

Appendix of Technology Standards and Infusion Exemplars Grades 9-12

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Appendix of Technology Standards and Infusion Exemplars

Department of Curriculum and Instruction



Belleville Public Schools

Curriculum Guide

Appendix of Technology Standards and Infusion Exemplars

Grade 9-12

Belleville Board of Education

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Appendix of Technology Standards and Exemplars

The purpose of this appendix is to serve as a guide for educators to meet the technological requirements as per the NJDOE website:

New Jersey's Technology Standards consist of 8.1 Educational Technology and 8.2 Technology, Engineering, Design and Computational Thinking, which work symbiotically to provide students with the necessary skills for college and career readiness.

"Advances in technology have drastically changed the way we interact with the world and each other. The digital age requires that we understand and are able to harness the power of technology to live and learn". - International Society for Technology in Education

In this ever-changing digital world where citizenship is being re-imagined, our students must be able to harness the power of technology to live, solve problems and learn in college, on the job and throughout their lives. Enabled with digital and civic citizenship skills, students are empowered to be responsible members of today's diverse global society.

Readiness in this century demands that students actively engage in critical thinking, communication, collaboration, and creativity. Technology empowers students with real-world data, tools, experts and global outreach to actively engage in solving meaningful problems in all areas of their lives. The power of

technology discretely supports all curricular areas and multiple levels of mastery for all students.

Technology Infusion Exemplars by Discipline for Grades 9-12

What **Technology Infusion** and/or strategies are integrated into this unit to enhance learning? Please list all hardware, software and strategies. Please find a technology pedagogy wheel for assistance while completing this section.

ELA:

- [Digital Brain Dump with Flipgrid and Socrative](#)
- [Caption This! A fun, deep-thinking Google Drawings activity.](#)
- Create an online portfolio including a social media page and business card for a character identity using Canva.
- "Add and Pass" activity in docs- Digital version of adding onto a story and passing to next group of students until finished. Begin with an image on a blank document (can be a scene from a story or even a historical figure).
- [Writable.com](#)- 600+ prompts and assignments
- [ThinkCERCA.com](#)-Web-based literacy program that scaffold the development of critical thinking and argumentative writing skills.
- [Commonlit.org](#)-Feature rich literacy resource.
- readwritethink.org: *A-ll's Well that Sells Well: A Creative Introduction to Shakespeare*: After taking a virtual tour of The Globe Theater in Elizabethan London, students compare attending a performance at The Globe to attending a current professional production (such as a play on Broadway) or to viewing a movie at a local theater. They discuss the similarities and differences in the theaters and imagine what types of products might have been advertised in Elizabethan time, if The Globe showed commercials before the play like modern movie theaters do. They create a commercial advertisement geared toward an Elizabethan audience to promote one of today's products or conveniences. This activity helps students better understand the Elizabethan times and Elizabethan theater audiences, as well as persuasive advertising techniques.
- readwritethink.org: *Creating Psychological Profiles of Characters in To Kill a Mockingbird*: Design a digital poster and plan a presentation representing a psychological profiles for a selected character while determining what specific factors (such as family, career, environment, and so forth) have the greatest influence on the characters' decision making throughout the novel.
- readwritethink.org: *Ghosts and Fears in Language Arts: Exploring the Ways Writers Scare Readers*:

Fright Fair Projects: "Why people like to be scared"-Students can create a Google survey on what movies fellow teens watch, whether or not they watch horror movies and if so why do they like them? Statistics on how well scary movies do at the box office can be researched and fellow students who enjoy horror films can be interviewed. Findings can be presented in the form of a digital news broadcast.

- readwritethink.org: *An Introduction to Graphic Novels:Podcast*readwritethink.org: *Comics and Graphic Novels*
- Create a Book Trailer

MATH:

- [Digital Brain Dump with Flipgrid and Socrative.](#)
- [Khan Academy: Algebra Functions](#)
- [Math by Kahoot-Algebra](#) (Curriculum Aligned Games and videos)
- [Kahoot:Math by Kahoot-Algebra](#) (Model and Solve Equations with Variables ob Both Sides)
- [YouTube:Algebra Basics: Solving Equations Part 1-Math Antics](#)
- [YouTube:Algebra Basics: Solving Equations Part 2-Math Antics](#)
- [YouTube:Basic Linear Functions-Math Antics](#)
- [Khan Academy:Solving Equations](#)
- [Khan Acaemy:Geometry-Law of Detachment](#)

SCIENCE:

- [Digital Brain Dump with Flipgrid and Socrative](#)
- [YouTube:Intro to Chemistry, Basic Concepts-Periodic Table](#)
- [Khan Academy: Introduction to Chemistry](#)
- [Weather and Climate-](#) Bozeman Science
- Create PowToon on subject material
- [Khan Academy:High School Biology:Cells](#)
- [Khan Academy:High School Biology:Evolution](#)

SOCIAL STUDIES:

- Google Earth
- [Digital Brain Dump with Flipgrid and Socrative.](#)
- [Caption This! A fun, deep-thinking Google Drawings activity](#)
- [Digital History-](#) A comprehensive collection of historical data on United States history.
- [Digital History: The Great Depression](#)
- Create an online portfolio including a social media page and business card for a historian using Canva.
- [iCivics.org](#) gives students the necessary tools to learn about and participate in civic life, and teaches the materials and support to achieve this goal. Their free resources include interactive digital tools, print-and-go lessons and award winning games.
- <http://www.loc.gov>: Library of Congress: News, events, new content and more from the National Library of Congress and Specifice subject areas- From legislature to poetry, from music to science, from cataloging to copyright.

- [Historical Thinking Matters.org](#): A pick for best social studies websites "focused on key topics in U.S. history, that is designed to teach students how to critically read primary sources and how to critique and construct historical narratives.
- [Historical Thinking Matters: Rosa Parks](#) (Black History Month)
- [YouTube: Larry King Live \(1995\)- Interview with Rosa Parks](#) (Black History Month)
- [NPR: National Public Radio-Podcasts](#)
- [Ted Talks: Ugly History: Witch Hunts](#)

New Jersey Student Learning Standards (NJSL-S)

Adopted 10.1.14

2014 New Jersey Student Learning Standards - Technology

Content Area		Technology	
Standard		8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.	
Strand		A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.	
Grade Level bands	Content Statement Students will:	Indicator	Indicator
P	Understand and use technology systems.	8.1.P.A.1	Use an input device to select an item and navigate the screen
		8.1.P.A.2	Navigate the basic functions of a browser.
	Select and use applications effectively and productively.	8.1.P.A.3	Use digital devices to create stories with pictures, numbers, letters and words.
		8.1.P.A.4	Use basic technology terms in the proper context in conversation with peers and teachers (e.g., camera, tablet, Internet, mouse, keyboard, and printer).
		8.1.P.A.5	Demonstrate the ability to access and use resources on a computing device.
K-2	Understand and use technology systems.	8.1.2.A.1	Identify the basic features of a digital device and explain its purpose.
		8.1.2.A.2	Create a document using a word processing application.
	Select and use applications effectively and productively.	8.1.2.A.3	Compare the common uses of at least two different digital applications and identify the advantages and disadvantages of using each.
		8.1.2.A.4	Demonstrate developmentally appropriate navigation skills in virtual environments (i.e. games, museums).
		8.1.2.A.5	Enter information into a spreadsheet and sort the information.
		8.1.2.A.6	Identify the structure and components of a database.
		8.1.2.A.7	Enter information into a database or spreadsheet and filter the information.
3-5	Understand and use technology systems.	8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
		8.1.5.A.2	Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
	Select and use applications effectively and productively.	8.1.5.A.3	Use a graphic organizer to organize information about problem or issue.
		8.1.5.A.4	Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.
		8.1.5.A.5	Create and use a database to answer basic questions.
		8.1.5.A.6	Export data from a database into a spreadsheet; analyze

			and produce a report that explains the analysis of the data.
6-8	Understand and use technology systems. Select and use applications effectively and productively.	8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
		8.1.8.A.2	Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
		8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
		8.1.8.A.4	Graph and calculate data within a spreadsheet and present a summary of the results
		8.1.8.A.5	Create a database query, sort and create a report and describe the process, and explain the report results.
9-12	Understand and use technology systems. Select and use applications effectively and productively.	8.1.12.A.1	Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
		8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.
		8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
		8.1.12.A.4	Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.
		8.1.12.A.5	Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.
Content Area		Technology	
Standard		8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.	
Strand		B. Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.	
Grade Level bands	Content Statement Students will:	Indicator	Indicator
P	Apply existing knowledge to generate new ideas, products, or processes. Create original works as a means of personal or group expression.	8.1.P.B.1	Create a story about a picture taken by the student on a digital camera or mobile device.
K-2		8.1.2.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources .
3-5		8.1.5.B.1	Collaborative to produce a digital story about a significant local event or issue based on first-person interviews.
6-8		8.1.8.B.1	Synthesize and publish information about a local or global issue or event (ex. telecollaborative project, blog, school web).
9-12		8.1.12.B.2	Apply previous content knowledge by creating and piloting a digital learning game or tutorial.
Content Area		Technology	

Standard	8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.		
Strand	C. Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.		
Grade Level bands	Content Statement	Indicator	Indicator
P	Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media. Communicate information and ideas to multiple audiences using a variety of media and formats. Develop cultural understanding and global awareness by engaging with learners of other cultures. Contribute to project teams to produce original works or solve problems.	8.1.P.C.1	Collaborate with peers by participating in interactive digital games or activities.
K-2		8.1.2.C.1	Engage in a variety of developmentally appropriate learning activities with students in other classes, schools, or countries using various media formats such as online collaborative tools, and social media.
3-5		8.1.5.C.1	Engage in online discussions with learners of other cultures to investigate a worldwide issue from multiple perspectives and sources, evaluate findings and present possible solutions, using digital tools and online resources for all steps.
6-8		8.1.8.C.1	Collaborate to develop and publish work that provides perspectives on a global problem for discussions with learners from other countries.
9-12		8.1.12.C.1	Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.
Content Area	Technology		
Standard	8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.		
Strand	D. Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.		
Grade Level bands	Content Statement	Indicator	Indicator
K-2	Advocate and practice safe, legal, and responsible use of information and technology.	8.1.2.D.1	Develop an understanding of ownership of print and nonprint information.
3-5	Advocate and practice safe, legal, and responsible use of information and technology.	8.1.5.D.1	Understand the need for and use of copyrights.
		8.1.5.D.2	Analyze the resource citations in online materials for proper use.
	Demonstrate personal responsibility for lifelong learning.	8.1.5.D.3	Demonstrate an understanding of the need to practice cyber safety, cyber security, and cyber ethics when using technologies and social media.
	Exhibit leadership for digital citizenship.	8.1.5.D.4	Understand digital citizenship and demonstrate an understanding of the personal consequences of inappropriate use of technology and social media.
6-8	Advocate and practice safe, legal, and responsible use of	8.1.8.D.1	Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security,

	information and technology.		and cyber ethics including appropriate use of social media.
	Demonstrate personal responsibility for lifelong learning.	8.1.8.D.2	Demonstrate the application of appropriate citations to digital content.
		8.1.8.D.3	Demonstrate an understanding of fair use and Creative Commons to intellectual property.
	Exhibit leadership for digital citizenship.	8.1.8.D.4	Assess the credibility and accuracy of digital content.
		8.1.8.D.5	Understand appropriate uses for social media and the negative consequences of misuse.
9-12	Advocate and practice safe, legal, and responsible use of information and technology.	8.1.12.D.1	Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.
	Demonstrate personal responsibility for lifelong learning.	8.1.12.D.2	Evaluate consequences of unauthorized electronic access (e.g., hacking) and disclosure, and on dissemination of personal information.
		8.1.12.D.3	Compare and contrast policies on filtering and censorship both locally and globally.
	Exhibit leadership for digital citizenship.	8.1.12.D.4	Research and understand the positive and negative impact of one's digital footprint.
		8.1.12.D.5	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.
Content Area		Technology	
Standard		8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.	
Strand		E: Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.	
Grade Level bands	Content Statement	Indicator	Indicator
	Students will:		
P	Plan strategies to guide inquiry.	8.1.P.E.1	Use the Internet to explore and investigate questions with a teacher's support.
K-2	Plan strategies to guide inquiry Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.	8.1.2.E.1	Use digital tools and online resources to explore a problem or issue.
3-5	Plan strategies to guide inquiry. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.	8.1.5.E.1	Use digital tools to research and evaluate the accuracy of, relevance to, and appropriateness of using print and non-print electronic information sources to complete a variety of tasks.

	Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.		
6-8	Plan strategies to guide inquiry. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. Evaluate and select information sources and digital tools based on the appropriateness for specific tasks. Process data and report results.	8.1.8.E.1	Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.
9-12	Plan strategies to guide inquiry. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. Evaluate and select information sources and digital tools based on the appropriateness for specific tasks. Process data and report results.	8.1.12.E.1	Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.
		8.1.12.E.2	Research and evaluate the impact on society of the unethical use of digital tools and present your research to peers.
Content Area		Technology	
Standard		8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.	
Strand		F: Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.	
Grade Level bands	Content Statement Students will:	Indicator	Indicator
K-2	Identify and define authentic problems and significant questions for investigation. Plan and manage activities to develop a solution or complete a project. Collect and analyze data to identify solutions and/or make informed decisions. Use multiple processes and diverse perspectives to explore	8.1.2.F.1	Use geographic mapping tools to plan and solve problems.

	alternative solutions.		
3-5	<p>Identify and define authentic problems and significant questions for investigation.</p> <p>Plan and manage activities to develop a solution or complete a project.</p> <p>Collect and analyze data to identify solutions and/or make informed decisions.</p> <p>Use multiple processes and diverse perspectives to explore alternative solutions</p>	8.1.5.F.1	Apply digital tools to collect, organize, and analyze data that support a scientific finding.
6-8	<p>Identify and define authentic problems and significant questions for investigation.</p> <p>Plan and manage activities to develop a solution or complete a project.</p> <p>Collect and analyze data to identify solutions and/or make informed decisions.</p> <p>Use multiple processes and diverse perspectives to explore alternative solutions.</p>	8.1.8.F.1	Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.
9-12	<p>Identify and define authentic problems and significant questions for investigation.</p> <p>Plan and manage activities to develop a solution or complete a project.</p> <p>Collect and analyze data to identify solutions and/or make informed decisions.</p> <p>Use multiple processes and diverse perspectives to explore alternative solutions.</p>	8.1.12.F.1	Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.

2014 New Jersey Core Curriculum Content Standards - Technology

Content Area	Technology
Standard	8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, te computational thinking and the designed world as they relate to the individual, global society, and
Strand	A. The Nature of Technology: Creativity and Innovation Technology systems impact every aspect

		we live.	
Grade Level bands	Content Statement Students will be able to understand:	Indicator	Indicator
K-2	The characteristics and scope of technology.	8.2.2.A.1	Define products produced as a result of technology or of nature
		8.2.2.A.2	Describe how designed products and systems are useful at scho
	The core concepts of technology.	8.2.2.A.3	Identify a system and the components that work together to acc
		8.2.2.A.4	Choose a product to make and plan the tools and materials nee
	The relationships among technologies and the connections between technology and other fields of study.	8.2.2.A.5	Collaborate to design a solution to a problem affecting the corr
3-5	The characteristics and scope of technology.	8.2.5.A.1	Compare and contrast how products made in nature differ from human made in how they are produced and used.
		8.2.5.A.2	Investigate and present factors that influence the development . product and a system.
	The core concepts of technology.	8.2.5.A.3	Investigate and present factors that influence the development . products and systems, e.g., resources, criteria and constraints.
	The relationships among technologies and the connections between technology and other fields of study.	8.2.5.A.4	Compare and contrast how technologies have changed over tin and economic, political and/or cultural influences.
		8.2.5.A.5	Identify how improvement in the understanding of materials sc technologies.
6-8	The characteristics and scope of technology.	8.2.8.A.1	Research a product that was designed for a specific demand an product has changed to meet new demands (i.e. telephone for c phone for mobility needs).
	The core concepts of technology.	8.2.8.A.2	Examine a system, consider how each part relates to other part: redesign to improve the system.
		8.2.8.A.3	Investigate a malfunction in any part of a system and identify i
	The relationships among technologies and the connections between technology and other fields of study.	8.2.8.A.4	Redesign an existing product that impacts the environment to l the environment.
		8.2.8.A.5	Describe how resources such as material, energy, information, capital contribute to a technological product or system.
9-12	The characteristics and scope of technology.	8.2.12.A.1	Propose an innovation to meet future demands supported by ar potential full costs, benefits, trade-offs and risks, related to the
	The core concepts of technology.	8.2.12.A.2	Analyze a current technology and the resources used, to identif terms of availability, cost, desirability and waste.
	The relationships among technologies and the connections between technology and other fields of study.	8.2.12.A.3	Research and present information on an existing technological repurposed for a different function.
Content Area	Technology		
Standard	8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, t		

	computational thinking and the designed world as they relate to the individual, global society, and		
Strand	B. Technology and Society: Knowledge and understanding of human, cultural and societal value designing technological systems and products in the global society.		
Grade Level bands	Content Statement Students will be able to understand:	Indicator	Indicator
K-2	The cultural, social, economic and political effects of technology.	8.2.2.B.1	Identify how technology impacts or improves life.
	The effects of technology on the environment.	8.2.2.B.2	Demonstrate how reusing a product affects the local and global
	The role of society in the development and use of technology.	8.2.2.B.3	Identify products or systems that are designed to meet human needs
	The influence of technology on history.	8.2.2.B.4	Identify how the ways people live and work has changed because of
3-5	The cultural, social, economic and political effects of technology.	8.2.5.B.1	Examine ethical considerations in the development and production through its life cycle.
	The effects of technology on the environment.	8.2.5.B.2	Examine systems used for recycling and recommend simplification and share with product developers.
		8.2.5.B.3	Investigate ways that various technologies are being developed to prevent improper use of resources.
	The role of society in the development and use of technology.	8.2.5.B.4	Research technologies that have changed due to society's changing
		8.2.5.B.5	Explain the purpose of intellectual property law.
The influence of technology on history.	8.2.5.B.6	Compare and discuss how technologies have influenced historical	
6-8	The cultural, social, economic and political effects of technology.	8.2.8.B.1	Evaluate the history and impact of sustainability on the development of a product or system over time and present results to peers.
		8.2.8.B.2	Identify the desired and undesired consequences from the use of
	The effects of technology on the environment.	8.2.8.B.3	Research and analyze the ethical issues of a product or system and report findings for review by peers and /or experts.
		8.2.8.B.4	Research examples of how humans can devise technologies to prevent the consequences of other technologies and present your findings.
	The role of society in the development and use of technology.	8.2.8.B.5	Identify new technologies resulting from the demands, values, needs of individuals, businesses, industries and societies.
		8.2.8.B.6	Compare and contrast the different types of intellectual property: copyrights, patents and trademarks.
	The influence of technology on history.	8.2.8.B.7	Analyze the historical impact of waste and demonstrate how a product can be reused or remanufactured into a new product.
9-12	The cultural, social, economic and political effects of technology.	8.2.12.B.1	Research and analyze the impact of the design constraints (specifications) for a product or technology driven by a cultural, social, economic and environmental context and publish for review.
	The effects of technology on the environment.	8.2.12.B.2	Evaluate ethical considerations regarding the sustainability of resources that are used for the design, creation and maintenance of

			product.
	The role of society in the development and use of technology.	8.2.12.B.3	Analyze ethical and unethical practices around intellectual property influenced by human wants and/or needs.
	The influence of technology on history.	8.2.12.B.4	Investigate a technology used in a given period of history, e.g. revolution or information age, and identify their impact and how it changed to meet human needs and wants.
		8.2.12.B.5	Research the historical tensions between environmental and economic development as driven by human needs and wants in the development of a technology and present the competing viewpoints to peers for review.

Content Area		Technology	
Standard		8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technology, and computational thinking and the designed world as they relate to the individual, global society, and the environment.	
Strand		C. Design: The design process is a systematic approach to solving problems.	
Grade Level bands	Content Statement	Indicator	Indicator
	Students will be able to understand:		
K-2	The attributes of design.	8.2.2.C.1	Brainstorm ideas on how to solve a problem or build a product.
		8.2.2.C.2	Create a drawing of a product or device that communicates its design and discuss.
		8.2.2.C.3	Explain why we need to make new products.
	The application of engineering design.	8.2.2.C.4	Identify designed products and brainstorm how to improve one.
		8.2.2.C.5	Describe how the parts of a common toy or tool interact and work together.
	The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.	8.2.2.C.6	Investigate a product that has stopped working and brainstorm solutions to the problem.
3-5	The attributes of design.	8.2.5.C.1	Collaborate with peers to illustrate components of a designed system.
		8.2.5.C.2	Explain how specifications and limitations can be used to direct development.
		8.2.5.C.3	Research how design modifications have led to new products.
	The application of engineering design.	8.2.5.C.4	Collaborate and brainstorm with peers to solve a problem and evaluate solutions to provide the best results with supporting sketches or models.
		8.2.5.C.5	Explain the functions of a system and subsystems.
	The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.	8.2.5.C.6	Examine a malfunctioning tool and identify the process to troubleshoot and repair the tool.
		8.2.5.C.7	Work with peers to redesign an existing product for a different purpose.
6-8	The attributes of design.	8.2.8.C.1	Explain how different teams/groups can contribute to the overall design process.
		8.2.8.C.2	Explain the need for optimization in a design process.

		8.2.8.C.3	Evaluate the function, value, and aesthetics of a technological from the perspective of the user and the producer.
	The application of engineering design.	8.2.8.C.4	Identify the steps in the design process that would be used to solve a problem.
		8.2.8.C.5	Explain the interdependence of a subsystem that operates as part of a larger system.
		8.2.8.C.5.a	Create a technical sketch of a product with materials and measurements labeled.
	The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.	8.2.8.C.6	Collaborate to examine a malfunctioning system and identify the steps used to troubleshoot, evaluate and test options to repair the product for a better solution.
		8.2.8.C.7	Collaborate with peers and experts in the field to research and use the design process, data analysis and trends, and maintain annotated sketches to record the developmental cycle.
		8.2.8.C.8	Develop a proposal for a chosen solution that include models (mathematical) to communicate the solution to peers.
9-12	The attributes of design.	8.2.12.C.1	Explain how open source technologies follow the design process.
		8.2.12.C.2	Analyze a product and how it has changed or might change over time based on needs and wants.
	The application of engineering design.	8.2.12.C.3	Analyze a product or system for factors such as safety, reliability, cost, maintenance and repair, and human factors engineering (ergonomics).
		8.2.12.C.4	Explain and identify interdependent systems and their functions.
		8.2.12.C.5	Create scaled engineering drawings of products both manually and with CAD software. Materials and measurements labeled.
	The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.	8.2.12.C.6	Research an existing product, reverse engineer and redesign it to improve its function.
		8.2.12.C.7	Use a design process to devise a technological product or system to solve a global problem, provide research, identify trade-offs and construct a prototype. The process through drawings that include data and materials.
Content Area		Technology	
Standard		8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, design, and computational thinking and the designed world as they relate to the individual, global society, and the environment.	
Strand		D. Abilities for a Technological World: The designed world is the product of a design process that uses resources to convert resources into products and systems.	
Grade Level bands	Content Statement Students will understand how to:	Indicator	Indicator
K-2	Apply the design process.	8.2.2.D.1	Collaborate and apply a design process to solve a simple problem through hands-on experiences.
	Use and maintain technological products and systems.	8.2.2.D.2	Discover how a product works by taking it apart, sketching how it is made, and putting it back together.
		8.2.2.D.3	Identify the strengths and weaknesses in a product or system.
		8.2.2.D.4	Identify the resources needed to create technological products and systems.
	Assess the impact of products and systems.	8.2.2.D.5	Identify how using a tool (such as a bucket or wagon) aids in reducing the effort needed to move a load.
3-5	Apply the design process.	8.2.5.D.1	Identify and collect information about a problem that can be solved, generate ideas to solve the problem, and identify constraints and resources that are considered.
		8.2.5.D.2	Evaluate and test alternative solutions to a problem using the design process.

			offs identified in the design process to evaluate potential solutions.
	Use and maintain technological products and systems.	8.2.5.D.3	Follow step by step directions to assemble a product or solve a problem.
		8.2.5.D.4	Explain why human-designed systems, products, and environments are constantly monitored, maintained, and improved.
		8.2.5.D.5	Describe how resources such as material, energy, information, and capital are used in products or systems.
	Assess the impact of products and systems.	8.2.5.D.6	Explain the positive and negative effect of products and systems on the environment, and when the product or system is used.
		8.2.5.D.7	Explain the impact that resources such as energy and materials used to produce products or systems have on the environment.
6-8	Apply the design process.	8.2.8.D.1	Design and create a product that addresses a real world problem or process under specific constraints.
		8.2.8.D.2	Identify the design constraints and trade-offs involved in design (e.g., how the prototype might fail and how it might be improved) by testing, problem and reporting results in a multimedia presentation, design portfolio, or engineering notebook.
		8.2.8.D.3	Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.
	Use and maintain technological products and systems.	8.2.8.D.4	Research and publish the steps for using and maintaining a product or system. Incorporate diagrams or images throughout to enhance user communication.
	Assess the impact of products and systems.	8.2.8.D.5	Explain the impact of resource selection and the production process on the development of a common or technological product or system.
		8.2.8.D.6	Identify and explain how the resources and processes used in the production of a current technological product can be modified to have a more sustainable impact on the environment.
9-12	Apply the design process.	8.2.12.D.1	Design and create a prototype to solve a real world problem using science, engineering, and math principles. Identify constraints addressed during the creation of the prototype, test, make, and present the solution for peer review.
		8.2.12.D.2	Write a feasibility study of a product to include: economic, manufacturing, financial, and management factors, and provide recommendations for implementation.
	Use and maintain technological products and systems.	8.2.12.D.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design and creation of a technological product or system.
	Assess the impact of products and systems.	8.2.12.D.4	Assess the impacts of emerging technologies on developing countries and communities.
		8.2.12.D.5	Explain how material processing impacts the quality of engineering products.
		8.2.12.D.6	Synthesize data, analyze trends and draw conclusions regarding the impact of technology on the individual, society, or the environment and the future.

Content Area	Technology		
Standard	8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, and computational thinking and the designed world as they relate to the individual, global society, and the future.		
Strand	E. Computational Thinking: Programming: Computational thinking builds and enhances problem-solving skills and enables students to move beyond using knowledge to creating knowledge.		
Grade Level	Content Statement Students will be able to	Indicator	Indicator

bands	understand:		
K-2	Computational thinking and computer programming as tools used in design and engineering.	8.2.2.E.1	List and demonstrate the steps to an everyday task.
		8.2.2.E.2	Demonstrate an understanding of how a computer takes input of written commands and then interprets and displays information.
		8.2.2.E.3	Create algorithms (a sets of instructions) using a pre-defined language (e.g., to move a student or a character through a maze).
		8.2.2.E.4	Debug an algorithm (i.e., correct an error).
		8.2.2.E.5	Use appropriate terms in conversation (e.g., basic vocabulary, input, output, the operating system, debug, and algorithm).
3-5	Computational thinking and computer programming as tools used in design and engineering.	8.2.5.E.1	Identify how computer programming impacts our everyday lives.
		8.2.5.E.2	Demonstrate an understanding of how a computer takes input, processes the data, stores the data through a series of commands, and outputs information.
		8.2.5.E.3	Using a simple, visual programming language, create a program and procedures to generate specific output.
		8.2.5.E.4	Use appropriate terms in conversation (e.g., algorithm, program, procedures, memory, storage, processing, software, coding, programming).
6-8	Computational thinking and computer programming as tools used in design and engineering.	8.2.8.E.1	Identify ways computers are used that have had an impact across different cultures, activities and within different careers where they are used.
		8.2.8.E.2	Demonstrate an understanding of the relationship between hardware and software.
		8.2.8.E.3	Develop an algorithm to solve an assigned problem using a specific programming language, commands and use peer review to critique the solution.
		8.2.8.E.4	Use appropriate terms in conversation (e.g., programming, language, RAM, ROM, Boolean logic terms).
9-12	Computational thinking and computer programming as tools used in design and engineering.	8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in the real world.
		8.2.12.E.2	Analyze the relationships between internal and external components of a system.
		8.2.12.E.3	Use a programming language to solve problems or accomplish robotic functions, website designs, applications, and games.
		8.2.12.E.4	Use appropriate terms in conversation (e.g., troubleshooting, diagnostic software, GUI, abstraction, variables, data types, statements).

