LESTER C. NOECKER SCHOOL
ROSELAND SCHOOL DISTRICT

Technology Curriculum

Computer Science and Design Thinking
Kindergarten - Sixth Grade
Updated and aligned to 2020 NJSLS
Revised August 2022

"Creative and innovative thinking... does not come from a device...it comes from a curious mind."

– David Culberhouse

Educational Technology is a means to support our efforts to educate children and not be viewed as an end in itself. In the Roseland School District, we will continue to encourage innovative and sustained technology integration as driven by the goals of our curricula. The focus of the teacher will remain instructing students to produce meaningful, high quality work. Technology extends learning beyond the classroom. Technology needs to fit into our school curricula in three ways:

- Teach about technology
- Teach with technology
- Students apply technology in meaningful and authentic ways

A lifelong learner is someone who has the ability to learn new skills, apply new concepts, and react to the unexpected. We must challenge and encourage students to adapt to technologies in order to succeed in our technology driven world. Therefore, technology needs to be an integral part of the learning process and curriculum. In order to ensure the optimum use of technology, computer literacy skills must be identified and benchmarked via grade level. Staff development must be given high priority as it relates to integrated computer literacy skills in the curricula. This will culminate in the ability of our staff and students to interact with the community at large for support as it relates to technology as a major influence in the lives of today's students.

Our Goals are to:

- **Enable students to learn by doing.** Research has now confirmed what many instinctively knew - that children, who are actively engaged in learning, learn more;
- **Encourage students to become lifelong learners** who can access, analyze, and synthesize information;
- **Encourage educators to become guides and coaches to students,** rather than be "the sage on the stage;" and
- **Make students proficient in the basic technological skills needed to continue their education as active learners**.

WHAT IS DIGITAL CITIZENSHIP? Digital media and technology evolves at a rapid pace, bringing with it amazing opportunities as well as real risks for our students. On the positive side, they are using the Internet and mobile technologies to create, connect, explore and learn in ways never before imagined. Challenges from harmful behaviors, cyberbullying to digital cheating, are surfacing in schools and in homes across the country. Our students are faced with ethical challenges daily without a roadmap to guide them; digital citizenship is critical in supporting students' navigation in a digital world.

SUPPORTING STANDARDS

"[New Jersey's Technology Standards](#) (2020) consist of 8.1 Computer Science and 8.2 Design Thinking which work symbiotically to provide students with the necessary skills for college and career readiness."

"Computer Science and Design Thinking: New approaches necessary for solving the critical challenges that we face as a society will require harnessing the power of technology and computing. Rapidly changing technologies and the proliferation of digital information have permeated and radically transformed learning, working, and everyday life."

"To be well-educated, global-minded individuals in a computing-intensive world, students must have a clear understanding of the concepts and practices of computer science. As education systems adapt to a vision of students who are not just computer users but also computationally literate creators who are proficient in the concepts and practices of computer science and design thinking, engaging students in computational thinking and human-centered approaches to design through the study of computer science and technology serves to prepare students to ethically produce and critically consume technology. "

The **New Jersey Student Learning Standards for Technology** are integrated into the Roseland School District Technology Curriculum.

> Standard 8.1 Computer Science: Computer Science, previously a strand entitled 'Computational Thinking: Programming' in standard 8.2 of the 2014 NJSLSTechnology, outlines a comprehensive set of concepts and skills, such as data and analysis, algorithms and programming, and computing systems.

> Standard 8.2 Design Thinking: This standard, previously standard 8.2 Technology Education of the 2014 NJSLS – Technology, outlines the technological design concepts and skills essential for technological and engineering literacy. The new framework design, detailed previously, includes Engineering Design, Ethics and Culture, and the Effects of Technology on the Natural world among the disciplinary concepts.

The 2016 ISTE Standards for Students (International Society for Technology in Education) are the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world.

The "2016 ISTE Standards for Students fit nicely with many of the other initiatives across the educational space to ensure that our children can harness the digital society that they live in. We are living in a connected, global world and it is critical that young people understand how they can harness technologies to work with others across geographic spaces and social spheres."

—Caitlin Dooley

Simply being able to use technology is no longer enough. Today's students need to be able to use technology to analyze, learn and explore. Digital age skills are vital for preparing students to work, live and contribute to the social and civic fabric of their communities.

1. Empowered Learner - Students leverage technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences.

    1a Students articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.

    1b Students build networks and customize their learning environments in ways that support the learning process.

    1c Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.

    1d Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.

2. Digital Citizen - Students recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical.

    2a Students cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.

    2b Students engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.

2c Students demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.

2d Students manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.

3. Knowledge Constructor - Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.

3a Students plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.

3b Students evaluate the accuracy, perspective, credibility and relevance of information, media, data or other resources.

3c Students curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.

3d Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.

4. Innovative Designer - Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.

4a Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.

4b Students select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.

4c Students develop, test and refine prototypes as part of a cyclical design process.

4d Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.

5. Computational Thinker - Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.

5a Students formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.

5b Students collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.

5c Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.

5d Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.

6. Creative Communicator - Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.

6a Students choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.

6b Students create original works or responsibly repurpose or remix digital resources into new creations.

6c Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.

6d Students publish or present content that customizes the message and medium for their intended audiences.

7. Global Collaborator - Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.

7a Students use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.

7b Students use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.

7c Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.

7d Students explore local and global issues and use collaborative technologies to work with others to investigate solutions.

ASSESSMENT
Students in the Roseland School District benefit from the use of formative, summative, and performance assessments in all content areas, including technology and media. Our integrated technology program has been designed and planned to focus heavily on student understanding and application in authentic and meaningful ways.

Use of Essential Learnings and Standards

The following Essential Learnings by Grade Level and Standards for Technology Skills and Digital Citizenship are embedded in units which have been created to authentically engage students in their concepts. Students will develop mastery in a variety of technological skills while also incorporating digital literacy and citizenship strategies through collaboration, communication, ethics, safety, and responsibility

Essential **Kindergarten** Learnings:
1. Individuals use computing devices to perform a variety of tasks accurately and quickly. Computing devices interpret and follow the instructions they are given literally.
2. Connecting devices to a network or the Internet provides great benefits, but care must be taken to use authentication measures, such as strong passwords, to protect devices and information from unauthorized access.
3. Engineering design is a creative process for meeting human needs or wants that can result in multiple solutions.
4. Reusing and recycling materials can save money while preserving natural resources and avoiding damage to the environment.

Grade Level K		
	Technology Skills	**Standards**
1. Computer Science	Computing Systems	NJCSDT 8.1.2.CS.1: Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.
	Networks and the Internet	NJCSDT 8.1.2.NI.4: Explain why access to devices need to be secured.
2. Design Thinking	Engineering Design	NJCSDT 8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.

3. Classroom Integration	Interaction of Technology and Humans	NJCSDT 8.2.2.ITH.1: Identify products that are designed to meet human wants or needs.
	Effects of Technology on the Natural World	NJCSDT 8.2.2.ETW.4: Explain how the disposal of or reusing a product affects the local and global environment.

Essential **First Grade** Learnings:

1. Individuals use computing devices to perform a variety of tasks accurately and quickly. Computing devices interpret and follow the instructions they are given literally.
2. Computer networks can be used to connect individuals to other individuals, places, information, and ideas. The Internet enables individuals to connect with others worldwide.
3. Individuals develop and follow directions as part of daily life.
4. A sequence of steps can be expressed as an algorithm that a computer can process.
5. Computers follow precise sequences of steps that automate tasks.
6. Complex tasks can be broken down into simpler instructions, some of which can be broken down even further.
7. Engineering design is a creative process for meeting human needs or wants that can result in multiple solutions.
8. The use of technology developed for the human designed world can affect the environment, including land, water, air, plants, and animals.
9. Technologies that use natural sources can have negative effects on the environment, its quality, and inhabitants.

Grade Level 1		
	Technology Skills	**Standards**
1. Computer Science	Computing Systems	NJCSDT 8.1.2.CS.3: Describe basic hardware and software problems using accurate terminology. NJCSDT 8.1.2.CS.1: Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.
	Networks and the Internet	NJCSDT 8.1.2.NI.2: Describe how the Internet enables individuals to connect with others worldwide. NJCSDT 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.

		NJCSDT 8.1.2.NI.4: Explain why access to devices need to be secured. ISTE 2a. Cultivate and manage their digital identities and reputations and are aware of the permanence of their actions in the digital world.
	Algorithms and Programming	NJCSDT 8.1.2.AP.1: Model daily processes by creating and following algorithms to complete tasks. NJCSDT 8.1.2.AP.3: Create programs with sequences and simple loops to accomplish tasks. NJCSDT 8.1.2.AP.4: Break down a task into a sequence of steps. NJCSDT 8.1.2.AP.5: Describe a program's sequence of events, goals, and expected outcomes. NJCSDT 8.1.2.AP.6: Debug errors in an algorithm or program that includes sequences and simple loops.
2. Design Thinking	Engineering Design	NJCSDT 8.2.2.ED.1: Communicate the function of a product or device. NJCSDT8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process. NJCSDT 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process. NJCSDT 8.2.2.ED.4: Identify constraints and their role in the engineering design process.
3. Classroom Integration	Interaction of Technology and Humans	NJCSDT 8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. NJCSDT8.2.2.ITH.2: Explain the purpose of a product and its value.
	Effects of Technology on the Natural World	NJCSDT 8.2.2.ETW.4: Explain how the disposal of or reusing a product affects the local and global environment.

Essential **Second Grade** Learnings:
1. Describing a problem is the first step toward finding a solution when computing systems do not work as expected.
2. Connecting devices to a network or the Internet provides great benefits, but care must be taken to use authentication measures, such as strong passwords, to protect devices and information from unauthorized access.
3. Computing technology has positively and negatively changed the way individuals live and work (e.g., entertainment, communication, productivity tools).
4. Individuals collect, use, and display data about individuals and the world around them.
5. Computers store data that can be retrieved later. Data can be copied, stored in multiple locations, and retrieved.
6. Data can be used to make predictions about the world.

7. People work together to develop programs for a purpose, such as expressing ideas or addressing problems.
8. The development of a program involves identifying a sequence of events, goals, and expected outcomes, and addressing errors (when necessary).
9. Limitations (constraints) must be considered when engineering designs.
10. Human needs and desires determine which new tools are developed.
11. Technology has changed the way people live and work.
12. Various tools can improve daily tasks and quality of life.
13. Innovation and the improvement of existing technology involves creative thinking.
14. Reusing and recycling materials can save money while preserving natural resources and avoiding damage to the environment.
15. The availability of technology for essential tasks varies in different parts of the world.

<table>
<tr><td colspan="3" align="center">Grade Level 2</td></tr>
<tr><td></td><td align="center">Technology Skills</td><td align="center">Standards</td></tr>
<tr><td>1. Computer Science</td><td>Computing Systems</td><td>NJCSDT 8.1.2.CS.3: Describe basic hardware and software problems using accurate terminology.
NJCSDT 8.1.2.CS.1: Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.</td></tr>
<tr><td></td><td>Networks and the Internet</td><td>NJCSDT 8.1.2.NI.1: Model and describe how individuals use computers to connect to other individuals, places, information, and ideas through a network.
NJCSDT 8.1.2.NI.2: Describe how the Internet enables individuals to connect with others worldwide.
NJCSDT 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.
NJCSDT 8.1.2.NI.4: Explain why access to devices need to be secured.
ISTE 2a. Cultivate and manage their digital identities and reputations and are aware of the permanence of their actions in the digital world.</td></tr>
<tr><td></td><td>Impacts of Computing</td><td>NJCSDT 8.1.2.IC.1: Compare how individuals live and work before and after the implementation of new computing technology.</td></tr>
<tr><td></td><td>Data and Analysis</td><td>NJCSDT 8.1.2.DA.1: Collect and present data, including climate change data, in various visual formats.
NJCSDT 8.1.2.DA.2: Store, copy, search, retrieve, modify, and delete data using a computing device
NJCSDT 8.1.2.DA.3: Identify and describe patterns in data visualizations.</td></tr>
</table>

		NJCSDT 8.1.2.DA.4: Make predictions based on data using charts or graphs.
	Algorithms and Programming	NJCSDT 8.1.2.AP.1: Model daily processes by creating and following algorithms to complete tasks. NJCSDT 8.1.2.AP.3: Create programs with sequences and simple loops to accomplish tasks. NJCSDT 8.1.2.AP.4: Break down a task into a sequence of steps. NJCSDT 8.1.2.AP.5: Describe a program's sequence of events, goals, and expected outcomes. NJCSDT 8.1.2.AP.6: Debug errors in an algorithm or program that includes sequences and simple loops.
2. Design Thinking	Engineering Design	NJCSDT 8.2.2.ED.1: Communicate the function of a product or device. NJCSDT8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process. NJCSDT 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process. NJCSDT 8.2.2.ED.4: Identify constraints and their role in the engineering design process.
	Ethics and Culture	NJCSDT 8.2.2.EC.1: Identify and compare technology used in different schools, communities, regions, and parts of the world.
3. Classroom Integration	Interaction of Technology and Humans	NJCSDT 8.2.2.ITH.3: Identify how technology impacts or improves life. NJCSDT 8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks. NJCSDT 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.
	Effects of Technology on the Natural World	NJCSDT 8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. NJCSDT 8.2.2.ETW.2: Identify the natural resources needed to create a product. NJCSDT 8.2.2.ETW.3: Describe or model the system used for recycling technology. NJCSDT 8.2.2.ETW.4: Explain how the disposal of or reusing a product affects the local and global environment.

Essential **Third Grade** Learnings:

1. Computing devices may be connected to other devices to form a system as a way to extend their capabilities.
2. Distinguishing between public and private information is important for safe and secure online interactions.
3. Data can be organized, displayed, and presented to highlight relationships
4. Different algorithms can achieve the same result.
5. Some algorithms are more appropriate for a specific use than others.
6. Engineering design is a systematic and creative process of communicating and collaborating to meet a design challenge.
7. Technology spurs new businesses and careers.

Grade Level 3		
1. Educational Technology	**Technology Skills**	**Standards**
	Computing Systems	NJCSDT 8.1.5.CS.1: Model how computing devices connect to other components to form a system.
	Algorithms and Programming	NJCSDT 8.1.5.AP.1: Compare and refine multiple algorithms for the same task and determine which is the most appropriate. NJCSDT 8.1.5.AP.3: Create programs that include sequences, events, loops, and conditionals. NJCSDT 8.1.5.AP.4: Break down problems into smaller, manageable sub-problems to facilitate program development. NJCSDT 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.
	Engineering Design	NJCSDT 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. • NJCSDT 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. NJCSDT 8.2.5.ED.5: Describe how specifications and limitations impact the engineering design process. NJCSDT 8.2.5.ED.6: Evaluate and test alternative solutions to a problem using the constraints and tradeoffs identified in the design process.
	Research	ISTE 3.D Students build knowledge by actively exploring real-world issues and problems, developing

		ideas and theories and pursuing answers and solutions. NJCSDT 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.
	Problem Solving/ Critical Thinking	ISTE 1.A Students articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes. ISTE 1.C Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways ISTE 6.B Students create original works or responsibly repurpose or remix digital resources into new creations.
2. Digital Citizenship		
	Collaboration	NJCSDT 8.1.5.IC.1: Identify computing technologies that have impacted how individuals live and work and describe the factors that influenced the changes. NJCSDT 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. ISTE 7.B Students use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints. ISTE 7. C Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.
	Communication	ISTE 6.C Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.
	Ethics	ISTE 2.C Students demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.
	Safety	NJCSDT 8.1.5.NI.2: Describe physical and digital security measures for protecting sensitive personal information. ISTE 2.D Students manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online. ISTE 2.B Students engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.
	Responsibility	ISTE 2.A Students cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.
3. Classroom Integration	Data Analysis	NJCSDT 8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

Essential **Fourth Grade** Learnings:
1. Software and hardware work together as a system to accomplish tasks (e.g., sending, receiving, processing, and storing units of information).
2. Information can be protected using various security measures (i.e., physical and digital).
3. Individuals can select, organize, and transform data into different visual representations and communicate insights gained from the data.
4. Programming languages provide variables, which are used to store and modify data.
5. A variety of control structures are used to change the flow of program execution (e.g., sequences, events, loops, conditionals).
6. Often, several design solutions exist, each better in some way than the others.
7. Societal needs and wants determine which new tools are developed to address real-world problems.
8. Technology innovation and improvement may be influenced by a variety of factors.
9. The technology developed for the human designed world can have unintended consequences for the environment

Grade Level 4		
1. Educational Technology	**Technology Skills**	**Standards**
	Computing Systems	NJCSDT 8.1.5.CS.2: Model how computer software and hardware work together as a system to accomplish tasks.
	Algorithms and Programming	NJCSDT 8.1.5.AP.1: Compare and refine multiple algorithms for the same task and determine which is the most appropriate. NJCSDT 8.1.5.AP.2: Create programs that use clearly named variables to store and modify data. NJCSDT 8.1.5.AP.3: Create programs that include sequences, events, loops, and conditionals. NJCSDT 8.1.5.AP.4: Break down problems into smaller, manageable sub-problems to facilitate program development. NJCSDT 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.
	Engineering Design	NJCSDT 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. • NJCSDT 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. NJCSDT 8.2.5.ED.5: Describe how specifications and limitations impact the engineering design process. NJCSDT 8.2.5.ED.6: Evaluate and test alternative solutions to a problem using the constraints and tradeoffs identified in the design process.
	Nature of Technology	NJCSDT 8.2.5.NT.1: Troubleshoot a product that has stopped working and brainstorm ideas to correct the problem. NJCSDT 8.2.5.NT.2: Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries, and societies.
	Research	ISTE 3.A Students plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits. ISTE 3.D Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.
	Problem Solving/ Critical Thinking	ISTE 1.A Students articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes. ISTE 1.C Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways ISTE 6.B Students create original works or responsibly repurpose or remix digital resources into new creations.
2. Digital Citizenship		
	Collaboration	ISTE 7.B Students use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints. ISTE 7. C Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.
	Communication	ISTE 6.C Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations..
	Ethics	ISTE 2.C Students demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.
	Safety	ISTE 2.D Students manage their personal data to maintain digital privacy and security and are aware of

		data-collection technology used to track their navigation online. ISTE 2.B Students engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.
	Responsibility	NJCSDT 8.2.5.ITH.1: Explain how societal needs and wants influence the development and function of a product and a system. ISTE 2.A Students cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.
3. Classroom Integration	Data Analysis	NJCSDT 8.1.5.DA.4: Organize and present climate change data visually to highlight relationships or support a claim. NJCSDT 8.1.5.DA.5: Propose cause and effect relationships, predict outcomes, or communicate ideas using data.
	Effects of Technology on the Natural World	NJCSDT 8.2.5.ETW.3: Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved. NJCSDT 8.2.5.ETW.4: Explain the impact that resources, such as energy and materials used to develop technology, have on the environment. NJCSDT 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.

Essential **Fifth Grade** Learnings:
1. Shared features allow for common troubleshooting strategies that can be effective for many systems.
2. Information needs a physical or wireless path to travel to be sent and received.
3. The development and modification of computing technology is driven by people's needs and wants and can affect individuals differently.
4. Many factors influence the accuracy of inferences and predictions.
5. Programs can be broken down into smaller parts to facilitate their design, implementation, and review. Programs can also be created by incorporating smaller portions of programs that already exist.
6. Individuals develop programs using an iterative process involving design, implementation, testing, and review.
7. Engineering design requirements include desired features and limitations that need to be considered.
8. A new tool may have favorable or unfavorable results as well as both positive and negative effects on society.
9. Engineers create and modify technologies to meet people's needs and wants; scientists ask questions about the natural world.
10. Technology must be continually developed and made more efficient to reduce the need for nonrenewable resources.
11. Technological choices and opportunities vary due to factors such as differences in economic resources, location, and cultural values.

		Grade Level 5		
1. Educational Technology	**Technology Skills**	**Standards**		
	Computing Systems	NJCSDT 8.1.5.CS.3: Identify potential solutions for simple hardware and software problems using common troubleshooting strategies.		
	Algorithms and Programming	NJCSDT 8.1.5.AP.1: Compare and refine multiple algorithms for the same task and determine which is the most appropriate. NJCSDT 8.1.5.AP.2: Create programs that use clearly named variables to store and modify data NJCSDT 8.1.5.AP.3: Create programs that include sequences, events, loops, and conditionals. NJCSDT 8.1.5.AP.4: Break down problems into smaller, manageable sub-problems to facilitate program development. NJCSDT 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. NJCSDT 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.		
	Engineering Design	NJCSDT 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. • NJCSDT 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. NJCSDT 8.2.5.ED.4: Explain factors that influence the development and function of products and systems (e.g., resources, criteria, desired features, constraints). NJCSDT 8.2.5.ED.5: Describe how specifications and limitations impact the engineering design process. NJCSDT 8.2.5.ED.6: Evaluate and test alternative solutions to a problem using the constraints and tradeoffs identified in the design process.		
	Nature of Technology	NJCSDT 8.2.5.NT.3: Redesign an existing product for a different purpose in a collaborative team. NJCSDT 8.2.5.NT.4: Identify how improvement in the understanding of materials science impacts technologies. NJCSDT 8.2.5.ETW.1: Describe how resources such as material, energy, information, time, tools, people, and capital are used in products or systems. • NJCSDT 8.2.5.ETW.2: Describe ways that various technologies are used to reduce improper use of		

		resources.
	Research	ISTE 3.A Students plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits. ISTE 3.D Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.
	Problem Solving/ Critical Thinking	ISTE 1.A Students articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes. ISTE 1.C Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways ISTE 6.B Students create original works or responsibly repurpose or remix digital resources into new creations.
2. Digital Citizenship		
	Collaboration	NJCSDT 8.1.5.NI.1: Develop models that successfully transmit and receive information using both wired and wireless methods. ISTE 7.B Students use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints. ISTE 7. C Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.
	Communication	ISTE 6.C Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.
	Ethics	ISTE 2.C Students demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property. NJCSDT 8.2.5.EC.1: Analyze how technology has contributed to or reduced inequities in local and global communities and determine its short- and long-term effects.
	Safety	NJCSDT 8.2.5.ITH.2: Evaluate how well a new tool has met its intended purpose and identify any shortcomings it might have. NJCSDT 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. ISTE 2.D Students manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online. ISTE 2.B Students engage in positive, safe, legal and ethical behavior when using technology, including

		social interactions online or when using networked devices.
	Responsibility	NJCSDT 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. ISTE 2.A Students cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.

Essential **Sixth Grade** Learnings:

1. The study of human-computer interaction can improve the design of devices and extend the abilities of humans.
2. Advancements in computing technology can change individuals' behaviors.
3. People use digital devices and tools to automate the collection, use, and transformation of data.
4. Algorithms that are readable are easier to follow, test, and debug.
5. Engineering design is a systematic, creative, and iterative process used to address local and global problems.
6. The process includes generating ideas, choosing the best solution, and making, testing, and redesigning models or prototypes
7. Improvements in technology are intended to make the completion of tasks easier, safer, and/or more efficient.
8. Technology advances through the processes of innovation and invention which relies upon the imaginative and inventive nature of people.

Grade Level 6		
1. Educational Technology	**Technology Skills**	**Standards**
	Computing Systems	NJCSDT 8.1.8.CS.1: Recommend improvements to computing devices in order to improve the ways users interact with the devices.
	Algorithms and Programming	NJCSDT 8.1.8.AP.7: Design programs, incorporating existing code, media, and libraries, and give attribution. NJCSDT 8.1.8.AP.9: Document programs in order to make them easier to follow, test, and debug.
	Engineering Design	NJCSDT 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. NJCSDT 8.2.8.ED.2: Identify the steps in the design process that could be used to solve a problem. NJCSDT 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).
	Research	ISTE 3.A Students plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits. ISTE 3.D Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions. NJCSDT 8.2.8.ITH.2: Compare how technologies have influenced society over time
	Problem Solving/ Critical Thinking	ISTE 1.A Students articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes. ISTE 1.C Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways ISTE 6.B Students create original works or responsibly repurpose or remix digital resources into new creations. NJCSDT 8.2.8.NT.1: Examine a malfunctioning tool, product, or system and propose solutions to the problem.
2. Digital Citizenship		
	Collaboration	ISTE 7.B Students use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints. ISTE 7. C Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.
	Communication	ISTE 6.C Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.
	Ethics	ISTE 2.C Students demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.
	Safety	ISTE 2.D Students manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online. ISTE 2.B Students engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.
	Responsibility	NJCSDT 8.1.8.IC.1: Compare the trade-offs associated with computing technologies that affect an individual's everyday activities and career options. ISTE 2.A Students cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.

3. Classroom Integration	Data Analysis	NJCSDT 8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose.

Appendix - Technology- Media Resources

Rubrics/Assessments - http://www.schrockguide.net/assessment-and-rubrics.html

Link to New Jersey Technology Standards (2020) https://www.nj.gov/education/cccs/2020/2020%20NJSLS-CSDT.pdf
ISTE Standards for Students - http://www.iste.org/standards/for-students

Learning.com catalog - https://catalog.learning.com/
Common Sense Media - https://www.commonsense.org/education/
NetSmartz - https://www.netsmartz.org/Home
Digital Citizenship (K-6 Lessons)
ISTE Digital Citizenship https://www.iste.org/explore/categorylist?code=Digital+citizenship