze and evaluate the ease of use and effectiveness of available features of selected digital learning tools and resources.</p>

INFORMATION AND COMMUNICATIONS TECHNOLOGY

The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.

Topic 2: Use digital learning tools and resources to locate, evaluate and use information.

<p>K-2.ICT.2.a. Develop basic skills for locating information using digital learning tools and resources.</p> <p>K-2.ICT.2.b. Identify main ideas and details in information found with digital learning tools and resources.</p>	<p>3-5.ICT.2.a. Identify questions related to a topic of interest to broaden or narrow the topic as needed.</p> <p>3-5.ICT.2.b. Use appropriate search techniques to locate needed information using digital learning tools and resources.</p> <p>3-5.ICT.2.c. Use multiple criteria developed with guidance to differentiate between relevant and irrelevant information found with digital learning tools and resources.</p> <p>3-5.ICT.2.d. Explain basic ideas of plagiarism and copyright.</p> <p>3-5.ICT.2.e. Use digital citation tools to cite sources with appropriate guidance.</p>	<p>6-8.ICT.2.a. Use advanced search techniques to locate needed information using digital learning tools and resources.</p> <p>6-8.ICT.2.b. Use multiple criteria to evaluate the validity of information found with digital learning tools and resources.</p> <p>6-8.ICT.2.c. Apply principles of copyright, use digital citation tools and use strategies to avoid plagiarism.</p>	<p>9-12.ICT.2.a. Use advanced search and filtering techniques to locate needed information using digital learning tools and resources.</p> <p>9-12.ICT.2.b. Independently construct an evaluative process for information sources chosen for a learning task.</p> <p>9-12.ICT.2.c. Analyze the complexities and discrepancies found in digital information to make informed decisions.</p> <p>9-12.ICT.2.d. Apply principles of copyright, use digital citation tools and use strategies to avoid plagiarism when using the work of others as well as creating personal work.</p>
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INFORMATION AND COMMUNICATIONS TECHNOLOGY

The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.

Topic 3: Use digital learning tools and resources to construct knowledge.

K-2.ICT.3.a. Develop basic skills for gathering and organizing information from multiple digital learning tools and resources to build knowledge.

K-2.ICT.3.b. Use visuals found in digital learning tools and resources to clarify and add to knowledge.

K-2.ICT.3.c. Collect, record and organize observations and data during student explorations using digital learning tools and resources.

K-2.ICT.3.d. With guidance, create artifacts using digital learning tools and resources to demonstrate knowledge.

3-5.ICT.3.a. Gather, organize and summarize information from multiple digital learning tools and resources to build knowledge of a topic.

3-5.ICT.3.b. Interpret images, diagrams, maps, graphs, infographics, videos, animations, interactives, etc., in digital learning tools and resources to clarify and add to knowledge.

3-5.ICT.3.c. Organize observations and data collected during student explorations to determine if patterns are present.

3-5.ICT.3.d. Create artifacts using digital learning tools and resources to demonstrate knowledge.

6-8.ICT.3.a. Analyze and integrate textual, visual and quantitative information (e.g., images, diagrams, maps, graphs, infographics, videos, animations, interactives) from multiple digital learning tools and resources.

6-8.ICT.3.b. Analyze data collected or retrieved from a variety of digital learning tools and resources to determine if patterns or trends are present.

6-8.ICT.3.c. Create artifacts using digital learning tools and resources to demonstrate knowledge.

9-12.ICT.3.a. Synthesize textual, visual and quantitative research and data (e.g., images, diagrams, maps, graphs, infographics, videos, animations, interactives) from a variety of digital learning tools and resources.

9-12.ICT.3.b. Analyze relationships and forecast outcomes using data collected by students or retrieved from a variety of digital learning tools and resources.

9-12.ICT.3.c. Create artifacts using digital learning tools and resources to demonstrate knowledge.

INFORMATION AND COMMUNICATIONS TECHNOLOGY

The understanding and application of digital learning tools for accessing, creating, evaluating, applying and communicating ideas and information.

Topic 4: Use digital learning tools and resources to communicate and disseminate information to multiple audiences.

K-2.ICT.4.a. With guidance, discuss and identify communication needs considering the task, situation and information to be shared.

K-2.ICT.4.b. With guidance, use digital learning tools to add audio and/or visual media to clarify information.

K-2.ICT.4.c. With guidance, select appropriate digital learning tools and resources to produce and publish information.

3-5.ICT.4.a. With guidance, discuss and identify communication needs considering goals, audience and content.

3-5.ICT.4.b. With guidance, select media formats appropriate to content and audience.

3-5.ICT.4.c. Evaluate the features of digital learning tools and resources based on the characteristics of a specific audience.

3-5.ICT.4.d. Produce and publish information appropriate for a target audience using digital learning tools and resources.

6-8.ICT.4.a. Use digital learning tools and resources to identify communication needs considering goals, audience and content.

6-8.ICT.4.b. Select and use a variety of media formats to communicate information to a target audience.

6-8.ICT.4.c. Discuss and identify ways to communicate and disseminate information so that users with varied needs can access information.

6-8.ICT.4.d. Evaluate the effectiveness of a digital tool to communicate information with multiple audiences.

9-12.ICT.4.a. Use digital learning tools and resources to identify communication needs considering goals, audience, content, access to tools or devices, timing of communication (e.g., time zones), etc.

9-12.ICT.4.b. Based on communication needs, develop, implement and evaluate a communication plan to disseminate information to multiple audiences.

9-12.ICT.4.c. Integrate accessibility principles to effectively communicate to, and meet the needs of, multiple audiences.

9-12.ICT.4.d. Use digital learning tools to represent and model complex systems of information to a target audience.

SOCIETY AND TECHNOLOGY

The interconnectedness of technology, self, society and the natural world, specifically addressing the ethical, legal, political and global impact of technology.

Topic 1: Demonstrate an understanding of technology's impact on the advancement of humanity – economically, environmentally and ethically.

<p>K-2.ST.1.a. Demonstrate appropriate and identify inappropriate uses of technology required to be a responsible user.</p> <p>K-2.ST.1.b. Identify positive and negative impacts one's use of technology can have on oneself and one's family.</p>	<p>3-5.ST.1.a. Demonstrate appropriate use of technology and explain the importance of responsible and ethical technology use.</p> <p>3-5.ST.1.b. Identify positive and negative impacts one's use of personal technology and technology systems (e.g., agriculture, transportation, energy generation, water treatment) can have on one's community.</p> <p>3-5.ST.1.c. Describe legal and responsible practices when utilizing technology.</p>	<p>6-8.ST.1.a. Advocate and exhibit ethical, legal and responsible practices when utilizing technology.</p> <p>6-8.ST.1.b. Explore the advantages and disadvantages of widespread use, accessibility and reliance on technology in one's world.</p> <p>6-8.ST.1.c. Review and demonstrate ethical considerations and legal requirements involved in the creation and use of digital technologies.</p> <p>6-8.ST.1.d. Analyze an environmental concern and investigate technology solutions to that problem.</p>	<p>9-12.ST.1.a. Interpret, and practice, ethical considerations and legal requirements involved in the creation and use of digital technologies.</p> <p>9-12.ST.1.b. Debate the advantages and disadvantages of widespread use, accessibility, and reliance on technology in one's world, in the workplace and in global society.</p> <p>9-12.ST.1.c. Select a technology and analyze its global impact across multiple disciplines.</p>
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SOCIETY AND TECHNOLOGY

The interconnectedness of technology, self, society and the natural world, specifically addressing the ethical, legal, political and global impact of technology.

Topic 2: Analyze the impact of communication and collaboration in both digital and physical environments.

<p>K-2.ST.2.a. Communicate and collaborate using several digital methods.</p> <p>K-2.ST.2.b. Identify positive and negative ways of collaborating in digital and physical environments.</p> <p>K-2.ST.2.c. Investigate how technology does (or does not) impact the way(s) one's family communicates.</p>	<p>3-5.ST.2.a. Create a plan and select collaboration and/or communication tools to complete a given task.</p> <p>3-5.ST.2.b. Exercise digital etiquette when communicating and collaborating.</p> <p>3-5.ST.2.c. Identify the positive and negative impact the use of technology can have on relationships, communities and self.</p>	<p>6-8.ST.2.a. Critique specific instances of how technology has impacted access to information, communications and collaboration.</p> <p>6-8.ST.2.b. Explain the positive and negative impact the use of technology can have on personal, professional and community relationships.</p> <p>6-8.ST.2.c. Investigate how social media impacts society and the digital identities of individuals and organizations.</p> <p>6-8.ST.2.d. Apply appropriate interactions and digital etiquette in varying contexts, reflecting upon potential impacts in both digital and physical environments.</p>	<p>9-12.ST.2.a. Demonstrate and advocate effective collaboration strategies and techniques using technology.</p> <p>9-12.ST.2.b. Describe and demonstrate professionalism and civility in communications and collaborative environments.</p> <p>9-12.ST.2.c. Analyze how social media impacts society, individuals and organizations.</p> <p>9-12.ST.2.d. Manage and adjust appropriate interactions and digital etiquette in varying contexts, in digital, physical and cultural environments.</p>
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SOCIETY AND TECHNOLOGY

The interconnectedness of technology, self, society and the natural world, specifically addressing the ethical, legal, political and global impact of technology.

Topic 3: Explain how technology, society and the individual impact one another.

<p>K-2.ST.3.a. State the advantages and disadvantages of technology in one's life.</p> <p>K-2.ST.3.b. Identify examples of how technology innovations/inventions can have multiple applications.</p> <p>K-2.ST.3.c. Identify how the use of technology affects self and others in various ways.</p> <p>K-2.ST.3.d. Define and discuss digital identity and digital footprints.</p> <p>K-2.ST.3.e. Provide examples of how rules for respecting others' belongings apply to digital content and information.</p>	<p>3-5.ST.3.a. Describe the advantages and disadvantages of technology (past, present, future) to understand the relationship between technology, society and the individual.</p> <p>3-5.ST.3.b. Demonstrate how technology innovations/inventions can have multiple applications.</p> <p>3-5.ST.3.c. Identify and discuss how the use of technology affects self and others in various ways.</p> <p>3-5.ST.3.d. Identify the components of one's digital identity and one's digital footprint.</p> <p>3-5.ST.3.e. Identify and discuss laws and rules that apply to digital content and information.</p>	<p>6-8.ST.3.a. Discuss and define how issues (e.g., economic, political, scientific and cultural) are influenced by the development and use of technology.</p> <p>6-8.ST.3.b. Explain how new technology development is driven by factors such as commercialization, creative/inventive thinking and cultural/historical influence.</p> <p>6-8.ST.3.c. Analyze how technological innovations and inventions can have multiple applications, both intended and unintended.</p> <p>6-8.ST.3.d. Describe the impact of an individual's wants, values and interests on the development of new technologies.</p> <p>6-8.ST.3.e. Manage components of one's digital identity and one's digital footprint.</p> <p>6-8.ST.3.f. Evaluate current and past revisions to laws, rules and policies as society responds to technological advancements.</p>	<p>9-12.ST.3.a. Debate how demand for technology and innovation have reshaped the social, cultural, political and/or economic landscape, citing references and examples.</p> <p>9-12.ST.3.b. Discuss how technological innovation has resulted when ideas, knowledge or skills have been shared across multiple fields.</p> <p>9-12.ST.3.c. Forecast the need to review, adapt, and innovate laws and policies applied to copyrights, patents, trademarks, and speech.</p> <p>9-12.ST.3.d. Predict changes in society and intentional and unintentional consequences resulting from continued technological progress and defend the rationale within a given context.</p> <p>9-12.ST.3.e. Analyze and influence one's digital identity and digital footprint while considering past, present and future implications.</p>
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DESIGN AND TECHNOLOGY

Addresses the nature of technology to develop and improve products and systems over time to meet human/societal needs and wants through design processes.

Topic 1: Define and describe technology, including its core concepts of systems, resources, requirements, processes, controls, optimization and trade-offs.

<p>K-2.DT.1.a. Identify and discuss differences between the human-designed world and the natural world.</p> <p>K-2.DT.1.b. Describe technology as something someone made to meet a want or need.</p> <p>K-2.DT.1.c. Explain that systems have parts or components that work together to accomplish a goal.</p> <p>K-2.DT.1.d. Give examples of how resources such as tools and materials are things that help people get a job done.</p>	<p>3-5.DT.1.a. Demonstrate how applying human knowledge using tools and machines extends human capabilities to meet our needs and wants.</p> <p>3-5.DT.1.b. Give examples of how requirements for a product can limit the design possibilities for that product.</p> <p>3-5.DT.1.c. Describe a process as a series of actions and how it is used to produce a result.</p> <p>3-5.DT.1.d. Identify and describe examples of technology products and processes.</p> <p>3-5.DT.1.e. Explain how controls use information to cause systems to change, like a home thermostat turning on the heat based on the low temperature of a room.</p>	<p>6-8.DT.1.a. Explore and document how technology can impact efficiency.</p> <p>6-8.DT.1.b. Analyze how tools, materials and processes are used to alter the natural and human-designed worlds.</p> <p>6-8.DT.1.c. Define and categorize the requirements of a design as either criteria or constraints.</p> <p>6-8.DT.1.d. Explain how optimization is the process of making a product as fully functional and effective as possible.</p> <p>6-8.DT.1.e. Describe how trade-offs involve a choice of one quality over another.</p> <p>6-8.DT.1.f. Give examples of how trade-offs must occur when optimizing a design in order to maintain design requirements.</p>	<p>9-12.DT.1.a. Explore and document how systems theory includes the concepts of system dynamics, systems thinking and computational thinking.</p> <p>9-12.DT.1.b. Discuss how a design process builds on the core concepts of technology, including the relationship between systems.</p>
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DESIGN AND TECHNOLOGY

Addresses the nature of technology to develop and improve products and systems over time to meet human/societal needs and wants through design processes.

Topic 2: Identify a problem and use an engineering design process to solve the problem.

<p>K-2.DT.2.a. Observe and describe details of an object's design.</p> <p>K-2.DT.2.b. Demonstrate the ability to follow a simple design process: identify a problem, think about ways to solve the problem, develop possible solutions, and share and evaluate solutions with others.</p> <p>K-2.DT.2.c. Explain that a design process is a plan to find solutions to problems.</p> <p>K-2.DT.2.d. Demonstrate that there are many possible solutions to a design problem.</p> <p>K-2.DT.2.e. Communicate design plans and solutions using drawings and descriptive language.</p>	<p>3-5.DT.2.a. Critique needs and opportunities for designing solutions.</p> <p>3-5.DT.2.b. Plan and implement a design process: identify a problem, think about ways to solve the problem, develop possible solutions, test and evaluate solution(s), present a possible solution, and redesign to improve the solution.</p> <p>3-5.DT.2.c. Generate, develop and communicate design ideas and decisions using appropriate terms and graphical representations.</p>	<p>6-8.DT.2.a. Apply a complete design process to solve an identified individual or community problem: research, develop, test, evaluate and present several possible solutions, and redesign to improve the solution.</p> <p>6-8.DT.2.b. Describe how invention is a process of turning ideas and imagination into devices and systems.</p> <p>6-8.DT.2.c. Explain how innovation is the process of modifying an existing system or system element(s) to improve it.</p> <p>6-8.DT.2.d. Consider multiple factors, including criteria and constraints, (e.g., research, cost, time, materials, feedback, safety) to justify decisions when developing products and systems to solve problems.</p> <p>6-8.DT.2.e. Identify and explain why effective designs develop from non-linear, flexible application of a design process.</p>	<p>9-12.DT.2.a. Evaluate a design solution using conceptual, physical, digital and mathematical models at various intervals of a design process in order to check for proper design and note areas where improvements are needed (e.g., check the design solutions against criteria and constraints).</p> <p>9-12.DT.2.b. Implement, document and present a design process as applied to a particular product, process or problem.</p>
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DESIGN AND TECHNOLOGY

Addresses the nature of technology to develop and improve products and systems over time to meet human/societal needs and wants through design processes.

Topic 3: Demonstrate that solutions to complex problems require collaboration, interdisciplinary understanding and systems thinking.

<p>K-2.DT.3.a. Describe how different technologies are used in various fields.</p> <p>K-2.DT.3.b. Work as a team to identify possible problems to solve and their potential technological solutions.</p>	<p>3-5.DT.3.a. Design a product with multiple components and describe how the components interact to form a system.</p> <p>3-5.DT.3.b. Explore and document connections between technology and other fields of study.</p> <p>3-5.DT.3.c. Identify a product and describe how people from different disciplines combined their skills in the design and production of the product.</p>	<p>6-8.DT.3.a. Collaborate to solve a problem as an interdisciplinary team modeling different roles and functions.</p> <p>6-8.DT.3.b. Explain ways that invention and innovation within one field can transfer into other fields of technology.</p> <p>6-8.DT.3.c. Evaluate the effectiveness of the group's collaboration during the engineering design process and the contribution of the varying roles.</p> <p>6-8.DT.3.d. Give examples of how changes in one part of a system can impact other parts of that system.</p> <p>6-8.DT.3.e. Deconstruct a system into its component parts and describe how they interrelate.</p>	<p>9-12.DT.3.a. Evaluate a technological problem that has benefited from a multidisciplinary approach.</p> <p>9-12.DT.3.b. Locate and evaluate past predictions about the development of technology.</p> <p>9-12.DT.3.c. Describe techniques for making decisions about the future development of technology.</p> <p>9-12.DT.3.d. Analyze the interactions within systems and between systems.</p> <p>9-12.DT.3.e. Apply systems thinking to solve a complex problem.</p>
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DESIGN AND TECHNOLOGY

Addresses the nature of technology to develop and improve products and systems over time to meet human/societal needs and wants through design processes.

Topic 4: Evaluate designs using functional, aesthetic and creative elements.

<p>K-2.DT.4.a. Identify and discuss the use of aesthetics in everyday objects.</p> <p>K-2.DT.4.b. Identify and discuss functional aspects of everyday objects.</p> <p>K-2.DT.4.c. Identify and discuss examples of creativity found in everyday objects.</p> <p>K-2.DT.4.d. Discuss and give examples of how changes in design can be used to strengthen or improve a product.</p>	<p>3-5.DT.4.a. Use criteria developed with guidance to evaluate a new or improved product for its functional, aesthetic and creative elements.</p> <p>3-5.DT.4.b. Examine a familiar product or process and suggest improvements to its design.</p>	<p>6-8.DT.4.a. Examine the progression of a product to identify how the functional, aesthetic and creative elements were applied.</p> <p>6-8.DT.4.b. Analyze environments or products that are examples of the application of the principles of universal or inclusive design.</p> <p>6-8.DT.4.c. Apply the design principle “form follows function” to develop a product.</p>	<p>9-12.DT.4.a. Evaluate project/product solutions and communicate observations of the entire design process results.</p> <p>9-12.DT.4.b. Interpret data/information related to product testing to determine revisions and modifications to a design’s function and aesthetics.</p> <p>9-12.DT.4.c. Critically evaluate a design solution at multiple points of a design process. Consider design requirements and adjust processes and outcomes as needed.</p> <p>9-12.DT.4.d. Explain the interrelationship between technology, creativity and innovation.</p>
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Acknowledgements

During the revision process, the Advisory Committee, Working Group and Department used the following resources: the International Society for Technology in Education Standards (ISTE), the International Technology and Engineering Educators Association Standards (ITEEA), the Australian Curriculum Technologies Content Descriptions (ACARA) and Ohio's Learning Standards (to ensure alignment across content areas).

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