Egg Harbor City Public Schools

Computer Science & Design Thinking Curriculum
Grades K-8

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Introduction

The purpose of the Egg Harbor City School District Computer Science & Design Thinking Curriculum Guide is to provide parents, staff members, and community members with information that describes the Computer Science & Design Thinking instructional goals in our school district. This curriculum guide was developed to assist students achieve success with concepts and practices of computer science and to prepare them to be well-rounded, global-minded individuals in a computing-intensive world.

Computer Design & Thinking Practices is a multi-faceted curriculum that can be applied to everyday life including when making informed decisions in their future goals and careers. The foregoing curriculum serves as a resource guide to assist teachers with implementing the New Jersey Student Learning Standards and District goals for Computer Science & Thinking Practices as it intertwines throughout all curricular areas. Through cultivation of students' intellectual curiosity, skills and knowledge, our students can achieve academically and socially, and contribute as responsible and productive citizens of our global community.

Instructional Practices

The Computer Science & Design Thinking Curriculum will be an ever-evolving, interdisciplinary curriculum in an effort to keep
up-to-date with the latest content knowledge, utilizing the best instructional practices, incorporating effective interdisciplinary Assessments, and discarding materials and practices that are ineffective or detrimental to student achievement. An evolving curriculum allows for flexibility to adapt to students' academic needs and interests, while maintaining a focus on student achievement
of the Standards and District goals.

Curriculum Design

Addressing Grade Level Expectations –

Highlighted within the Lesson (Unit) Plan

→ Select Standards
→ State the Rationale (Goal)
→ Describe the Context (Objective)
→ Address a Timeframe
→ Identify Instructional Strategies
→ Present an Overview
→ Devise Essential and Guiding Questions
→ Determine Exit Outcomes and Indicators
→ Devise Learning Opportunities
→ Develop Assessment Opportunities
→ Use Data to Drive Instruction
→ Provide appropriate Accommodations/Modifications
→ Address Cross-Curricular Connections
→ Integrate Technology and Career Readiness Skills
→ Incorporate LGBTQ+ and Disabilities Awareness
→ Reflect on Teaching Practices

Accommodations/Modifications

Overview

Accommodations Versus Modifications

Accommodations:

→ Are changes to how the content is:
1) Taught
2) Made Accessible
3) Assessed
→ Do not change what the student is expected to master.
→ Maintain the objectives of the course.

Modifications:
→ Are changes to what a student learns or is expected to do.
→ May be incorporated to assist students who are behind grade level.
→ Could take the form of an alternative assessment.

Special Education Students (IEP –Individualized Education Program) –

- Implemented by Special Education Self-Contained Teachers
- Implemented by Special Education In-Class Resource Teachers
- Implemented by General Education Teachers (Supplemental Instruction)
- Implemented by Special Area Teacher (as per discipline area)
- Accommodation and Modifications

Text-to-Speech assistive tools	Speech-to-text assistive tools	Multi-Sensory Approach
Repeat Instructions	Review Directions	Have Student Restate Information
Visual Reinforcements	Visual Reminders	Preferential Seating
Check Work in Progress	Provide Student with Immediate Feedback	Avoid placing student under pressure of time or completion
Repeat Directions Quietly	Have the student repeat and explain directions	Support Auditory Presentations with Visuals (ex. Project model of assignment on SmartBoard)
Posted Assignments online and in the classroom	Assignment Pad	Provide Extra Assignment Time

Modified Homework	Clean Work Area	Highlight Key Words
Concrete Examples	Study Carrel/Quiet Work Space	Use Manipulatives
Prior Notice of Test	Test Scheduling: Adding time as needed, providing frequent breaks	Test Study Guides
Modified assessments	Extra Response Time	Extra Time Tests
Provide Models	Extra Drill/Practice	Monitor Assignments
Test Setting: Administer tests in small group and/or in a separate room	Oral Testing	Recognize and Give Credit for Oral Participation
Post Routines online and in classroom	Positive Reinforcement	Mindfulness Activities

504 Plan Students –

- Implemented by General Education Teachers
- Implemented by Special Area Teacher (as per discipline area)
- Accommodation and Modification Options Chart

Text-to-Speech assistive tools	Speech-to-text assistive tools	Multi-Sensory Approach
Repeat Instructions	Review Directions	Have Student Restate Information
Visual Reinforcements	Visual Reminders	Preferential Seating
Check Work in Progress	Provide Student with Immediate Feedback	Avoid placing student under pressure of time or completion
Repeat Directions Quietly	Have the student repeat and explain directions	Support Auditory Presentations with Visuals (ex. Project model of assignment on SmartBoard)

Post Assignments online and in the classroom	Assignment Pad	Provide Extra Assignment Time
Modified Homework	Clean Work Area	Highlight Key Words
Concrete Examples	Study Carrel/Quiet Work Space	Use Manipulatives
Prior Notice of Test	Test Scheduling: Adding time as needed, providing frequent breaks	Test Study Guides
Modified assessments	Extra Response Time	Extra Time Tests
Provide Models	Extra Drill/Practice	Monitor Assignments
Test Setting: Administer tests in small group and/or in a separate room	Oral Testing	Recognize and Give Credit for Oral Participation
Post Routines online and in classroom	Positive Reinforcement	Mindfulness Activities

English Language Learners –

- Implemented by ESL Teacher
- Implemented by General Education Teachers
- Implemented by Special Area Teacher (as per discipline area)
- Accommodation and Modification Options Chart

Text-to-Speech assistive tools	Speech-to-text assistive tools	Multi-Sensory Approach
Repeat Instructions	Review Directions	Have Student Restate Information
Visual Reinforcements	Visual Reminders	Preferential Seating
Check Work in Progress	Provide Student with Immediate Feedback	Avoid placing student under pressure of time or completion

Repeat Directions Quietly	Have the student repeat and explain directions	Support Auditory Presentations with Visuals (ex. Project model of assignment on SmartBoard)
Post Assignments online and in the classroom	Assignment Pad	Provide Extra Assignment Time
Modified Homework	Clean Work Area	Highlight Key Words
Concrete Examples	Study Carrel/Quiet Work Space	Use Manipulatives
Prior Notice of Test	Test Scheduling: Adding time as needed, providing frequent breaks	Test Study Guides
Modified assessments	Extra Response Time	Extra Time Tests
Provide Models	Extra Drill/Practice	Monitor Assignments
Test Setting: Administer tests in small group and/or in a separate room	Oral Testing	Recognize and Give Credit for Oral Participation
Post Routines online and in classroom	Positive Reinforcement	Mindfulness Activities

Basic Skills Instruction Students or Students at Risk of School Failure (IPP –Individualized Program Plan) –

- Implemented by Special Education In-Class Resource Teachers
- Implemented by General Education Teachers
- Implemented by Special Area Teacher (as per discipline area)
- Accommodation and Modification Options Chart

Text-to-Speech assistive tools	Speech-to-text assistive tools	Multi-Sensory Approach
Repeat Instructions	Review Directions	Have Student Restate Information

Visual Reinforcements	Visual Reminders	Preferential Seating
Check Work in Progress	Provide Student with Immediate Feedback	Avoid placing student under pressure of time or completion
Repeat Directions Quietly	Have the student repeat and explain directions	Support Auditory Presentations with Visuals (ex. Project model of assignment on SmartBoard)
Post Assignments online and in the classroom	Assignment Pad	Provide Extra Assignment Time
Modified Homework	Clean Work Area	Highlight Key Words
Concrete Examples	Study Carrel/Private Work Space	Use Manipulatives
Prior Notice of Test	Test Scheduling: Adding time as needed, providing frequent breaks	Test Study Guides
Modified assessments	Extra Response Time	Extra Time Tests
Provide Models	Extra Drill/Practice	Monitor Assignments
Test Setting: Administer tests in small group and/or in a separate room	Oral Testing	Recognize and Give Credit for Oral Participation
Post Routines online and in classroom	Positive Reinforcement	Mindfulness Activities

Gifted and Talented Students –

- Implemented by General Education Teachers
- Implemented by Special Education In-Class Resource Teachers
- Implemented by Special Area Teacher (as per discipline area)
- Accommodation and Modification Options Chart

Encourage students to explore concepts in depth and encourage independent studies or investigations.	Use thematic instruction to connect learning across the curriculum.	Encourage creative expression and thinking by allowing students to choose how to approach a problem or assignment.
Expand students' time to research topics of interest	Invite students to explore different points of view on a topic of study and compare the two.	Provide learning centers where students are in charge of their learning.
Brainstorm with gifted children on what types of projects they would like to explore to extend what they're learning in the classroom.	Determine where students' interests lie and capitalize on their inquisitiveness.	Refrain from having them complete more work in the same manner.
Employ differentiated curriculum to keep interest high.	Avoid drill and practice activities.	Ask students' higher level questions that require students to look into causes, experiences, and facts to draw a conclusion or make connections to other areas of learning.
If possible, compact curriculum to allow gifted students to move more quickly through the material	Encourage students to make transformations- use a common task or item in a different way.	Allow for choice.

Assessments:

Formative – (Refer to **Tools for Formative Assessment** on the Google Team Drive in the Staff Resources Folder under the Formative Assessment Folder for a list of techniques to check for understanding and how to utilize each.)

- Analyzing Student Work (Homework, Classwork, Tests, Quizzes)
- Observation
- Strategic Questioning
- Think-Pair-Share.
- 3,2,1 Countdown
- Classroom Polls
- Exit Slips
- Admit Slips

- Thumbs Up and Thumbs Down
- Extended Projects
- Self-Assessment
- Portfolio Check
- Journal Entry
- Story Map
- Quizlet
- Let's Go Learn
- Blooket
- Gimkit
- Epic
- Nearpod / Flocabulary
- Graphic Organizers

Summative –
- Core discipline End of Unit Assessment
- Core discipline Final Exam
- Interdisciplinary Project Based Assignments

Benchmark –
- Grades K-8 Core discipline Fall Benchmark
- Grades K-8 Core discipline Winter Benchmark
- Grades K-8 Core discipline Spring Benchmark

Alternatives-

- Group conversations
- Digital Portfolios and journals
- Demonstrations
- Conferences

- Observations
- Digital Drawings / Illustrations

Instructional Materials:

A variety of programs and materials will be used to integrate Computer Technology & Design Thinking into all disciplines to allow students to reach their fullest potential in the area of computer sciences. They will learn internet safety and typing skills to prepare them for course work in all grade levels and beyond. Students will be able to take what they have learned and apply it to their grade level class work. There will be an emphasis on using Google applications. Students will be exposed to code.org to explore computer science and programming.

Suggested Supplemental Materials, included but not limited to:

General

- Google Applications (Doc, Slides, Classroom, Quickdraw, etc)
- code.org
- scratch.mit.edu
- Seesaw
- Jamboard
- Flocabulary
- Nearpod
- Makey Makey
- Ozobots
- Pear Deck
- FlipGrid
- Typing Club and various online learn-to-type programs
- Variety of hands on materials

Grade Specific

- K-2 -KidsCodeCS, CDN, The Word Collector by Peter Reynolds, The Most Magnificent Thing by Ashley Spires

- 3-5 Computer Science Unplugged, PollEverywhere, Robot Rumpus by Sean Taylor, How to Spy on a Shark by Lori Haskins Houran and Francisca Marquez
- 6-8 DataGov, PollEverywhere, Thingiverse, The Mighty Mars Rovers by Elizabeth Rusch, The Wild Robot by Peter Brown

Pacing Guide:

- Refer to Matrix (where identified in core disciplines)
- Refer to Interdisciplinary Pacing Guide Time Frames
- Identified on Lesson Plan

Standards: https://www.nj.gov/education/standards/compsci/Docs/2020%20NJSLS-CSDT.pdf

Interdisciplinary Connections

Reading:

NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it;
cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

NJSLSA.R2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and
ideas.

NJSLSA.R3. Analyze how and why individuals, events, and ideas develop and interact over the course of a text.

NJSLSA.R4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

NJSLSA.R5. Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.

NJSLSA.R6. Assess how point of view or purpose shapes the content and style of a text.

NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

NJSLSA.R8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

NJSLSA.R9 Analyze and reflect on how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

NJSLSA.R10. Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed

Reading standards align with CS&DT Practice 7 Communicating About Computing and Design: Communication involves personal expression and exchanging ideas with others. In computer science, students communicate with diverse audiences about the use and effects of computation and the appropriateness of computational choices. Students write clear comments, document their work, and communicate their ideas through multiple forms of media. Clear communication includes using precise language and carefully considering possible audiences.

Writing:

NJSLSA.W6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

NJSLSA.W7. Conduct short as well as more sustained research projects, utilizing an inquiry-based research process, based on focused questions, demonstrating understanding of the subject under investigation.

NJSLSA.W8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

Writing standards align with:

- *CS&DT Practice 7 Communicating About Computing and Design: Communication involves personal expression and exchanging ideas with others. In computer science, students communicate with diverse audiences about the use and effects of computation and the appropriateness of computational choices. Students write clear comments, document their work, and communicate their ideas through multiple forms of media. Clear communication includes using precise language and carefully considering possible audiences.*

Speaking and Listening:

NJSLSA.SL1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

NJSLSA.SL2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

NJSLSA.SL3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric.

NJSLSA.SL4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

NJSLSA.SL5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

NJSLSA.SL6. Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

Speaking and Listening standards align with:

- *CS&DT Practice 2: Collaborating Around Computing and Design:Collaborative computing is the process of performing a computational task by working on pairs in teams. Because it involves asking for the contributions and feedback of others, effective collaboration can lead to better outcomes than working independently. Collaboration requires individuals to navigate and incorporate diverse perspectives, conflicting ideas, disparate skills, and distinct personalities. Students should use collaborative tools to effectively work together and to create complex artifacts*
- *CS&DT Practice 7: Communicating About Computing and Design: Communication involves personal expression and exchanging ideas with others. In computer science, students communicate with diverse audiences about the use and effects of computation and the appropriateness of computational choices. Students write clear comments, document their work, and communicate their ideas through multiple forms of media. Clear communication includes using precise language and carefully considering possible audiences.*

<u>Language</u>:

NJSLSA.L6. Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression

Language standards align with:

- *CS&DT Practice 1: Fostering an Inclusive Computing and Design Culture: Building an inclusive and diverse computing culture requires strategies for incorporating perspectives from people of different genders, ethnicities, and abilities. Incorporating these perspectives involves understanding the personal, ethical, social, economic, and cultural contexts in which people operate. Considering the needs of diverse users during the design process is essential to producing inclusive computational products.*
- *CS&DT Practice 7 Communicating About Computing and Design: Communication involves personal expression and exchanging ideas with others. In computer science, students communicate with diverse audiences about the use and effects of computation and the appropriateness of computational choices. Students write clear comments, document their work, and communicate their ideas through multiple forms of media. Clear communication includes using precise language and carefully considering possible audiences.*

Math

The Standards for Mathematical Practice describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" that help develop an understanding of the importance of mathematics education. The incorporation of these standards into the Computer Science & Design Thinking curriculum provides students with a "real-world" application of their mathematics skills in relation to the area of computer science.

These standards are:

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

Math Standards align with:

- *CS&DT Practice 2: Collaborating Around Computing and Design: Collaborative computing is the process of performing a computational task by working on pairs in teams. Because it involves asking for the contributions and feedback of others, effective collaboration can lead to better outcomes than working independently. Collaboration requires individuals to navigate and incorporate diverse perspectives, conflicting ideas, disparate skills, and distinct personalities. Students should use collaborative tools to effectively work together and to create complex artifacts.*
- *CS&DT Practice 3: Recognizing and Defining Computational Problems: The ability to recognize appropriate and worthwhile opportunities to apply computation is a skill that develops over time and is central to computing. Solving a problem with a computational approach requires defining the problem, breaking it down into parts, and evaluating each part to determine whether a computational solution is appropriate.*

- *CS&DT Practice 4: Developing and Using Abstractions: Abstractions are formed by identifying patterns and extracting common features from specific examples in order to create generalizations. Using generalized solutions and parts of solutions designed for broad reuse simplifies the development process by managing complexity*

Social Studies

Social studies education provides learners with the knowledge, skills, attitudes, and perspectives needed to become active, informed, and contributing members of local, state, national, and global communities. The incorporation of social studies principles into the computer science curriculum allows students to understand the lasting effects of human interaction with each other and with the natural world.

Relevant Disciplinary Concepts include, but are not limited to:

Geography, People and the Environment:

Spatial Views of the World: Spatial views of the world focus on the creation of maps and use of geospatial technologies. Creating maps and other geographical representations is an essential and enduring part of seeking new geographic knowledge that is personally and socially useful and that can be applied in making decisions and solving problems. Once maps or other representations are created, it prompts new questions concerning the locations, spaces, and patterns portrayed.

Human Population Patterns: Human population, patterns and movement focus on the size, composition, distribution, and movement of human populations and how they are fundamental and active features on Earth's surface. This includes understanding that the expansion and redistribution of the human population affects patterns of settlement, environmental changes, and resource use. Patterns and movements of population also relate to physical phenomena including climate variability, landforms, and locations of various natural hazards and their effects on population size, composition, and distribution

Human Environment Interaction: Human-environment interactions are essential aspects of human life in all societies and they occur at local-to-global scales. Human-environment interactions happen both in specific places and across broad regions. Culture influences the locations and the types of interactions that occur. Earth's human systems and physical systems are in constant interaction and have reciprocal influences flowing among them. These interactions result in a variety of spatial patterns that require careful observation, investigation, analysis, and explanation.

Global Interconnections: Global interconnections occur in both human and physical systems. Earth is a set of interconnected ecosystems of which humans are an influential part. Many natural phenomena have no perceptible boundaries. For example, the oceans are one dynamic system. The atmosphere covers the entire planet. Land and water forms shift over geological eons. Many life forms diffuse from place to place and bring environmental changes with them. Humans have spread across the planet, along with their cultural practices, artifacts, languages, diseases, and other attributes. All of these interconnections create complex spatial patterns at multiple scales that continue to change over time.

Social Studies standards align with:

- *CS&DT Practice 1: Fostering an Inclusive Computing and Design Culture: Building an inclusive and diverse computing culture requires strategies for incorporating perspectives from people of different genders, ethnicities, and abilities. Incorporating these perspectives involves understanding the personal, ethical, social, economic, and cultural contexts in which people operate. Considering the needs of diverse users during the design process is essential to producing inclusive computational products.*
- *CS&DT Practice2: Collaborating Around Computing and Design: Collaborative computing is the process of performing a computational task by working on pairs in teams. Because it involves asking for the contributions and feedback of others, effective collaboration can lead to better outcomes than working independently. Collaboration requires individuals to navigate and incorporate diverse perspectives, conflicting ideas, disparate skills, and distinct personalities. Students should use collaborative tools to effectively work together and to create complex artifacts.*
- *CS&DT Practice 3 Recognizing and Defining Computational Problems:The ability to recognize appropriate and worthwhile opportunities to apply computation is a skill that develops over time and is central to computing. Solving a problem with a computational approach requires defining the problem, breaking it down into parts, and evaluating each part to determine whether a computational solution is appropriate.*
- *CS&DT Practice 7: Communicating About Computing and Design:Communication involves personal expression and exchanging ideas with others. In computer science, students communicate with diverse audiences about the use and effects of computation and the appropriateness of computational choices. Students write clear comments, document their work, and communicate their ideas through multiple forms of media. Clear communication includes using precise language and carefully considering possible audiences.*

Science

Scientific and technological advances have proliferated and now permeate most aspects of life in the 21st century. It is increasingly important that all members of our society develop an understanding of scientific and engineering concepts and processes. Learning how to construct scientific explanations and how to design evidence-based solutions provides students with tools to think critically about personal and societal issues and needs. Students can then contribute meaningfully to decision-making processes, such as discussions about climate change, new approaches to health care, and innovative solutions to local and global problems.

These Standards are:

1. Constructing Explanations and Designing Solutions
2. Engaging in Argument from Evidence
3. Using Mathematics and Computational Thinking
4. Obtaining, Evaluating, and Communicating Information

Science standards align with:

- *CS&DT Practice 3 Recognizing and Defining Computational Problems:The ability to recognize appropriate and worthwhile opportunities to apply computation is a skill that develops over time and is central to computing. Solving a problem with a computational approach requires defining the problem, breaking it down into parts, and evaluating each part to determine whether a computational solution is appropriate.*
- *CS&DT Practice 4: Developing and Using Abstractions: Abstractions are formed by identifying patterns and extracting common features from specific examples in order to create generalizations. Using generalized solutions and parts of solutions designed for broad reuse simplifies the development process by managing complexity.*
- *CS&DT Practice 5 Creating Computational Artifacts: The process of developing computational artifacts embraces both creative expression and the exploration of ideas to create prototypes and solve computational problems. Students create artifacts that are personally relevant or beneficial to their community and beyond. Computational artifacts can be created by*

combining and modifying existing artifacts or by developing new artifacts. Examples of computational artifacts include programs, simulations, visualizations, digital animations, robotic systems, and apps.

- *CS&DT Practice 6 Testing and Refining Computational Artifacts : Testing and refinement is the deliberate and iterative process of improving a computational artifact. This process includes debugging (identifying and fixing errors) and comparing actual outcomes to intended outcomes. Students also respond to the changing needs and expectations of end users and improve the performance, reliability, usability, and accessibility of artifacts.*

Media Arts:

Media arts is a unique medium of artistic expression that can amplify and integrate the four traditional art forms. The media artist utilizes a fundamental understanding of the mediums of analog and digital media to integrate digital technologies with traditional forms of artistic expression. The study of media arts can foster new modes and processes of creative thinking within the realms of the digital and virtual worlds that are evermore present in students' lives. In fact, many students are already creating media art on their own and will benefit from support systems within their schools that mirror their life experiences. Because many young people hold a fascination with new media, infusing Media Arts study into the Computer Science & Design Thinking curriculum can potentially enhance the connection between in-school and out-of-school learning and act as motivation for active learning.

2022 National Core Art Standards: The National Core Art Standards consist of Creating, Producing, Responding and Connecting. Listed below are the anchor standards for each catergory.

Creating: Conceiving and developing new artistic ideas and work.

- *Anchor Standard #1:* Generate and conceptualize artistic ideas and work.
- *Anchor Standard #2:* Organize and develop artistic ideas and work.
- *Anchor Standard #3:* Refine and complete artistic work.

Producing (media arts): Realizing and presenting artistic ideas and work.

- *Anchor Standard #4:* Select, analyze and interpret artistic work for presentation.
- *Anchor Standard #5:* Develop and refine artistic techniques and work for presentation.
- *Anchor Standard #6:* Convey meaning through the presentation of artistic work.

Responding:Understanding and evaluating how the arts convey meaning.

- *Anchor Standard #7:* Perceive and analyze artistic work.
- *Anchor Standard #8:* Interpret intent and meaning in artistic work.
- *Anchor Standard #9:* Apply criteria to evaluate artistic work

Connecting: Relating artistic ideas and work with personal meaning and external context.

- *Anchor Standard #10:* Synthesize and relate knowledge and personal experiences to make art.
- *Anchor Standard #11:* Relate artistic ideas and works with societal, cultural and historical context to deepen understanding.

Media Arts standards align with:

- *CS&DT Practice 1: Fostering an Inclusive Computing and Design Culture: Building an inclusive and diverse computing culture requires strategies for incorporating perspectives from people of different genders, ethnicities, and abilities. Incorporating these perspectives involves understanding the personal, ethical, social, economic, and cultural contexts in which people operate. Considering the needs of diverse users during the design process is essential to producing inclusive computational products.*
- *CS&DT Practice 5: Creating Computational Artifacts: The process of developing computational artifacts embraces both creative expression and the exploration of ideas to create prototypes and solve computational problems. Students create artifacts that are personally relevant or beneficial to their community and beyond. Computational artifacts can be created by combining and modifying existing artifacts or by developing new artifacts. Examples of computational artifacts include programs, simulations, visualizations, digital animations, robotic systems, and apps.*

Visual and Performing Arts

Throughout time, the arts have served as a distinctive vehicle for self-discovery and a means of understanding the world in which we live. As the state of New Jersey continues to transform public education to meet the needs of a changing world and the 21st century workforce, capitalizing on the unique ability of the arts to develop creativity, critical thinking, and innovation skills is critical to the success of our students. The arts infuse our lives with meaning on nearly all levels—generating significant creative and intellectual

capital. They inspire creative and critical thinking and encourage acceptance of diversity. A well-designed sequential arts program promotes responsible decision making, enhances self-awareness, builds self-esteem and self-management skills, and helps students build relationship and collaboration skills; all of which are essential to prepare New Jersey students for postsecondary success. Because many young people hold a fascination with new media, infusing Visual and Performing Arts study into the Computer Science & Design Thinking curriculum can potentially enhance the connection between in-school and out-of-school learning and act as motivation for active learning.

Creating

- *Anchor Standard #1*: Conceptualizing and generating ideas.
- *Anchor Standard #2*: Organizing and developing ideas.
- *Anchor Standard #3*: Refining and completing products.

Performing/Presenting/Producing

- *Anchor Standard #4*: Developing and refining techniques and models or steps needed to create products.
- *Anchor Standard #5*: Selecting, analyzing and interpreting work.
- *Anchor Standard #6*: Conveying meaning through art.

Responding

- *Anchor Standard #7*: Perceiving and analyzing products.
- *Anchor Standard #8*: Applying criteria to evaluate products.
- *Anchor Standard #9*: Interpreting intent and meaning.

Connecting

- *Anchor Standard #10*: Synthesizing and relating knowledge and personal experiences to create products.
- *Anchor Standard #11*: Relating artistic ideas and works within societal, cultural, and historical contexts to deepen understanding.

Visual and Performing Arts standards align with:

- *CS&DT Practice 1: Fostering an Inclusive Computing and Design Culture: Building an inclusive and diverse computing culture requires strategies for incorporating perspectives from people of different genders, ethnicities, and abilities. Incorporating these perspectives involves understanding the personal, ethical, social, economic, and cultural contexts in which people operate. Considering the needs of diverse users during the design process is essential to producing inclusive computational products.*
- *CS&DT Practice 5: Creating Computational Artifacts: The process of developing computational artifacts embraces both creative expression and the exploration of ideas to create prototypes and solve computational problems. Students create artifacts that are personally relevant or beneficial to their community and beyond. Computational artifacts can be created by combining and modifying existing artifacts or by developing new artifacts. Examples of computational artifacts include programs, simulations, visualizations, digital animations, robotic systems, and apps.*

Comprehensive Health and Physical Education

Successful preparation of students for the opportunities, rigors and advances of the 21st Century cannot be accomplished without a strong and sustained emphasis on the health and wellness of all students. Today's students are continually bombarded with physical, mental, and social influences that affect not only learning in school, but also the lifelong health of the citizens that schools are preparing for graduation. Comprehensive Health and Physical Education standards address the needs for students to gain knowledge and skills in caring for themselves, interacting effectively with others, and analyzing the impact of choices and consequences.

Personal Growth and Development: Personal Growth and Development are lifelong processes of physical, behavioral, emotional and cognitive change throughout one's lifetime. Personal Growth and Development pertains to keeping your body healthy and understanding hormonal changes (all body systems) and their impact on sexuality. It encompasses the human condition: who we are, how we grow or evolve, and how interaction with others affects the process of growth physically, mentally, socially, and emotionally from infancy through advanced age.

Emotional Health: Emotional Health encompasses the views, feelings, and expressions about oneself. Emotional health includes a person's emotional, mental, psychological, and social well-being. It also helps determine how to handle stress and make choices related to others. Emotionally healthy people consciously develop coping mechanisms that are situationally appropriate to resolve and

gather positive outcomes, develop strategies for mental health emergencies, respond to situations in a positive and appropriate manner, connect with resources and trusted individuals to assist, communicate feelings with confidence, and recognize support systems

Social and Sexual Health: Social and Sexual Health is a person's ability to communicate and interact with others efficiently. Individuals are able to form meaningful relationships with others and interact in healthy, appropriate ways. They encompass respect and accept differences of an individual's race, religion, gender identity, gender expression, ethnicity, disability, socioeconomic background, and perspectives of health-related decisions. The extent to which people connect with others in different environments, adapt to various social and sexual situations, feel supported by individuals, institutions, and experience a sense of belonging, all contribute to social and sexual health.

Community Health Services and Support: Community Health Services provide informational resources and assistance to communities and individuals to support disease and injury prevention, disaster relief, and improve the quality of services provided to all individuals. Community Health Services promote public health, health equity, healthy lifestyles and reduce health disparities. Services and support can include the provision of Culturally and Linguistically Appropriate Services (CLAS), medical/dental health services, nursing, clothing, shelter, hunger relief, and allied health professional care to people in need, or people maintaining regular wellness screenings in the person's home, other residential settings, or a community health care facility.

Movement Skills and Concepts: Movement Skills and Concepts include learning and investigating the fundamentals of movement (on land, water, snow, sand and ice) from one place to another and the understanding of biomechanics (how the body moves, grows and matures). Movement skills fall into three main categories: locomotor, non-locomotor, and manipulative skills. Concepts into categories such as spatial awareness (where the body moves), body awareness (what can the body do), qualities of movement (how the body moves and with whom/what does the body move).

Comprehensive Health and Physical Education standards align with:

- *CS&DT Practice 1: Fostering an Inclusive Computing and Design Culture: Building an inclusive and diverse computing culture requires strategies for incorporating perspectives from people of different genders, ethnicities, and abilities. Incorporating these perspectives involves understanding the personal, ethical, social, economic, and cultural contexts in which people operate. Considering the needs of diverse users during the design process is essential to producing inclusive computational products.*

- *CS&DT Practice 7: Communicating About Computing and Design:Communication involves personal expression and exchanging ideas with others. In computer science, students communicate with diverse audiences about the use and effects of computation and the appropriateness of computational choices. Students write clear comments, document their work, and communicate their ideas through multiple forms of media. Clear communication includes using precise language and carefully considering possible audiences.*

Integration of 21st Century Skills through NJSLS 9:

New Jersey's Standard 9 is composed of the Career Readiness, Life Literacies, and Key Skills

- Mission- Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.

- This standard will be addressed via researching and presenting information, working collaboratively with partners or small groups, using technology like Google Suite on a regular basis, grounding reading, writing, and speaking in evidence from text, both literary and informational, building knowledge through content rich non-fiction, inferencing, identifying main idea and theme, sequence of events, cause and effect, vocabulary, problem and solution, point of view, and by evaluating various forms of media and formats.

- **Vision- An education in career readiness, life literacies, and key skills fosters a population that:**
  Continually self-reflects and seeks to improve the essential life and career practices that lead to success;
  Uses effective communication and collaboration skills and resources to interact with a global society; Possesses financial literacy and responsibility at home and in the broader community; Plans, executes, and alters career goals in response to changing societal and economic conditions; and seeks to attain skill and content mastery to achieve success in a chosen career path.

9.1 Financial Literacy Themes

- Civic Financial Responsibility
- Financial Institutions

- Financial Psychology
- Planning and Budgeting
- Risk Management
- Economic and Government Influences
- Credit Profile

9.2 Career Awareness, Exploration, Preparation and Training Themes

- Career Awareness and Planning

9.4 Life Literacies and Key Skills Themes

- Creativity and Innovation
- Critical Thinking and Problem Solving
- Digital Citizenship
- Global and Cultural Awareness
- Information and Media Literacy
- Technology Literacy
- Career Readiness, Life Literacy, and Key Skills Practices

NJSLS Standard 9 is integrated across the K-8 curriculum in various subject areas, where appropriate. Lessons could include:

- working collaboratively to solve problems
- comparing and contrasting
- classroom debates and negotiations
- speaking and listening skills
- networking
- customizing resumes and references
- questioning techniques
- communicating clearly and effectively, with reason
- employ valid and reliable research strategies
- accept and integrating criticism and feedback
- utilize critical thinking to make sense of problems and persevere in solving them

- use technology to enhance productivity
- In addition, a yearly career fair will be conducted.

The integration of 21st century skills will be identified on lesson plans.

Career Readiness, Life Literacies, and Key Skills

- Act as a responsible and contributing community members and employee.
- Attend to financial well-being
- Consider the environmental, social and economic impacts of decisions
- Demonstrate creativity and innovation.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Model integrity, ethical leadership and effective management.
- Plan education and career paths aligned to personal goals.
- Use technology to enhance productivity, increase collaboration and communicate effectively.
- Work productively in teams while using cultural/global competence.

Standards in Action: Climate Change

- The NJSLS-CLKS includes the skills, knowledge and practices necessary for success in an increasingly complex world and changing natural environment. Climate change is included in these standards. Collaborating to solve a problem, approaching a solution with innovation, and determining the validity of a source of information are all essential skills required in the standards and necessary for students to maintain awareness of and successfully address climate change. Climate change can be integrated into the teaching of these standards in a few ways. For example, middle school students could develop a plan for implementing an environmentally focused project in the local community such as protecting a wetland or developing an urban greenway along a stream. The plan would include goals, priorities and necessary resources. In a career and technical education program, as a part of a green building design integrated project, students could explore various sustainable and reclaimed products used for construction. After researching several sources, students would create a collage of information, share with their classmates and take notes on new products and ideas. Students could also compare and contrast actions being taken in different countries to combat Climate Change.

New Jersey's Standard 9.1 Financial Literacy

- This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance.
- Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.
- This standard would be addressed via read alouds, STEAM and problem solving activities, by having a classroom economy, the use of school-wide currency, higher order thinking and questioning strategies, and by hosting a career fair each year.
- Resources-My Classroom Economy link
    - Free Experiential learning / Financial Literacy
    - My Classroom Economy Resource

New Jersey's Standard 9.2 Career Awareness, Exploration, and Preparation

- This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.
- This standard would be addressed via researching and presenting information, working collaboratively with partners or small groups, using technology like Google Suite on a regular basis, grounding reading, writing, and speaking in evidence from text, both literary and informational, building knowledge through content rich non-fiction, inferencing, identifying main idea and theme, sequence of events, cause and effect, vocabulary, problem and solution, point of view, and by evaluating various forms of media and formats. Students would also have the opportunity to examine career paths available in different countries and communities, and increase awareness of the concept of working abroad.

New Jersey's Technology Standard 9.3 Career and Technical Education

- All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age.

Standard 9.3 is broken into the following strands:

- Strand A: Career Awareness (met by Grade 4)

- Strand B: Career Exploration (met by Grade 8)

- This standard would be addressed via researching and presenting information, working collaboratively with partners or small groups, using technology like Google Suite on a regular basis, grounding reading, writing, and speaking in evidence from text, both literary and informational, building knowledge through content rich non-fiction, inferencing, identifying main idea and theme, sequence of events, cause and effect, vocabulary, problem and solution, point of view, and by evaluating various forms of media and formats. Students would also have the opportunity to examine career paths available in different countries and communities, and increase awareness of the concept of working abroad.

Standard 9.4 Life Literacies and Key Skills.

- This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy.

Personal Financial Literacy:

- New Jersey's Standard 9.1 Personal Financial Literacy
  - This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance.
  - Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

<u>Theme 1: Civic Financial Responsibility</u>

- This idea will be addressed via read alouds, researching various civic duties and responsibilities, delineating classroom jobs, project based learning activities on volunteering and giving back to the community

<u>Theme 2: Financial Institutions</u>

- This standard will be addressed via read alouds, researching the American banking and credit system, STEAM and problem solving activities, analysis of informational text (primary and secondary)

<u>Theme 3: Financial Psychology</u>

- This standard will be addressed via STEAM and problem solving activities, having a classroom token economy, personal reflections on spending habits and emotional well-being

Theme 4: Planning and Budgeting

- This standard will be addressed via STEAM and problem solving activities, by having a classroom economy, the use of school-wide currency, analysis of informational texts regarding savings accounts

Theme 5: Risk Management

- This standard will be addressed via the use of read alouds regarding insurance, higher order thinking and questioning techniques regarding when insurance is needed

Theme 6: Economic and Government Influences (Grades 5- 8)

- This standard will be addressed via read alouds, research and debates on taxation, research on the history of taxation, defining trade practices throughout American history, determining state and federal financial laws.

Theme 7: Credit Profile (Grades 5th- 8th)

- This standard will be addressed via read alouds, analysis of informational texts, compare and contrasting product prices, classroom discussions on credit score

Career Awareness, Exploration and Preparation

New Jersey's Standard 9.2 Career Awareness, Exploration, and Preparation

- This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.
- This standard would be addressed via researching and presenting information, working collaboratively with partners or small groups, using technology like Google Suite on a regular basis, grounding reading, writing, and speaking in evidence from text, both literary and informational, building knowledge through content rich non-fiction, inferencing, identifying main idea and theme, sequence of events, cause and effect, vocabulary, problem and solution, point of view, and by evaluating various forms of media and formats.

Theme 1: Career Awareness and Planning

- This standard will be addressed via the use of read alouds regarding occupations, defining individual skills, training, and knowledge required for various occupations and higher education, determining incomes associated with various careers, compare and contrast of public, private and entrepreneurial occupations. Students would also have the opportunity to examine career paths available in different countries and communities, and increase awareness of the concept of working abroad.

Career Readiness, Life Literacies, and Key Skills

Standard 9.4 Life Literacies and Key Skills.

- This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy.

Theme 1: Creativity and Innovation

- This standard will be addressed via read alouds, project based learning assignments, think-a-louds, classroom collaboration activities, perspective- taking assignments, and problem solving assignments as they relate to career readiness

Theme 2: Critical thinking and problem solving

- This standard will be addressed via read alouds, project based learning assignments, research assignments, compare and contrast activities, multi-solution project based learning assignments, local, national, and global research projects based on current events

Theme 3: Digital Citizenship

- This standard will be addressed via read alouds, project based learning assignments, research assignments, primary and secondary resource analysis, citation assignments, online safety and research assignments, student presentations, collaborative activities, outcome based assignments regarding technology safety

Theme 4: Global and Cultural Awareness

- This standard will be addressed via diverse read alouds and author spotlights, project based learning assignments, research assignments, classroom discussions, and cultural awareness activities.

Theme 5: Information and Media Literacy

- This standard will be addressed via read alouds, project based learning assignments, research assignments, classroom discussions, Google Scholar assignments, Google Suite activities, and analysis of media bias assignments.

Theme 6: Technology Literacy

- This standard will be addressed via read alouds, project based learning assignments, research assignments, classroom discussions, use of Google Docs and Microsoft Word assignments, Google Suite Slides and Microsoft Powerpoint assignments, Google Sheets and Microsoft Excel assignments, and current events assignments.

Career Ready Practices:

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of
Study.

Integration and Focus -

- Our career programs are focused on STEAM based practices, meaning all lessons are hands-on and introduce students to high interest, STEM-based careers.
- With our career programs, students learn how the concepts and topics they learn in school are related to the real world. And, all lessons are experiential and use simple supplies, no text book or handout is used.
- The career programs will utilize videos, magazines, presenters, internet search engines, hands on projects, and experiments that focus on topics that link student learning to various career options.

Technology through NJSLS and Career Education:

Identified on Lesson Plan –

Mission:

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.

Vision: The design process builds in our students the recognition that success is not merely identifying a problem but working through a process and that failure is not an end but rather a point for reevaluation. Whether applied as a skill in product development, in the learning environment, in daily life, in a local or more global arena, the design process supports students in their paths to becoming responsible, effective citizens in college, careers and life. Computational thinking provides an organizational means of approaching life and its tasks. It develops an understanding of technologies and their operations and provides students with the abilities to build and create knowledge and new technologies.

Standards:

Technology Standard 8.1: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.

Use of non-fiction media, world language- specific vocabulary, data analysis, research-based assignments, word processing, online spreadsheet tools, STEM activities, problem-based learning

Technology Standard 8.2: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Problem-based learning, STEM activities, use of non-fiction media, solving real-world world language -based issues, projects with constraints

Implementation During Instruction:

→ Webquests
→ Demos Activities
→ Classroom Responders
→ Chromebooks

→ Online Progress Monitoring Tools
→ Online Assessments
→ Online Word Processing
→ Let's Go Learn
→ LinkIt

Additional Content-Specific Information/Resources –

1. National / International Technology Student Standards
    1. 8.1 Educational Technology
        1. International Society for Technology in Education (ISTE) Standards for Student
        2. American Association of School Librarians (AASL) Student Standards for the 21st-Century Learner
        3. Common Sense Student Standards Alignment in the K-12 Digital Citizenship Curriculum
    2. 8.2 Technology Education, Engineering, Design and Computational Thinking - Programming
        1. K12 Computer Science Student Framework Statements by Grade Band
        2. International Technology and Engineering Educators Association Standards for Technological Literacy

Career Education:

Identified on Lesson Plan –

- Integrated into 21st Century Skills (NJSLS 9) and Technology (NJSLS 8)
- Annual Career Fair
- Career Ready Practices
    - CRP1. Act as a responsible and contributing citizen and employee
    - CRP2. Apply appropriate academic and technical skills.
    - CRP3. Attend to personal health and financial well-being.
    - CRP4. Communicate clearly and effectively and with reason.

- CRP5. Consider the environmental, social and economic impacts of decisions.
- CRP6. Demonstrate creativity and innovation.
- CRP7. Employ valid and reliable research strategies.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP9. Model integrity, ethical leadership and effective management.
- CRP10. Plan education and career paths aligned to personal goals.
- CRP11. Use technology to enhance productivity.
- CRP12. Work productively in teams while using cultural global competence.

Integration and Focus -

- Our career programs are focused on STEM based practices, meaning all lessons are hands-on and introduce students to high interest, STEM-based careers.
- With our career programs, students learn how the concepts and topics they learn in school are related to the real world. And, all lessons are experiential and use simple supplies, no text book or handout is used.
- The career programs will utilize videos, magazines, presenters, internet search engines, hands on projects, and experiments that focus on topics that link student learning to various career options.

Diversity and Inclusion:

Throughout the course of this Computer Science and Design Thinking curriculum, it is our intent to present materials and activities that are respectful and inclusive of diversity, gender identity, secuality, disability, age, socioeconomic status, ethnicity, race, nationality, religion, and culture. Students will participate in diverse, respectful conversations exploring multiple topics and perspectives. They will all be working in a welcoming environment to complete cross-curricular project based assignments collaboratively.

Integration and Focus -

- Students will be exposed to various ethnicities and cultures throughout the course of the curriculum via diverse assignments, books and authors, and research projects, videos, discussions of current events, etc.
- While learning about different scientists, engineers, creators, scientists, coders, etc, students will engage in comparisons to note similarities and differences between them. During certain months, certain people and their accomplishments will spotlighted (ex: Asian American - Pacific Islander Activities)

Integration of LGBT+ Individuals with Disabilities:

In each curricular area, the district will adopt inclusive instructional materials that portray the cultural and economic diversity of society including the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people in regards to the realm of Computer Science and Design Thinking.

- *This standard would be addressed via discussions and research involving the increasing representation of diverse creators, inventors, scientists, engineers, etc.*

Amistad Law: N.J.S.A. 18A 52:16A-88: Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Holocaust Law: N.J.S.A. 18A:35-28: Every board of education shall include instruction on the Holocaust and genocides in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

Integration of Asian-American and Pacific Islander Legislation:

In each curricular area, the district will adopt inclusive instructional materials that portray the contributions of members of the Asian American and Pacific Islander communities in regards to the realm of Computer Science and Design Thinking.

- This standard would be addressed via discussions and research involving the increasing representation of Asian-American and Pacific Islander creators, inventors, scientists, engineers, etc.
- While learning about different scientists, engineers, creators, scientists, coders, etc, students will engage in comparisons to note similarities and differences between them. During certain months, certain people and their accomplishments will spotlighted (ex: Asian American - Pacific Islander Activities in May)

Diversity and Inclusion Mandates align with:

- *CS&DT Practice 1: Fostering an Inclusive Computing and Design Culture: Building an inclusive and diverse computing culture requires strategies for incorporating perspectives from people of different genders, ethnicities, and abilities. Incorporating these perspectives involves understanding the personal, ethical, social, economic, and cultural contexts in which people operate. Considering the needs of diverse users during the design process is essential to producing inclusive computational products.*
- *CS&DT Practice 7: Communicating About Computing and Design:Communication involves personal expression and exchanging ideas with others. In computer science, students communicate with diverse audiences about the use and effects of computation and the appropriateness of computational choices. Students write clear comments, document their work, and communicate their ideas through multiple forms of media. Clear communication includes using precise language and carefully considering possible audiences.*

Disciplinary Concepts:

Design Thinking-

Engineering Design

People design for enjoyment and to solve problems, extend human capabilities, satisfy needs and wants, and improve the human condition. Engineering Design, a systematic approach to creating solutions to technological problems and finding ways to meet people's needs and desires, allows for the effective and efficient development of products and systems.

Interaction of Technology and Humans

Societies influence technological development. Societies are characterized by common elements such as shared values, differentiated roles, and cultural norms, as well as by entities such as community institutions, organizations, and businesses. Interaction of Technology and Humans concerns the ways society drives the improvement and creation of new technologies, and how technologies both serve and change society.

Nature of Technology

Human population, patterns and movement focus on the size, composition, distribution, and movement of human populations and how they are fundamental and active features on Earth's surface. This includes understanding that the expansion and redistribution of the human population affects patterns of settlement, environmental changes, and resource use. Patterns and movements of population also relate to physical phenomena including climate variability, landforms, and locations of various natural hazards and their effects on population size, composition, and distribution.

Effects of Technology on the Natural World

Many of engineering and technology's impacts on society and the environment are widely regarded as desirable. However, other impacts are regarded as less desirable. Effects of Technology on the Natural World concerns the positive and negative ways that technologies affect the natural world.

Ethics & Culture

Ethics and Culture concerns the profound effects that technologies have on people, how those effects can widen or narrow disparities, and the responsibility that people have for the societal consequences of their technological decisions.

Computer Science -

Computing Systems

People interact with a wide variety of computing devices that collect, store, analyze, and act upon information in ways that can affect human capabilities both positively and negatively. The physical components (hardware) and instructions (software) that make up a computing system communicate and process information in digital form.

Networks and the Internet

Computing devices typically do not operate in isolation. Networks connect computing devices to share information and resources and are an increasingly integral part of computing. Networks and communication systems provide greater connectivity in the computing world.

Impacts of Computing

Computing affects many aspects of the world in both positive and negative ways at local, national, and global levels. Individuals and communities influence computing through their behaviors and cultural and social interactions, and, in turn, computing influences new cultural practices.

Data & Analysis

Computing systems exist to process data. The amount of digital data generated in the world is rapidly expanding, so the need to process data effectively is increasingly important. Data is collected and stored so that it can be analyzed to better understand the world and make more accurate predictions.

Algorithms & Programming

An algorithm is a sequence of steps designed to accomplish a specific task. Algorithms are translated into programs, or code, to provide instructions for computing devices. Algorithms and programming control all computing systems, empowering people to communicate with the world in new ways and solve compelling problems.

Interdisciplinary Pacing Guide for Grades K-8

8.1 Computer Science				
By the end of Grade 2				
Concept	Standard	Grade K	Grade 1	Grade 2
Computing	8.1.2.CS.1: Select and	NJSLA: W.K.6. With	W.1.6. With guidance and	W.2.6. With guidance and

Systems	operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.	guidance and support from adults, explore a variety of digital tools to produce and publish writing, including in collaboration with peers	support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers.	support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers.
	8.1.2.CS.2: Explain the functions of common software and hardware components of computing systems.	NJSLSA.L6. Acquire and use accurately a range of general academic and domain-specific words and phrases	NJSLSA.L6. Acquire and use accurately a range of general academic and domain-specific words and phrases	NJSLSA.L6. Acquire and use accurately a range of general academic and domain-specific words and phrases
	8.1.2.CS.3: Describe basic hardware and software problems using accurate terminology	NJSLSA.L6. Acquire and use accurately a range of general academic and domain-specific words and phrases	NJSLSA.L6. Acquire and use accurately a range of general academic and domain-specific words and phrases	NJSLSA.L6. Acquire and use accurately a range of general academic and domain-specific words and phrases
Networks and the Internet	8.1.2.NI.1: Model and describe how individuals use computers to connect to other individuals, places, information, and ideas through a network.	Social Studies Unit: Everybody Works Media Arts: Anchor Standards 1-6 Standard 9.4 Life Literacies and Key Skills	Social Studies Unit: Work in Community Social Studies Unit: Our Past, Our Present Media Arts: Anchor Standards 1-6 Standard 9.4 Life Literacies and Key Skills	Social Studies: My Community, My County Social Studies: Working to Meet Our Needs Social Studies: The World Around Us Media Arts: Anchor Standards 1-6 Standard 9.4 Life Literacies and Key Skills

	8.1.2.NI.2: Describe how the Internet enables individuals to connect with others worldwide.	Social Studies Unit: Everybody Works Standard 9.4 Life Literacies and Key Skills	Social Studies Unit: Work in Community Standard 9.4 Life Literacies and Key Skills	Social Studies: My Community, My County Social Studies: Working to Meet Our Needs Social Studies: The World Around Us Standard 9.4 Life Literacies and Key Skills
	8.1.2.NI.3: Create a password that secures access to a device. Explain why it is important to create unique passwords that are not shared with others.	Health K-2: Personal Safety	Health K-2: Personal Safety	Health K-2: Personal Safety
	8.1.2.NI.4: Explain why access to devices need to be secured.	Health K-2: Personal Safety	Health K-2: Personal Safety	Health K-2: Personal Safety
Impacts of Computing	8.1.2.IC.1: Compare how individuals live and work before and after the implementation of new computing technology.	Science Unit: Weather Science Unit: Severe Weather Social Studies Unit: Everybody Works Social Studies Unit: Life Then and Now Social Studies Unit:	Science Unit: Our Sky Social Studies Unit: Work in Community Social Studies Unit: Our Past, Our Present Social Studies Unit: Amistad Social Studies Unit: Holocuast	Science Unit: Changes to the Earth's Surface Social Studies: The World Around Us Social Studies Unit: Amistad Social Studies Unit: Holocuast

		Amistad Social Studies Unit: Holocuast NJSLS 9.2 Career Awareness Standard 9.4 Life Literacies and Key Skills	NJSLS 9.2 Career Awareness Standard 9.4 Life Literacies and Key Skills	NJSLS 9.2 Career Awareness Standard 9.4 Life Literacies and Key Skills
Data & Analysis	8.1.2.DA.1: Collect and present data, including climate change data, in various visual formats.	Science Unit: Weather Science Unit: Severe Weather Math Unit: Calendar Math Math Unit: Classifying and Sorting Data	Science Unit: Our Sky Math Unit: Calendar Math Math Unit: Place Value Math Unit: Data	Science Unit: Changes to the Earth's Surface Math Unit: Data
	8.1.2.DA.2: Store, copy, search, retrieve, modify, and delete data using a computing device.	NJSLA: W.K.6. With guidance and support from adults, explore a variety of digital tools to produce and publish writing, including in collaboration with peers	NJSLA: W.K.6. With guidance and support from adults, explore a variety of digital tools to produce and publish writing, including in collaboration with peers	NJSLA: W.K.6. With guidance and support from adults, explore a variety of digital tools to produce and publish writing, including in collaboration with peers
	8.1.2.DA.3: Identify and describe patterns in data visualizations.	Science Unit: Weather Science Unit: Severe Weather Math Unit: Calendar Math	Science Unit: Our Sky Math Unit: Calendar Math Math Unit: Place Value Math Unit: Data	Science Unit: Changes to the Earth's Surface Math Unit: Data

		Math Unit: Classifying and Sorting Data		
	8.1.2.DA.4: Make predictions based on data using charts or graphs.	Science Unit: Weather Science Unit: Severe Weather Math Unit: Calendar Math	Science Unit: Our Sky Math Unit: Calendar Math Math Unit: Place Value Math Unit: Data	Science Unit: Changes to the Earth's Surface Math Unit: Data
Algorithms & Programming	8.1.2.AP.1: Model daily processes by creating and following algorithms to complete tasks.	Science Unit: Weather Science Unit: Severe Weather Math Unit: Calendar Math	Math Unit: Calendar Math Math Unit: Place Value Math Unit: Data	Math Unit: Data
	8.1.2.AP.2: Model the way programs store and manipulate data by using numbers or other symbols to represent information.	Math Unit: Operations and Algebraic Thinking	Math Unit: Data	Math Unit: Data
	8.1.2.AP.3: Create programs with sequences and simple loops to accomplish tasks.	Media Arts: Anchor Standards 1-6	Media Arts: Anchor Standards 1-6	Media Arts: Anchor Standards 1-6
	8.1.2.AP.4: Break down a task into a sequence of steps.	Math Unit: Calendar Math Math Unit: Numbers in Base 10 Media Arts: Anchor	Math Unit: Place Value Math Units: Addition to 20 and Subtraction to 20 Media Arts: Anchor	Math Unit: Place Value Math Unit: Addition and Subtraction to 20 Media Arts: Anchor

		Standards 1-6	Standards 1-6	Standards 1-6
	8.1.2.AP.5: Describe a program's sequence of events, goals, and expected outcomes.	Media Arts: Anchor Standards 1-6	Media Arts: Anchor Standards 1-6	Media Arts: Anchor Standards 1-6
	8.1.2.AP.6: Debug errors in an algorithm or program that includes sequences and simple loops.	Media Arts: Anchor Standards 1-6	Media Arts: Anchor Standards 1-6	Media Arts: Anchor Standards 1-6
By the end of Grade 5				
Concept	Standard	Grade 3	Grade 4	Grade 5
Computing Systems	8.1.5.CS.1: Model how computing devices connect to other components to form a system.	Standard 9.4 Life Literacies and Key Skills	Science Unit: Energy Science Unit: Waves, Light & Information Standard 9.4 Life Literacies and Key Skills	Standard 9.4 Life Literacies and Key Skills
	8.1.5.CS.2: Model how computer software and hardware work together as a system to accomplish tasks.		Science Unit: Energy Science Unit: Waves, Light & Information	
	8.1.5.CS.3: Identify potential solutions for simple hardware and software problems using common troubleshooting strategies.		Science Unit: Energy Science Unit: Waves, Light & Information	

Network and the Internet	8.1.5.NI.1: Develop models that successfully transmit and receive information using both wired and wireless methods.		Science Unit: Energy Science Unit: Waves, Light & Information	
	8.1.5.NI.2: Describe physical and digital security measures for protecting sensitive personal information.	Health 3-5: Personal Safety	Health 3-5: Personal Safety	Health 3-5: Personal Safety
Impacts of Computing	8.1.5.IC.1: Identify computing technologies that have impacted how individuals live and work and describe the factors that influenced the changes.	Social Studies: Our Communities Social Studies Unit: Amistad Social Studies Unit: Holocuast Standard 9.4 Life Literacies and Key Skills	Health 3-5: Personal Safety Social Studies Unit: Amistad Social Studies Unit: Holocuast Standard 9.4 Life Literacies and Key Skills	Health 3-5: Personal Safety Social Studies Unit: Amistad Social Studies Unit: Holocuast Standard 9.4 Life Literacies and Key Skills
	8.1.5.IC.2: Identify possible ways to improve the accessibility and usability of computing technologies to address the diverse needs and wants of users.	Standard 9.4 Life Literacies and Key Skills	Standard 9.4 Life Literacies and Key Skills	Standard 9.4 Life Literacies and Key Skills
Data & Analysis	8.1.5.DA.1: Collect, organize, and display data in order to highlight	Science Unit: Weather and Climate Science Unit: Growth &	Science Unit: Earth Systems Science Unit: History of	Science Unit: Matter and Its Interactions Science Unit: Forces

	relationships or support a claim.	Dev. of Organisms Science Unit: Motion and Stability Science Unit: Ecosystems Group Behavior Science Unit: Biological Evolution Science Unit: Natural Hazards	Planet Earth Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information Science Unit: Natural Hazards	Science Unit: Energy in Organisms Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe
	8.1.5.DA.2: Compare the amount of storage space required for different types of data.	Math Unit: Time Volume Mass	Math Unit: Measurement & Data	Math Unit: Measurement & Data
	8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.	Math Unit: Data Science Unit: Weather and Climate Science Unit: Growth & Dev. of Organisms Science Unit: Motion and Stability Science Unit: Ecosystems Group Behavior Science Unit: Biological Evolution Science Unit: Natural Hazards	Science Unit: Earth's Systems Science Unit: History of Planet Earth Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information	Science Unit: Matter and Its Interactions Science Unit: Forces Science Unit: Energy in Organisms Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe
	8.1.5.DA.4: Organize and present climate change data visually to highlight relationships or support a claim.	Science Unit: Weather and Climate Science Unit: Growth & Dev. of Organisms Science Unit: Ecosystems Group Behavior	Science Unit: Earth's Systems Science Unit: History of Planet Earth Science Unit: Energy Science Unit: Energy &	Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth

		Science Unit: Biological Evolution Science Unit: Natural Hazards	Natural Resources	Science Unit: Earth and the Universe
	8.1.5.DA.5: Propose cause and effect relationships, predict outcomes, or communicate ideas using data.	Science Unit: Weather and Climate Science Unit: Growth & Dev. of Organisms Science Unit: Motion and Stability Science Unit: Ecosystems Group Behavior Science Unit: Biological Evolution Science Unit: Natural Hazards	Science Unit: Earth Systems Science Unit: History of Planet Earth Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information Science Unit: Natural Hazards	Science Unit: Matter and Its Interactions Science Unit: Forces Science Unit: Energy in Organisms Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe
Algorithms & Programming	8.1.5.AP.1: Compare and refine multiple algorithms for the same task and determine which is the most appropriate.	Math Unit: Multiplication Math Unit: Division Math Unit: Multiplication & Division Fluency Practice	Math Unit: Number Sense & Algebraic Concepts Math Unit: Multiplication & Division Relationship Math Unit: Multiplication & Division of Multi-Digit Numbers Math Unit: Addition & Subtraction Computation Math Unit: Fraction Computation	Math Unit: Decimal Computation Math Unit: Division Math Unit: Algebraic Concepts Math Unit: Fraction Operations
	8.1.5.AP.2: Create programs that use clearly named variables to store and modify data.	Math Unit: Graphs	Math Unit: Measurement & Data	Math Unit: Measurement & Data

	8.1.5.AP.3: Create programs that include sequences, events, loops, and conditionals.	Math Unit: Shapes & Perimeter	Science Unit: Earth Systems Math Unit: Geometry Science Unit: Energy & Natural Resources	Math Unit: Geometry
	8.1.5.AP.4: Break down problems into smaller, manageable sub-problems to facilitate program development.	Math Unit: Shapes & Perimeter	Science Unit: Earth Systems Math Unit: Geometry	Math Unit: Geometry
	8.1.5.AP.5: Modify, remix, or incorporate pieces of existing programs into one's own work to add additional features or create a new program.	Math Unit: Shapes & Perimeter	Science Unit: Earth Systems Math Unit: Geometry Science Unit: Energy & Natural Resources	Math Unit: Geometry
	8.1.5.AP.6: Develop programs using an iterative process, implement the program design, and test the program to ensure it works as intended.	Math Unit: Shapes & Perimeter	Science Unit: Earth Systems Math Unit: Geometry Science Unit: Energy & Natural Resources	Math Unit: Geometry
By the end of Grade 8				
Concept	Standard	Grade 6	Grade 7	Grade 8
Computing Systems	8.1.8.CS.1: Recommend improvements to computing devices in order to improve the ways users interact with the			Science - Mobile Phones

	devices.			
	8.1.8.CS.2: Design a system that combines hardware and software components to process data.			Science - Mobile Phones
	8.1.8.CS.3: Justify design decisions and explain potential system trade-offs.			Science - Mobile Phones
	8.1.8.CS.4: Systematically apply troubleshooting strategies to identify and resolve hardware and software problems in computing systems.			Science - Mobile Phones
Networks and the Internet	8.1.8.NI.1: Model how information is broken down into smaller pieces, transmitted as addressed packets through multiple devices over networks and the Internet, and reassembled at the destination.		Science - Big Life	Science - Mobile Phones
	8.1.8.NI.2: Model the role of protocols in transmitting data across networks and the Internet and how they enable		Science - Big Life	

	secure and errorless communication.			
	8.1.8.NI.3: Explain how network security depends on a combination of hardware, software, and practices that control access to data and systems.			
	8.1.8.NI.4: Explain how new security measures have been created in response to key malware events.			
Impacts of Computing	8.1.8.IC.1: Compare the trade-offs associated with computing technologies that affect an individual's everyday activities and career options.			
	8.1.8.IC.2: Describe issues of bias and accessibility in the design of existing technologies.			
Data & Analysis	8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose.	Science - Hurricanes Science - Global Climates Science - History of Earth Science - A Changing World	Science - Biodiversity	Science - Rockets
	8.1.8.DA.2: Explain the			Science - Mobile Phones

	difference between how the computer stores data as bits and how the data is displayed.			
	8.1.8.DA.3: Identify the appropriate tool to access data based on its file format.	Science - Global Climates		
	8.1.8.DA.4: Transform data to remove errors and improve the accuracy of the data for analysis.	Science - History of Earth		
	8.1.8.DA.5: Test, analyze, and refine computational models.	Science - Hurricanes Science - Global Climates Science - History of Earth	Science - Biodiversity	Science - Rockets Science - Roller Coasters
	8.1.8.DA.6: Analyze climate change computational models and propose refinements.	Science - Hurricanes Science - Global Climates Science - Trees Science - A Changing World		
Algorithms & Programming	8.1.8.AP.1: Design and illustrate algorithms that solve complex problems using flowcharts and/or pseudocode.			Science - Mobile Phones
	8.1.8.AP.2: Create clearly named variables that represent different data types and perform operations on their	Science - Hurricanes		Science - Rockets Science - Roller Coasters

	values.			
	8.1.8.AP.3: Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.			Science - Mobile Phones
	8.1.8.AP.4: Decompose problems and sub-problems into parts to facilitate the design, implementation, and review of programs.			Science - Mobile Phones
	8.1.8.AP.5: Create procedures with parameters to organize code and make it easier to reuse.			Science - Mobile Phones
	8.1.8.AP.6: Refine a solution that meets users' needs by incorporating feedback from team members and users.			Science - Mobile Phones
	8.1.8.AP.7: Design programs, incorporating existing code, media, and libraries, and give attribution.			Science - Mobile Phones
	8.1.8.AP.8: Systematically			Science - Mobile Phones

	test and refine programs using a range of test cases and users.			
	8.1.8.AP.9: Document programs in order to make them easier to follow, test, and debug.			Science - Mobile Phones

8.2 Design Thinking				
By the end of Grade 2				
Concept	Standard	Grade K	Grade 1	Grade 2
Engineering Designs	8.2.2.ED.1: Communicate the function of a product or device.	Science Unit: Weather Science Unit: The Sun's Heat Science Unit: Plants & Animals Science Unit: Reduce, Reuse & Recycle Science Unit: Severe Weather Science Unit: Forces and Motion	Science Unit: Our Sky Science Unit: Sound Waves & Light Waves Science Unit: Animals Science Unit: Animal Families Science Unit: Plants	Science Unit: Earth's Surface Science Unit: Changes to Earth's Surface Science Unit: Matter Science Unit: Biodiversity Science Unit: Plants
	8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.	Science Unit: Weather Science Unit: The Sun's Heat Science Unit: Plants & Animals Science Unit: Reduce, Reuse & Recycle	Science Unit: Our Sky Science Unit: Sound Waves & Light Waves Science Unit: Animals Science Unit: Animal Families Science Unit: Plants	Science Unit: Earth's Surface Science Unit: Changes to Earth's Surface Science Unit: Matter Science Unit: Biodiversity Science Unit: Plants

		Science Unit: Severe Weather Science Unit: Forces and Motion		
	8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process.	Science Unit: Weather Science Unit: The Sun's Heat Science Unit: Plants & Animals Science Unit: Reduce, Reuse & Recycle Science Unit: Severe Weather Science Unit: Forces and Motion	Science Unit: Our Sky Science Unit: Sound Waves & Light Waves Science Unit: Animals Science Unit: Animal Families Science Unit: Plants	Science Unit: Earth's Surface Science Unit: Changes to Earth's Surface Science Unit: Matter Science Unit: Biodiversity Science Unit: Plants
	8.2.2.ED.4: Identify constraints and their role in the engineering design process.	Science Unit: Weather Science Unit: The Sun's Heat Science Unit: Plants & Animals Science Unit: Reduce, Reuse & Recycle Science Unit: Severe Weather Science Unit: Forces and Motion	Science Unit: Our Sky Science Unit: Sound Waves & Light Waves Science Unit: Animals Science Unit: Animal Families Science Unit: Plants	Science Unit: Earth's Surface Science Unit: Changes to Earth's Surface Science Unit: Matter Science Unit: Biodiversity Science Unit: Plants
Interaction of Technology and Humans	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs.	Science Unit: Weather Science Unit: The Sun's Heat Science Unit: Plants & Animals Science Unit: Reduce, Reuse & Recycle	Science Unit: Our Sky Science Unit: Sound Waves & Light Waves Science Unit: Animals Science Unit: Animal Families Science Unit: Plants	Science Unit: Earth's Surface Science Unit: Changes to Earth's Surface Science Unit: Matter Science Unit: Biodiversity Science Unit: Plants

		Science Unit: Severe Weather Science Unit: Forces and Motion		
	8.2.2.ITH.2: Explain the purpose of a product and its value.	Science Unit: Weather Science Unit: The Sun's Heat Science Unit: Plants & Animals Science Unit: Reduce, Reuse & Recycle Science Unit: Severe Weather Science Unit: Forces and Motion	Science Unit: Our Sky Science Unit: Sound Waves & Light Waves Science Unit: Animals Science Unit: Animal Families Science Unit: Plants	Science Unit: Earth's Surface Science Unit: Changes to Earth's Surface Science Unit: Matter Science Unit: Biodiversity Science Unit: Plants
	8.2.2.ITH.3: Identify how technology impacts or improves life.	Science Unit: Weather Science Unit: The Sun's Heat Science Unit: Plants & Animals Science Unit: Reduce, Reuse & Recycle Science Unit: Severe Weather Science Unit: Forces and Motion	Science Unit: Our Sky Science Unit: Sound Waves & Light Waves Science Unit: Animals Science Unit: Animal Families Science Unit: Plants	Science Unit: Earth's Surface Science Unit: Changes to Earth's Surface Science Unit: Matter Science Unit: Biodiversity Science Unit: Plants
	8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks.	Science Unit: Weather Science Unit: The Sun's Heat Science Unit: Plants & Animals Science Unit: Reduce, Reuse & Recycle	Science Unit: Our Sky Science Unit: Sound Waves & Light Waves Science Unit: Animals Science Unit: Animal Families Science Unit: Plants	Science Unit: Earth's Surface Science Unit: Changes to Earth's Surface Science Unit: Matter Science Unit: Biodiversity Science Unit: Plants

		Science Unit: Severe Weather Science Unit: Forces and Motion		
	8.2.2.ITH.5: Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.	Science Unit: Weather Science Unit: The Sun's Heat Science Unit: Plants & Animals Science Unit: Reduce, Reuse & Recycle Science Unit: Severe Weather Science Unit: Forces and Motion	Science Unit: Our Sky Science Unit: Sound Waves & Light Waves Science Unit: Animals Science Unit: Animal Families Science Unit: Plants	Science Unit: Earth's Surface Science Unit: Changes to Earth's Surface Science Unit: Matter Science Unit: Biodiversity Science Unit: Plants
Nature of Technology	8.2.2.NT.1: Model and explain how a product works after taking it apart, identifying the relationship of each part, and putting it back together.	Science Unit: Weather Science Unit: The Sun's Heat Science Unit: Plants & Animals Science Unit: Reduce, Reuse & Recycle Science Unit: Severe Weather Science Unit: Forces and Motion	Science Unit: Our Sky Science Unit: Sound Waves & Light Waves Science Unit: Animals Science Unit: Animal Families Science Unit: Plants	Science Unit: Earth's Surface Science Unit: Changes to Earth's Surface Science Unit: Matter Science Unit: Biodiversity Science Unit: Plants
	8.2.2.NT.2: Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem.	Science Unit: Weather Science Unit: The Sun's Heat Science Unit: Plants & Animals Science Unit: Reduce, Reuse & Recycle	Science Unit: Our Sky Science Unit: Sound Waves & Light Waves Science Unit: Animals Science Unit: Animal Families Science Unit: Plants	Science Unit: Earth's Surface Science Unit: Changes to Earth's Surface Science Unit: Matter Science Unit: Biodiversity Science Unit: Plants

		Science Unit: Severe Weather Science Unit: Forces and Motion		
Effects of Technology on the Natural World	8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology.	Science Unit: Reduce, Reuse & Recycle Science Unit: Plants & Animals	Science Unit: Plants	Science Unit: Biodiversity Science Unit: Plants
	8.2.2.ETW.2: Identify the natural resources needed to create a product.	Science Unit: Reduce, Reuse & Recycle Science Unit: Plants & Animals	Science Unit: Plants	Science Unit: Biodiversity Science Unit: Plants
	8.2.2.ETW.3: Describe or model the system used for recycling technology.	Science Unit: Reduce, Reuse & Recycle	Science Unit: Plants	Science Unit: Biodiversity Science Unit: Plants
	8.2.2.ETW.4: Explain how the disposal of or reusing a product affects the local and global environment.	Science Unit: Reduce, Reuse & Recycle	Science Unit: Plants	Science Unit: Biodiversity Science Unit: Plants
Ethics & Culture	8.2.2.EC.1: Identify and compare technology used in different schools, communities, regions, and parts of the world.	Science Unit: Weather Science Unit: The Sun's Heat Science Unit: Plants & Animals Science Unit: Reduce, Reuse & Recycle Science Unit: Severe Weather Science Unit: Forces and Motion	Science Unit: Our Sky Science Unit: Sound Waves & Light Waves Science Unit: Animals Science Unit: Animal Families Science Unit: Plants Social Studies Unit: Amistad Social Studies Unit: Holocuast	Science Unit: Earth's Surface Science Unit: Changes to Earth's Surface Science Unit: Matter Science Unit: Biodiversity Science Unit: Plants Social Studies Unit: Amistad Social Studies Unit: Holocuast

By the end of Grade 5				
Concept	Standard	Grade 3	Grade 4	Grade 5
Engineering Design	8.2.5.ED.1: Explain the functions of a system and its subsystems.	Science Unit: Growth & Dev. of Organisms Science Unit: Ecosystems Group Behavior	Science Unit: Plant & Animal Structures and Functions Science Unit: Earth Systems	Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe
	8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.	Science Unit: Weather and Climate Science Unit: Growth & Dev. of Organisms Science Unit: Motion and Stability Science Unit: Ecosystems Group Behavior Science Unit: Biological Evolution Science Unit: Natural Hazards	Science Unit: Earth Systems Science Unit:Plant & Animal Structures and Functions Science Unit: History of Planet Earth Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information Science Unit: Natural Hazards	Science Unit: Matter and Its Interactions Science Unit: Forces Science Unit: Energy in Organisms Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe
	8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.	Science Unit: Weather and Climate Science Unit: Growth & Dev. of Organisms Science Unit: Motion and Stability Science Unit: Ecosystems Group Behavior	Science Unit: Earth Systems Science Unit:Plant & Animal Structures and Functions Science Unit: History of Planet Earth Science Unit: Energy Science Unit: Energy &	Science Unit: Matter and Its Interactions Science Unit: Forces Science Unit: Energy in Organisms Science Unit: Ecosystem Dynamics Science Unit: Earth

		Science Unit: Biological Evolution Science Unit: Natural Hazards	Natural Resources Science Unit: Waves, Light & Information Science Unit: Natural Hazards	Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe
	8.2.5.ED.4: Explain factors that influence the development and function of products and systems (e.g., resources, criteria, desired features, constraints).	Science Unit: Weather and Climate Science Unit: Growth & Dev. of Organisms Science Unit: Motion and Stability Science Unit: Ecosystems Group Behavior Science Unit: Biological Evolution Science Unit: Natural Hazards	Science Unit: Earth Systems Science Unit:Plant & Animal Structures and Functions Science Unit: History of Planet Earth Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information Science Unit: Natural Hazards	Science Unit: Matter and Its Interactions Science Unit: Forces Science Unit: Energy in Organisms Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe
	8.2.5.ED.5: Describe how specifications and limitations impact the engineering design process.	Science Unit: Weather and Climate Science Unit: Growth & Dev. of Organisms Science Unit: Motion and Stability Science Unit: Ecosystems Group Behavior Science Unit: Biological Evolution Science Unit: Natural Hazards	Science Unit: Earth Systems Science Unit:Plant & Animal Structures and Functions Science Unit: History of Planet Earth Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information Science Unit: Natural Hazards	Science Unit: Matter and Its Interactions Science Unit: Forces Science Unit: Energy in Organisms Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe
	8.2.5.ED.6: Evaluate and test alternative solutions	Science Unit: Weather and Climate	Science Unit: Earth Systems	Science Unit: Matter and Its Interactions

	to a problem using the constraints and tradeoffs identified in the design process.	Science Unit: Growth & Dev. of Organisms Science Unit: Motion and Stability Science Unit: Ecosystems Group Behavior Science Unit: Biological Evolution Science Unit: Natural Hazards	Science Unit:Plant & Animal Structures and Functions Science Unit: History of Planet Earth Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information Science Unit: Natural Hazards	Science Unit: Forces Science Unit: Energy in Organisms Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe
Interaction of Technology & Humans	8.2.5.ITH.1: Explain how societal needs and wants influence the development and function of a product and a system.	Science Unit: Weather and Climate Standard 9.4 Life Literacies and Key Skills	Science Unit: Earth Systems Science Unit: History of Planet Earth Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information Science Unit: Natural Hazards Standard 9.4 Life Literacies and Key Skills	Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe Standard 9.4 Life Literacies and Key Skills
	8.2.5.ITH.2: Evaluate how well a new tool has met its intended purpose and identify any shortcomings it might have.	Science Unit: Weather and Climate	Science Unit: History of Planet Earth Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information Science Unit: Natural Hazards	Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe

	8.2.5.ITH.3: Analyze the effectiveness of a new product or system and identify the positive and/or negative consequences resulting from its use.	Science Unit: Growth & Dev. of Organisms Science Unit: Ecosystems Group Behavior	Science Unit: History of Planet Earth Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information Science Unit: Natural Hazards	Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe
	8.2.5.ITH.4: Describe a technology/tool that has made the way people live easier or has led to a new business or career.	Science Unit: Weather and Climate	Science Unit: History of Planet Earth Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information Science Unit: Natural Hazards	Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe
Nature of Technology	8.2.5.NT.1: Troubleshoot a product that has stopped working and brainstorm ideas to correct the problem.		Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information	Science Unit: Earth Systems Science Unit: Human Impacts on Earth
	8.2.5.NT.2: Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries, and societies.	Science Unit: Weather and Climate	Science Unit: History of Planet Earth Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information Science Unit: Natural Hazards	Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe

	8.2.5.NT.3: Redesign an existing product for a different purpose in a collaborative team.		Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information	Science Unit: Human Impacts on Earth
	8.2.5.NT.4: Identify how improvement in the understanding of materials science impacts technologies.	Science Unit: Weather and Climate	Science Unit: History of Planet Earth Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information Science Unit: Natural Hazards	Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe
Effects of Technology on the Natural World	8.2.5.ETW.1: Describe how resources such as material, energy, information, time, tools, people, and capital are used in products or systems.	Science Unit: Motion and Stability	Science Unit: History of Planet Earth Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information Science Unit: Natural Hazards	Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe
	8.2.5.ETW.2: Describe ways that various technologies are used to reduce improper use of resources		Science Unit: History of Planet Earth Science Unit: Energy Science Unit: Energy & Natural Resources	Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe
	8.2.5.ETW.3: Explain why	Science Unit: Weather and	Science Unit: History of	Science Unit: Ecosystem

	human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.	Climate	Planet Earth Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information Science Unit: Natural	Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe
	8.2.5.ETW.4: Explain the impact that resources, such as energy and materials used to develop technology, have on the environment.	Science Unit: Weather and Climate Science Unit: Growth & Dev. of Organisms Science Unit: Ecosystems Group Behavior Science Unit: Biological Evolution Science Unit: Natural Hazards	Science Unit: History of Planet Earth Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information Science Unit: Natural	Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe
	8.2.5.ETW.5: Identify the impact of a specific technology on the environment and determine what can be done to increase positive effects and to reduce any negative effects, such as climate change.	Science Unit: Weather and Climate Science Unit: Growth & Dev. of Organisms Science Unit: Ecosystems Group Behavior Science Unit: Biological Evolution Science Unit: Natural Hazards	Science Unit: History of Planet Earth Science Unit: Energy Science Unit: Energy & Natural Resources Science Unit: Waves, Light & Information Science Unit: Natural	Science Unit: Ecosystem Dynamics Science Unit: Earth Systems Science Unit: Human Impacts on Earth Science Unit: Earth and the Universe
Ethics & Culture	8.2.5.EC.1: Analyze how technology has contributed to or reduced inequities in local and global communities and	Social Studies: Our Community Social Studies Unit: Amistad Social Studies Unit: Holocuast	Social Studies Unit: Native American & European Settlers Social Studies Unit: Amistad	Social Studies: Colonial America Social Studies Unit: Amistad Social Studies Unit:

	determine its short- and long-term effects.		Social Studies Unit: Holocuast	Holocuast
By the end of Grade 8				
Concept	Standard	Grade 6	Grade 7	Grade 8
Engineering Design	8.2.8.ED.1: Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.	Science - History of Earth	Science - Cellular Life Science - Big Life Science - Biodiversity	Science - Roller Coasters
	8.2.8.ED.2: Identify the steps in the design process that could be used to solve a problem.	Science - Global Climates Science - History of Earth	Science - Cellular Life Science - Big Life Science - Biodiversity	Science - Rockets Science - Roller Coasters
	8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).	Science - Global Climates Science - History of Earth	Science - Cellular Life Science - Big Life Science - Biodiversity	Science - Rockets Science - Roller Coasters
	8.2.8.ED.4: Investigate a malfunctioning system, identify its impact, and explain the step-by-step process used to troubleshoot, evaluate, and test options to repair the product in a	Science - History of Earth	Science - Big Life	

	collaborative team.			
	8.2.8.ED.5: Explain the need for optimization in a design process.	Science - Global Climates Science - History of Earth	Science - Cellular Life Science - Big Life Science - Biodiversity	Science - Rockets Science - Roller Coasters
	8.2.8.ED.6: Analyze how trade-offs can impact the design of a product.	Science - Global Climates Science - History of Earth Science - Trees	Science - Cellular Life Science - Big Life Science - Biodiversity	Science - Rockets Science - Roller Coasters
	8.2.8.ED.7: Design a product to address a real-world problem and document the iterative design process, including decisions made as a result of specific constraints and trade-offs (e.g., annotated sketches).	Science - History of Earth	Science - Cellular Life Science - Big Life Science - Biodiversity	Science - Rockets Science - Roller Coasters
Interaction of Technology and Humans	8.2.8.ITH.1: Explain how the development and use of technology influences economic, political, social, and cultural issues.	Science - History of Earth Science - Trees Science - A Changing World Standard 9.4 Life Literacies and Key Skills	Science - Big Life Science - Biodiversity Standard 9.4 Life Literacies and Key Skills	Standard 9.4 Life Literacies and Key Skills
	8.2.8.ITH.2: Compare how technologies have influenced society over time.	Science - Trees Science - A Changing World Standard 9.4 Life Literacies and Key Skills	Science - Biodiversity Standard 9.4 Life Literacies and Key Skills	Standard 9.4 Life Literacies and Key Skills Science - Rockets Science - Mobile Phones
	8.2.8.ITH.3: Evaluate the impact of sustainability on	Science - Trees Science - A Changing World	Science - Biodiversity	

	the development of a designed product or system.			
	8.2.8.ITH.4: Identify technologies that have been designed to reduce the negative consequences of other technologies and explain the change in impact.	Science - Hurricanes Science - Trees Science - A Changing World	Science - Biodiversity	
	8.2.8.ITH.5: Compare the impacts of a given technology on different societies, noting factors that may make a technology appropriate and sustainable in one society but not in another.	Science - History of Earth Science - Trees Science - A Changing World	Science - Biodiversity	
Nature of Technology	8.2.8.NT.1: Examine a malfunctioning tool, product, or system and propose solutions to the problem.			
	8.2.8.NT.2: Analyze an existing technological product that has been repurposed for a different function.			
	8.2.8.NT.3: Examine a system, consider how each part relates to other			

	parts, and redesign it for another purpose.			
	8.2.8.NT.4: Explain how a product designed for a specific demand was modified to meet a new demand and led to a new product.			
Effects of Technology on the Natural World	8.2.8.ETW.1: Illustrate how a product is upcycled into a new product and analyze the short- and long-term benefits and costs.			
	8.2.8.ETW.2: Analyze the impact of modifying resources in a product or system (e.g., materials, energy, information, time, tools, people, capital).	Science - Trees Science - A Changing World		
	8.2.8.ETW.3: Analyze the design of a product that negatively impacts the environment or society and develop possible solutions to lessen its impact.	Science - Trees	Science - Biodiversity	
	8.2.8.ETW.4: Compare the environmental effects of two alternative technologies devised to	Science - Hurricanes Science - Trees		

	address climate change issues and use data to justify which choice is best.			
Ethics & Culture	8.2.8.EC.1: Explain ethical issues that may arise from the use of new technologies.	Science - Trees		Science - Rockets
	8.2.8.EC.2: Examine the effects of ethical and unethical practices in product design and development.	Science - Trees		

7 Core Practices:

1. Fostering an Inclusive Computing and Design Culture

Building an inclusive and diverse computing culture requires strategies for incorporating perspectives from people of different genders, ethnicities, and abilities. Incorporating these perspectives involves understanding the personal, ethical, social, economic, and cultural contexts in which people operate. Considering the needs of diverse users during the design process is essential to producing inclusive computational products. When engaging in this practice, students:

- Include the unique perspectives of others and reflect on one's own perspectives when designing and developing computational products.
- Address the needs of diverse end users during the design process to produce artifacts with broad accessibility and usability.
- Employ self- and peer-advocacy to address bias in interactions, product design, and development methods.

2. Collaborating Around Computing and Design

Collaborative computing is the process of performing a computational task by working on pairs in teams. Because it involves asking for the contributions and feedback of others, effective collaboration can lead to better outcomes than working independently. Collaboration requires individuals to navigate and incorporate diverse perspectives, conflicting ideas, disparate skills, and distinct personalities. Students should use collaborative tools to effectively work together and to create complex artifacts. When engaging in this practice, students:

- Cultivate working relationships with individuals possessing diverse perspectives, skills, and personalities.
- Create team norms, expectations, and equitable workloads to increase efficiency and effectiveness.
- Solicit and incorporate feedback from, and provide constructive feedback to, team members and other stakeholders.
- Evaluate and select technological tools that can be used to collaborate on a project.

3. Recognizing and Defining Computational Problems

The ability to recognize appropriate and worthwhile opportunities to apply computation is a skill that develops over time and is central to computing. Solving a problem with a computational approach requires defining the problem, breaking it down into parts, and evaluating each part to determine whether a computational solution is appropriate. When engaging in this practice, students:

- Identify complex, interdisciplinary, real-world problems that can be solved computationally.
- Decompose complex real-world problems into manageable sub-problems that could integrate existing solutions or procedures.
- Evaluate whether it is appropriate and feasible to solve a problem computationally.

4. Developing and Using Abstractions

Abstractions are formed by identifying patterns and extracting common features from specific examples in order to create generalizations. Using generalized solutions and parts of solutions designed for broad reuse simplifies the development process by managing complexity. When engaging in this practice, students:

- Extract common features from a set of interrelated processes or complex phenomena.
- Evaluate existing technological functionalities and incorporate them into new designs.
- Create modules and develop points of interaction that can apply to multiple situations and reduce complexity.
- Model phenomena and processes and simulate systems to understand and evaluate potential outcomes.

5. Creating Computational Artifacts

The process of developing computational artifacts embraces both creative expression and the exploration of ideas to create prototypes and solve computational problems. Students create artifacts that are personally relevant or beneficial to their community and beyond. Computational artifacts can be created by combining and modifying existing artifacts or by developing new artifacts. Examples of computational artifacts include programs, simulations, visualizations, digital animations, robotic systems, and apps. When engaging in this practice, students:

- Plan the development of a computational artifact using an iterative process that includes reflection on and modification of the plan, taking into account key features, time and resource constraints, and user expectations.
- Create a computational artifact for practical intent, personal expression, or to address a societal issue.
- Modify an existing artifact to improve or customize it.

6. Testing and Refining Computational Artifacts

Testing and refinement is the deliberate and iterative process of improving a computational artifact. This process includes debugging (identifying and fixing errors) and comparing actual outcomes to intended outcomes. Students also respond to the changing needs and expectations of end users and improve the performance, reliability, usability, and accessibility of artifacts. When engaging in this practice, students:

- Systematically test computational artifacts by considering all scenarios and using test cases.
- Identify and fix errors using a systematic process.
- Evaluate and refine a computational artifact, multiple times, to enhance its performance, reliability, usability, and accessibility.

7. Communicating About Computing and Design

Communication involves personal expression and exchanging ideas with others. In computer science, students communicate with diverse audiences about the use and effects of computation and the appropriateness of computational choices. Students write clear comments, document their work, and communicate their ideas through multiple forms of media. Clear communication includes using precise language and carefully considering possible audiences. When engaging in this practice, students:

- Select, organize, and interpret large data sets from multiple sources to support a claim.
- Describe, justify, and document computational and/or design processes and solutions using appropriate terminology consistent with the intended audience and purpose.
- Articulate ideas responsibly by observing intellectual property rights and giving appropriate attribution.