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Mission Statement for Technology Literacy Education

The Hamburg School Technology Education Program will provide computer and information literacy, which supports skills in information gathering, information organizing, and problem solving. The computer education program will also provide an understanding of the nature and impact of technology as it relates to society and the environment.

To be competitive in a global economy and the information age, our students will be required to access, select, process, and communicate information. Higher levels of thinking skills and knowledge will be required to use the computer effectively to solve complex problems. The computer allows the gathering and processing of information to be more effective, makes abstract concepts concrete and visual, and provides a wide array of opportunities to present information to an informed audience.

The computer education curriculum prepares students to use computer technology for learning, work, accessing and applying information, for content related problem solving, for producing products, and for communicating ideas and data. The curriculum also includes objectives to enable students to understand the societal uses and impact of technology on today's workplace and living habits. A major premise of the computer education curriculum is the use of the computer as a tool. The computer is not viewed as an end in and of itself; rather, the use of the computer is a means by which students more efficiently and effectively achieve the core content curriculum standards of the State of New Jersey.

It is understood that the computer curriculum will be ever changing to meet the technological advances of more sophisticated hardware and software as well as the growing use of computers within the core curriculum. The content aspect of the curriculum will be on-going and continually revised as the district educational process continues to use information, technology, and other tools to support the curriculum

Kindergarten

Unit Overview
Content Area: Computer Education
Unit Title: Kindergarten Computers
Target Course/Grade Level: By the end of Kindergarten
Unit Summary All students will become familiar with the basic operations of the computer and use a variety of resources for directed learning activities. Primary interdisciplinary connections: science/language arts/technology 21st century themes: Global Awareness, Financial, Economic, Business, and Entrepreneurial
Unit Rationale All students will develop a positive attitude toward technology that supports lifelong learning, collaboration, and productivity.
Learning Targets
Standards & Strands 8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge. Strand: <ul style="list-style-type: none"> A. Technology Operations and Concepts: <i>Students demonstrate a sound understanding of technology concepts, systems and operations.</i> B. Creativity and Innovation: <i>Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.</i> D. Digital Citizenship: <i>Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.</i> 8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: 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. Strand: <ul style="list-style-type: none"> A. The Nature of Technology: Creativity and Innovation <i>Technology systems impact every aspect of the world in which we live.</i> B. Technology and Society: <i>Knowledge and understanding of human, cultural and society values are fundamental when designing technology systems and products in the global society.</i>

<p>C. Design: The design process is a systematic approach to solving problems.</p> <p>D. Abilities for a Technological World: <i>The designed world is the product of a design process that provides the means to convert resources into products and systems.</i></p>	
<p>Content Statements: <i>Students will be able to understand:</i></p> <ul style="list-style-type: none"> • Understand and use technology systems. • Select and use applications effectively and productively. • Apply existing knowledge to generate new ideas, products, or processes. • Create original works as a means of personal or group expression. • Advocate and practice safe, legal, and responsible use of information and technology. • The characteristics and scope of technology. • The cultural, social, economic and political effects of technology. • The effects of technology on the environment. • The attributes of design • The application of engineering design. • The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving. • Assess the impact of products and systems 	
CPI #	Cumulative Progress Indicator (CPI)
8.1.2.A.1	Identify the basic features of a digital device and explain its purpose.
8.1.2.A.2	Create a document using a word processing application.
8.1.2.A.4	Demonstrate developmentally appropriate navigation skills in virtual environments (i.e. games, museums).
8.1.2.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources.
8.1.2.D.1	Develop an understanding of ownership of print and non-print information.
8.2.2.A.1	Define products produced as a result of technology or of nature.
8.2.2.A.2	Describe how designed products and systems are useful at school, home and work.
8.2.2.B.2	Demonstrate how reusing a product affects the local and global environment.
8.2.2.C.1	Brainstorm ideas on how to solve a problem or build a product.
8.2.2.C.2	Create a drawing of a product or device that communicates its function to peers and discuss.
8.2.2.C.3	Explain why we need to make new products.
8.2.2.C.4	Identify designed products and brainstorm how to improve one used in the classroom.

8.2.2.C.5	Describe how the parts of a common toy or tool interact and work as part of a system.
8.2.2.C.6	Investigate a product that has stopped working and brainstorm ideas to correct the problem.
8.2.2.D.5	Identify how using a tool (such as a bucket or wagon) aids in reducing work.
<div> <div> Unit Essential Questions <ul style="list-style-type: none"> • What are the parts of a computer and how do they each perform? • How can I use technology to share my ideas? • How can I save my work properly in order to complete a project? </div> <div> Unit Enduring Understandings <ul style="list-style-type: none"> • Understanding the basic workings of a computer and how to use each properly • Computer skills enable you to learn and enhance your knowledge base • Use of software and the internet as an integral part of the learning experience </div> </div>	
Unit Learning Targets <i>Students will...</i> <ul style="list-style-type: none"> • Use the computer as a tool • Learn proper internet navigation • Learn how to save multiple documents to the server • Collaboratively work on a project 	
Evidence of Learning	
Summative Assessment 8-10 classes Equipment needed: computers, printer, software, internet access Teacher Resources: rubric, http://www.nj.gov/education/cccs/standards/8/ , various websites	
Formative Assessments <ul style="list-style-type: none"> • Teacher observation • Final Project grade • Subject grade • Self-Assessment • Peer Assessment 	
Lesson Plans	
Lesson	Timeframe
Lesson 1 Parts of the Computer and SiPix Kapers	40 minute period/3-4 weeks
Lesson 2 “ABCYA Activities” (Intro to the Net) “Safe Saving” (The Server)	40 minute period/2 weeks
Lesson 3 “The Me Show” (Document Creation)	40 minute period/2 weeks
Lesson 4 Silly Creature Stories	40 minute period/3 weeks

Teacher Notes:

The schedule may vary dependent upon the learning level of the particular class.

Curriculum Development Resources

Click the links below to access additional resources used to design this unit:

http://www.abcya.com/kindergarten_computers.htm

<http://www.switchzoo.com>

Lesson Plans 1 and 2							
Content Area: Introduction to Technology							
Lesson Title: KidPix Kapers					Timeframe: 40 minute period/1x per week for 3-4 weeks		
Lesson Components							
21 st Century Themes							
x	Global Awareness	x	Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
21 st Century Skills							
X	Creativity and Innovation		Critical Thinking and Problem Solving	X	Communication and Collaboration	X	Information Literacy
X	Media Literacy	X	ICT Literacy	X	Life and Career Skills		
Interdisciplinary Connections: Technology, Language Arts							
Integration of Technology: use of software, completed project							
Equipment needed: computer, Kid Pix program, SmartBoard, printer							

Goals/Objectives	Learning Activities/Instructional Strategies	Formative Assessment Tasks
Students will: <ul style="list-style-type: none"> ● Be introduced to the KidPix program ● Learn the specific tools and how to save a document 	Lesson Sequence <ol style="list-style-type: none"> 1. Students will locate the correct icon for KidPix and open the program 2. As a group, the students will be introduced to the tools and then return to their stations to practice their skills 	<ul style="list-style-type: none"> ● Teacher Observation ● Rubric Assessment ● Graded Project ● Self-Assessment

<ul style="list-style-type: none"> ● Create a booklet about themselves to practice the tools ● Save documents to the server 	<p>3. Students will save various documents to the server to compile into a booklet when completed</p> <p>4. Each week, additional tools will be introduced, practiced, and assimilated until their use become commonplace</p>	
Differentiation The children will be assessed according to their individual strengths and weaknesses. Extra time to complete the project is permitted and available.		

LESSON REFLECTION

Reflect on the lesson you have developed and rate the degree to which the lesson ***Strongly, Moderately*** or ***Weakly*** meets the criteria below.

Lesson Activities:	Strongly	Moderately	Weakly
Are challenging and require higher order thinking and problem solving skills		<u>X</u>	
Allow for student choice	<u>X</u>		
Provide scaffolding for acquiring targeted knowledge/skills	<u>X</u>		
Integrate global perspectives			<u>X</u>
Integrate 21 st century skills			<u>X</u>
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	<u>X</u>		
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	<u>X</u>		
Are varied to address different student learning styles and preferences	<u>X</u>		
Are differentiated based on student needs	<u>X</u>		

Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	<u>X</u>		
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	<u>X</u>		
Provide opportunities for student reflection and self-assessment	<u>X</u>		
Provide data to inform and adjust instruction to better meet the varying needs of learners		<u>X</u>	

Grade 1

Unit Overview
Content Area: Computer Education
Unit Title: First Grade Computers
Target Course/Grade Level: By the end of grade 1
Unit Summary All students will become familiar with the basic operations of the computer and use a variety of resources for directed learning activities. Primary interdisciplinary connections: science/language arts/technology 21st century themes: Financial, Economic, Business, and Entrepreneurial Literacy
Unit Rationale All students will develop a positive attitude toward technology that supports lifelong learning, collaboration, and productivity.
Learning Targets
Standards & Strands 8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge. Strand: <ul style="list-style-type: none"> A. Technology Operations and Concepts: <i>Students demonstrate a sound understanding of technology concepts, systems and operations.</i> B. Creativity and Innovation: <i>Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.</i> C. Communication and Collaboration: <i>Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.</i> D. Digital Citizenship: <i>Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.</i> E. Research and Information Fluency: <i>Students apply digital tools to gather, evaluate, and use information.</i> 8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: 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. Strand: <ul style="list-style-type: none"> A. The Nature of Technology: Creativity and Innovation <i>Technology systems impact every aspect of the world in which we live.</i>

<p>B. Technology and Society: <i>Knowledge and understanding of human, cultural and society values are fundamental when designing technology systems and products in the global society.</i></p> <p>C. Design: <i>The design process is a systematic approach to solving problems.</i></p> <p>D. Abilities for a Technological World: <i>The designed world is the product of a design process that provides the means to convert resources into products and systems</i></p>	
<p>Content Statements: <i>Students will be able to understand:</i></p> <ul style="list-style-type: none"> ● Understand and use technology systems. ● Select and use applications effectively and productively. ● Apply existing knowledge to generate new ideas, products, or processes. ● Create original works as a means of personal or group expression. ● Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media. ● Communicate information and ideas to multiple audiences using a variety of media and formats ● Advocate and practice safe, legal, and responsible use of information and technology. ● Plan strategies to guide inquiry ● Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. ● Evaluate and select information sources and digital tools based on the appropriateness for specific tasks. ● The characteristics and scope of technology. ● The cultural, social, economic and political effects of technology. ● The effects of technology on the environment. ● The role of society in the development and use of technology. ● The influence of technology on history ● The attributes of design. ● The application of engineering design ● The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving. ● Apply the design process. ● Use and maintain technological products and systems. 	
CPI #	Cumulative Progress Indicator (CPI)
8.1.2.A.1	Identify the basic features of a digital device and explain its purpose.
8.1.2.A.2	Create a document using a word processing application.
8.1.2.A.3	Compare the common uses of at least two different digital applications and identify the advantages and disadvantages of using each.

8.1.2.A.4	Demonstrate developmentally appropriate navigation skills in virtual environments (i.e. games, museums).
8.1.2.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources.
8.1.2.C.1	Engage in a variety of developmentally appropriate learning activities with students in other classes, schools, or countries using various media formats such as online collaborative tools, and social media.
8.1.2.D.1	Develop an understanding of ownership of print and non-print information.
8.1.2.E.1	Use digital tools and online resources to explore a problem or issue.
8.2.2.A.1	Define products produced as a result of technology or of nature.
8.2.2.A.2	Describe how designed products and systems are useful at school, home and work.
8.2.2.B.1	Identify how technology impacts or improves life.
8.2.2.B.2	Demonstrate how reusing a product affects the local and global environment.
8.2.2.B.3	Identify products or systems that are designed to meet human needs.
8.2.2.B.4	Identify how the ways people live and work has changed because of technology.
8.2.2.C.1	Brainstorm ideas on how to solve a problem or build a product.
8.2.2.C.2	Create a drawing of a product or device that communicates its function to peers and discuss.
8.2.2.C.3	Explain why we need to make new products.
8.2.2.C.4	Identify designed products and brainstorm how to improve one used in the classroom.
8.2.2.C.5	Describe how the parts of a common toy or tool interact and work as part of a system.
8.2.2.C.6	Investigate a product that has stopped working and brainstorm ideas to correct the problem.
8.2.2.D.1	Collaborate and apply a design process to solve a simple problem from everyday experiences.
8.2.2.D.2	Discover how a product works by taking it apart, sketching how parts fit, and putting it back together.
8.2.2.D.3	Identify the strengths and weaknesses in a product or system.
8.2.2.D.4	Identify the resources needed to create technological products or systems.
<div> <div> Unit Essential Questions <ul style="list-style-type: none"> ● How can the Internet help me to understand my schoolwork? </div> <div> Unit Enduring Understandings <ul style="list-style-type: none"> ● Understanding the internet and how to integrate it into school subjects </div> </div>	

<ul style="list-style-type: none"> ● How can I use technology to share my ideas with others? ● What programs can be used to help me complete my classwork? 	<ul style="list-style-type: none"> ● Computer skills enable you to collaborate and share ideas and work ● Use multiple sources to create an integrated curricular project
Unit Learning Targets <i>Students will...</i> <ul style="list-style-type: none"> ● Use the computer as a tool ● Learn proper internet navigation ● Learn slide show formation using KidPix and construction of a graphic organizer using Kidspiration ● Create a presentation based on a first grade science curriculum unit-Frogs and Toads 	
Evidence of Learning	
Summative Assessment (X days) 8-10 classes Equipment needed: computers, printer, software, internet access Teacher Resources: rubric, http://www.nj.gov/education/cccs/standards/8/ , various websites	
Formative Assessments <ul style="list-style-type: none"> ● Teacher observation ● Final Project grade ● Subject grade ● Self-Assessment ● Peer Assessment 	
Lesson Plans	
Lesson	Timeframe
Lesson 1 Internet Research	40 minute period/1-2 weeks
Lesson 2 Graphic Organizer	40 minute period/2 weeks
Lesson 3 Slide Show Preparation	40 minute period/4 weeks
Lesson 4 Slide Show Presentation	40 minute period/1 week
Teacher Notes: The schedule may vary dependent upon the learning level of the particular class.	
Curriculum Development Resources Click the links below to access additional resources used to design this unit: http://www.kidzone.ws/lw/frogs/index.htm http://www.kidsbiology.com/animals-for-children.php?category=Frogs%20and%20Toads	

Lesson Plans 1 and 2							
Content Area: Integrated Science							
Lesson Title: Frogs vs. Toads				Timeframe: 40 minute period/1x per week for 3-4 weeks			
Lesson Components							
21 st Century Themes							
	Global Awareness	x	Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
21 st Century Skills							
X	Creativity and Innovation		Critical Thinking and Problem Solving	X	Communication and Collaboration	X	Information Literacy
X	Media Literacy	X	ICT Literacy	X	Life and Career Skills		
Interdisciplinary Connections: Science, Language Arts							
Integration of Technology: research, completed project							
Goals/Objectives		Learning Activities/Instructional Strategies				Formative Assessment Tasks	
Students will: <ul style="list-style-type: none">● Research the difference between frogs and toads● Complete facts list to use for a Venn diagram● Create a Venn diagram using Kidspiration		Lesson Sequence <ul style="list-style-type: none">A. Students will locate the correct website: http://www.kidzone.ws/lw/frogs/facts8.htmB. With a partner, the students will locate the correct terms to complete the facts listC. Students will open a new Kidspiration document and save it to the serverD. Each partnership will create a Venn diagram to share their research				<ul style="list-style-type: none">● Teacher Observation● Rubric Assessment● Graded Project● Self-Assessment	
Differentiation The children will be paired according to their individual strengths and weaknesses. Extra time to complete the project is permitted and available.							
Equipment needed: computer, SmartBoard, printer							

LESSON REFLECTION

Reflect on the lesson you have developed and rate the degree to which the lesson ***Strongly, Moderately*** or ***Weakly*** meets the criteria below.

Lesson Activities:	Strongly	Moderately	Weakly
Are challenging and require higher order thinking and problem solving skills		<u>X</u>	
Allow for student choice	<u>X</u>		
Provide scaffolding for acquiring targeted knowledge/skills	<u>X</u>		
Integrate global perspectives			<u>X</u>
Integrate 21 st century skills			<u>X</u>
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	<u>X</u>		
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	<u>X</u>		
Are varied to address different student learning styles and preferences	<u>X</u>		
Are differentiated based on student needs	<u>X</u>		
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	<u>X</u>		
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	<u>X</u>		
Provide opportunities for student reflection and self-assessment	<u>X</u>		
Provide data to inform and adjust instruction to better meet the varying needs of learners		<u>X</u>	

Grade 2

Unit Overview
Content Area: Computer Education
Unit Title: Second Grade Computers
Target Course/Grade Level: By the end of Grade 2
Unit Summary All students will continue to use the computer as a tool. They will be exposed to a variety of resources and learn to use them to complete directed learning activities.
Primary interdisciplinary connections: science/language arts/technology
21st century themes: Global Awareness
Unit Rationale All students will develop positive attitudes toward technology that support lifelong learning, collaboration, and productivity. Students will use technology to further their learning and achievement.
Learning Targets
Standards & Strands 8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge. Strand: <ul style="list-style-type: none"> A. Technology Operations and Concepts: <i>Students demonstrate a sound understanding of technology concepts, systems and operations.</i> B. Creativity and Innovation: <i>Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.</i> C. Communication and Collaboration: <i>Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.</i> D. Digital Citizenship: <i>Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.</i> E. Research and Information Fluency: <i>Students apply digital tools to gather, evaluate, and use information.</i> F. Critical thinking, problem solving, and decision making: <i>Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.</i> 8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: 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.

Strand:

- A. The Nature of Technology: Creativity and Innovation** *Technology systems impact every aspect of the world in which we live.*
- B. Technology and Society:** *Knowledge and understanding of human, cultural and society values are fundamental when designing technology systems and products in the global society.*
- C. Design:** *The design process is a systematic approach to solving problems.*
- E. Computational Thinking: Programming:** *Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.*

Content Statements

Students will be able to understand:

- Select and use applications effectively and productively.
- Apply existing knowledge to generate new ideas, products, or processes.
- Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.
- Advocate and practice safe, legal, and responsible use of information and technology
- Plan strategies to guide inquiry
- Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
- Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.
- Identify and define authentic problems and significant questions for investigation.
- Plan and manage activities to develop a solution or complete a project.
- Collect and analyze data to identify solutions and/or make informed decisions.
- Use multiple processes and diverse perspectives to explore alternative solutions.
- The characteristics and scope of technology.
- The core concepts of technology.
- The relationships among technologies and the connections between technology and other fields of study.
- The cultural, social, economic and political effects of technology.
- The effects of technology on the environment.
- The role of society in the development and use of technology.
- The influence of technology on history.
- The attributes of design.
- The application of engineering design.

<ul style="list-style-type: none"> • The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving. • Computational thinking and computer programming as tools used in design and engineering. 	
CPI #	Cumulative Progress Indicator (CPI)
8.1.2.A.2	Create a document using a word processing application.
8.1.2.A.3	Compare the common uses of at least two different digital applications and identify the advantages and disadvantages of using each.
8.1.2.A.4	Demonstrate developmentally appropriate navigation skills in virtual environments (i.e. games, museums).
8.1.2.A.5	Enter information into a spreadsheet and sort the information.
8.1.2.A.6	Identify the structure and components of a database.
8.1.2.A.7	Enter the information into a database or spreadsheet and filter the information.
8.1.2.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources.
8.1.2.C.1	Engage in a variety of developmentally appropriate learning activities with students in other classes, schools, or countries using various media formats such as online collaborative tools, and social media.
8.1.2.D.1	Develop an understanding of ownership of print and non-print information.
8.1.2.E.1	Use digital tools and online resources to explore a problem or issue.
8.1.2.F.1	Use geographic mapping tools to plan and solve problems.
8.2.2.A.1	Define products produced as a result of technology or of nature.
8.2.2.A.2	Describe how designed products and systems are useful at school, home, and work.
8.2.2.A.3	Identify a system and the components that work together to accomplish its purpose.
8.2.2.A.4	Choose a product to make and plan the tools and materials needed.
8.2.2.A.5	Collaborate to design a solution to a problem affecting the community.
8.2.2.B.1	Identify how technology impacts or improves life.
8.2.2.B.2	Demonstrate how reusing a product affects the local and global environment.
8.2.2.B.3	Identify products or systems that are designed to meet human needs.
8.2.2.B.4	Identify how the ways people live and work has changed because of technology.
8.2.2.C.1	Brainstorm ideas on how to solve a problem or build a product.

8.2.2.C.2	Create a drawing of a product or device that communicates its function to peers and discuss.		
8.2.2.C.3	Explain why we need to make new products.		
8.2.2.C.4	Identify designed products and brainstorm how to improve one used in the classroom.		
8.2.2.C.5	Describe how the parts of a common toy or tool interact and work as part of a system.		
8.2.2.C.6	Investigate a product that has stopped working and brainstorm ideas to correct the problem.		
8.2.2.E.1	List and demonstrate the steps to an everyday task.		
8.2.2.E.2	Demonstrate an understanding of how a computer takes input through a series of written commands and then interprets and displays information as output.		
8.2.2.E.3	Create algorithms (a set of instructions) using a pre-defined set of commands (e.g. to move a student or a character through a maze).		
8.2.2.E.4	Debug an algorithm (i.e., correct an error).		
8.2.2.E.5	Use appropriate terms in conversation (eg, basic vocabulary words: input, output, the operating system, debug, and algorithm).		
<table border="1"> <tr> <td> Unit Essential Questions <ul style="list-style-type: none"> ● How can I use the computer to convey knowledge appropriately? ● How can I use technology to share my ideas? ● What programs can be used to help me complete my classwork? </td><td> Unit Enduring Understandings <ul style="list-style-type: none"> ● Computer skills enable you to learn and enhance your knowledge base ● Understanding the basic workings of a computer and using the applications properly ● Locating and learning software applicable to various tasks </td></tr> </table>		Unit Essential Questions <ul style="list-style-type: none"> ● How can I use the computer to convey knowledge appropriately? ● How can I use technology to share my ideas? ● What programs can be used to help me complete my classwork? 	Unit Enduring Understandings <ul style="list-style-type: none"> ● Computer skills enable you to learn and enhance your knowledge base ● Understanding the basic workings of a computer and using the applications properly ● Locating and learning software applicable to various tasks
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Unit Learning Targets <i>Students will...</i> <ul style="list-style-type: none"> ● Use the computer to complete curricular related projects ● Use proper internet “netiquette” when researching the topic ● Learn to properly take notes and summarize information found on the web ● Create a research project using technology 			
Evidence of Learning			
Summative Assessment (X days) 8-10 classes			
Equipment needed: computers, printer, SmartBoard			
Teacher Resources: rubric, http://www.nj.gov/education/cccs/standards/8/ , various websites			
Formative Assessments			
● Teacher observation	● Self-Assessment		

<ul style="list-style-type: none"> ● Final Project grade ● Subject grade 	<ul style="list-style-type: none"> ● Peer Assessment
Lesson Plans	
Lesson	Timeframe
Lesson 1 The Solar System-research	40 minute period/1-2 weeks
Lesson 2 Creation of Slides	40 minute period/3-4 weeks
Lesson 3 Dwarf Research and Slide	40 minute period/1-2 weeks
Lesson 4 Unit Test	40 minute period/1 week
Teacher Notes: <ul style="list-style-type: none"> ● The schedule may vary dependent upon the learning level of the particular class. 	
Curriculum Development Resources Curriculum Development Resources Click the links below to access additional resources used to design this unit: http://science.nationalgeographic.com/science/space/solar-system/ <ul style="list-style-type: none"> ● http://solarsystem.nasa.gov/planets/index.cfm 	

Lesson Plan 1							
Content Area: Integrated Science							
Lesson Title: The Solar System				Timeframe: Timeframe: 40 minute period/1x per week for 8-10 weeks			
Lesson Components							
<u>21st Century Themes</u>							
x	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
<u>21st Century Skills</u>							
x	Creativity and Innovation		Critical Thinking and Problem Solving		Communication and Collaboration	x	Information Literacy

x	Media Literacy	x	ICT Literacy	x	Life and Career Skills
Interdisciplinary Connections: Science, Language Arts					
Integration of Technology: Research, completed slide show					
Equipment needed: computer, SmartBoard, printer					

Goals/Objectives	Learning Activities/Instructional Strategies	Formative Assessment Tasks
<p>Students will:</p> <ul style="list-style-type: none"> ● Conduct research on the solar system ● Locate position of planets, moons, and other areas of space ● Create slides of the inner and outer solar system ● Discuss Pluto's "demotion" and the dwarf planets ● Create dwarf slide ● Present slide shows ● Take a test on the solar system information 	<p>Lesson Sequence</p> <ol style="list-style-type: none"> 1. Students will locate http://science.nationalgeographic.com/science/space/solar-system/ 2. Discuss the inner and outer areas of the solar system. Identify the planets in each section 3. Open and save five KidPix documents to use for the Solar System slide show 4. Create pages for each section-inner, outer, and dwarf 5. Save documents properly to create show 6. Have each child share their slide show with the class in round robin fashion <p>During a separate class, the students will take a written test</p>	<ul style="list-style-type: none"> ● Teacher Observation ● Rubric Assessment ● Graded Test ● Self Assessment ● Peer Assessment
<p>Differentiation</p> <p>Lesser skilled students may be tutored by more advanced students. Extra time to complete the project is permitted and available.</p>		

LESSON REFLECTION

Reflect on the lesson you have developed and rate the degree to which the lesson ***Strongly, Moderately*** or ***Weakly*** meets the criteria below.

Lesson Activities:	Strongly	Moderately	Weakly
Are challenging and require higher order thinking and problem solving skills		<u>X</u>	
Allow for student choice	<u>X</u>		
Provide scaffolding for acquiring targeted knowledge/skills	<u>X</u>		
Integrate global perspectives			<u>X</u>
Integrate 21 st century skills		<u>X</u>	
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	<u>X</u>		
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	<u>X</u>		
Are varied to address different student learning styles and preferences	<u>X</u>		
Are differentiated based on student needs	<u>X</u>		
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	<u>X</u>		
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	<u>X</u>		
Provide opportunities for student reflection and self-assessment		<u>X</u>	
Provide data to inform and adjust instruction to better meet the varying needs of learners		<u>X</u>	

Grade 3

Unit Overview
Content Area: Computer Education
Unit Title: Third Grade Computers
Target Course/Grade Level: By the end of Grade 3
<p>Unit Summary</p> <p>Students who learn to use technology appropriately are more likely to solve problems and complete tasks in a timely efficient manner. The students will continue using the computer as a tool to complete curriculum based assignments.</p> <p>Primary interdisciplinary connections: language arts/science/social studies/technology</p> <p>21st century themes: Civic Literacy</p>
<p>Unit Rationale</p> <ul style="list-style-type: none"> ● All students will learn to use digital tools and information to solve problems and communicate knowledge ● All students will integrate technology into their specific curriculum subjects in order to complete classwork in an efficient, innovative manner
Learning Targets
<p>Standards & Strands</p> <p>8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.</p> <p>Strand:</p> <ul style="list-style-type: none"> A. Technology Operations and Concepts: <i>Students demonstrate a sound understanding of technology concepts, systems and operations.</i> B. Creativity and Innovation: <i>Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.</i> D. Digital Citizenship: <i>Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.</i> E. Research and Information Fluency: <i>Students apply digital tools to gather, evaluate, and use information.</i> <p>8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: 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.</p> <p>Strand:</p> <ul style="list-style-type: none"> A. The Nature of Technology: Creativity and Innovation <i>Technology systems impact every aspect of the world in which we live.</i>

<p>B. Technology and Society: <i>Knowledge and understanding of human, cultural and society values are fundamental when designing technology systems and products in the global society.</i></p> <p>C. Design: <i>The design process is a systematic approach to solving problems.</i></p> <p>D. Abilities for a Technological World: <i>The designed world is the product of a design process that provides the means to convert resources into products and systems.</i></p>	
<p>Content Statements: <i>Students will be able to understand:</i></p> <ul style="list-style-type: none"> • Understand and use technology systems. • Select and use applications effectively and productively. • Create original works as a means of personal or group expression. • Advocate and practice safe, legal, and responsible use of information and technology. • Demonstrate personal responsibility for lifelong learning. • Exhibit leadership for digital citizenship. • Plan strategies to guide inquiry. • Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. • Evaluate and select information sources and digital tools based on the appropriateness for specific tasks. • The characteristics and scope of technology. • The relationships among technologies and the connections between technology and other fields of study. • The cultural, social, economic and political effects of technology. • The effects of technology on the environment. • The role of society in the development and use of technology. • Assess the impact of products and systems. 	
CPI #	Cumulative Progress Indicator (CPI)
8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
8.1.5.A.2	Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
8.1.5.A.3	Use a graphic organizer to organize information about problem or issue.
8.1.5.B.1	Collaborative to produce a digital story about a significant local event or issue based on first-person interviews.
8.1.5.D.1	Understand the need for and use of copyrights.
8.1.5.D.2	Analyze the resource citations in online materials for proper use.
8.1.5.D.3	Demonstrate an understanding of the need to practice cyber safety, cyber security, and cyber ethics when using technologies and social media.

8.1.5.D.4	Understand digital citizenship and demonstrate an understanding of the personal consequences of inappropriate use of technology and social media.		
8.1.5.E.1	Use digital tools to research and evaluate the accuracy of, relevance to, and appropriateness of using print and non-print electronic information sources to complete a variety of tasks.		
8.2.5.A.1	Compare and contrast how products made in nature differ from products that are human made in how they are produced and used.		
8.2.5.A.4	Compare and contrast how technologies have changed over time due to human needs and economic, political and/or cultural influences.		
8.2.5.A.5	Identify how improvement in the understanding of materials science impacts technologies.		
8.2.5.B.1	Examine ethical considerations in the development and production of a product through its life cycle.		
8.2.5.B.2	Examine systems used for recycling and recommend simplification of the systems and share with product developers.		
8.2.5.B.3	Investigate ways that various technologies are being developed and used to reduce improper use of resources.		
8.2.5.B.4	Research technologies that have changed due to society's changing needs and wants.		
8.2.5.B.5	Explain the purpose of intellectual property law.		
8.2.5.B.6	Compare and discuss how technologies have influenced history in the past century.		
8.2.5.C.1	Collaborate with peers to illustrate components of a designed system.		
8.2.5.C.2	Explain how specifications and limitations can be used to direct a product's development.		
8.2.5.C.3	Research how design modifications have lead to new products.		
8.2.5.C.4	Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.		
8.2.5.C.5	Explain the functions of a system and subsystems.		
8.2.5.C.6	Examine a malfunctioning tool and identify the process to troubleshoot and present options to repair the tool.		
8.2.5.D.6	Explain the positive and negative effect of products and systems on humans, other species and the environment, and when the product or system should be used.		
8.2.5.D.7	Explain the impact that resources such as energy and materials used in a process to produce products or system have on the environment.		
<table border="1"> <tr> <td> Unit Essential Questions <ul style="list-style-type: none"> ● How can a person use the computer to convey knowledge of a particular subject? ● How can technology be used to creatively express ideas? How does this increase success? </td><td> Unit Enduring Understandings <ul style="list-style-type: none"> ● Communicating knowledge and ideas through technology is a productive and useful skill </td></tr> </table>		Unit Essential Questions <ul style="list-style-type: none"> ● How can a person use the computer to convey knowledge of a particular subject? ● How can technology be used to creatively express ideas? How does this increase success? 	Unit Enduring Understandings <ul style="list-style-type: none"> ● Communicating knowledge and ideas through technology is a productive and useful skill
Unit Essential Questions <ul style="list-style-type: none"> ● How can a person use the computer to convey knowledge of a particular subject? ● How can technology be used to creatively express ideas? How does this increase success? 	Unit Enduring Understandings <ul style="list-style-type: none"> ● Communicating knowledge and ideas through technology is a productive and useful skill 		

<ul style="list-style-type: none"> ● How can a cooperative group effectively work to create a project pertaining to the curriculum? ● How can a student locate and use valid sources of information? ● How do individuals protect themselves on the Internet? What steps can be taken to increase safety? ● How can relevant materials be located and managed? ● Will the use of technology benefit the final product? 	<ul style="list-style-type: none"> ● Completing favorable tasks improves schoolwork and increases the likelihood of success ● Using the computer properly will improve the overall quality of completed work ● Working cooperatively in groups will assist future workplace readiness ● Practicing cyber safety, cyber security, and cyber ethics will help protect the global community ● Conducting research and verifying sources is necessary ● Checking for the appropriateness and validity of sources is essential to quality products ● Accessing and applying data through digital tools will assist in generating solutions and making decisions
Unit Learning Targets <i>Students will...</i> <ul style="list-style-type: none"> ● Use the computer as a tool ● Learn software-Pages and Keynote ● Use Kidspiration software ● Use proper “netiquette” and online research skills ● Create a curriculum-based project on a topic, such as birds or states 	
Evidence of Learning	
Summative Assessment (X days) 10-12 classes Equipment needed: Computer per student, printer, SmartBoard Programs needed: Kidspiration, Pages and Keynote software, internet access Teacher Resources: http://www.birds.cornell.edu/Page.aspx?pid=1478 http://animals.nationalgeographic.com/animals/birds/ www.netstate.com www.google.com/images www.50states.com Formative Assessment: Teacher Observation, Project Rubric, Classroom Subject Grade, Self-Assessment, and Peer Assessment.	
Lesson Plans	
Lesson	Timeframe

Lesson 1 Discovering New Jersey's Birds	40 minute period per week/1-2 weeks
Lesson 1 Discovering New Jersey's Birds	40 minute period per week/1-2 weeks
Lesson 2 Characteristics of a Feathered Friend	40 minute period per week/2-3weeks
Lesson 3 My Bird's Story	40 minute period per week/2-3 weeks
Lesson 4 My Personal Perspective	40 minute period per week/2-3 weeks
Teacher Notes: Depending on the level of the students, the timeframe of the project may vary. The objective is to prepare the students to conduct internet research, in order to successfully complete a curricular-based science project. This project is an extension of the Bird Watching Unit.	
Curriculum Development Resources Click the links below to access additional resources used to design this unit: http://www.njaudubon.org/SectionResearch/NewJerseyBirds.aspx http://www.njbrc.net/	

Lesson Plan 1 Template							
Content Area: Computers							
Lesson Title: Our Fine Feathered New Jersey Friends					Timeframe: Timeframe: 40 minute period/ 1x per week for 1-2 weeks		
Lesson Components							
21 st Century Themes							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy	x	Civic Literacy		Health Literacy
21 st Century Skills							
X	Creativity and Innovation	X	Critical Thinking and Problem Solving	X	Communication and Collaboration	X	Information Literacy
X	Media Literacy	X	ICT Literacy	X	Life and Career Skills		

Interdisciplinary Connections: Science, Language Arts
Integration of Technology: research, completed project
Equipment needed: computer, printer, Smart Board

Goals/Objectives	Learning Activities/Instructional Strategies	Formative Assessment Tasks
<p>Students will:</p> <ul style="list-style-type: none"> ● Research local species of New Jersey birds ● Discuss adaptations necessary for birds from this geographical area ● Take organized notes about their particular species of feathered friends 	<p>Lesson Sequence</p> <ol style="list-style-type: none"> 1. Using the SmartBoard, students will research bird species native to New Jersey 2. Student partners will decide on one particular bird and access specific web sites to take “notes” 3. Partners will discuss what constitutes the most important facts and organize their thoughts 4. Each partnership will open a new Page’s document and save properly 5. The students will work together to compile a list of characteristics to be used at a later date 	<ul style="list-style-type: none"> ● Teacher Observation ● Rubric Assessment ● Graded Project ● Self-Assessment

LESSON REFLECTION

Reflect on the lesson you have developed and rate the degree to which the lesson ***Strongly, Moderately*** or ***Weakly*** meets the criteria below.

Lesson Activities:	Strongly	Moderately	Weakly
Are challenging and require higher order thinking and problem solving skills		<u>X</u>	
Allow for student choice	<u>X</u>		
Provide scaffolding for acquiring targeted knowledge/skills	<u>X</u>		
Integrate global perspectives			<u>X</u>
Integrate 21 st century skills		<u>X</u>	
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	<u>X</u>		
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	<u>X</u>		
Are varied to address different student learning styles and preferences	<u>X</u>		
Are differentiated based on student needs	<u>X</u>		
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	<u>X</u>		
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	<u>X</u>		
Provide opportunities for student reflection and self-assessment	<u>X</u>		
Provide data to inform and adjust instruction to better meet the varying needs of learners	<u>X</u>		

Grade 4

Unit Overview
Content Area: Computer Education
Unit Title: Fourth Grade Computers
Target Course/Grade Level: By the end of Grade 4
<p>Unit Summary</p> <p>Students who learn to use technology appropriately are more likely to solve problems and complete tasks in a time efficient manner. The students will continue using the computer as a tool to complete curriculum based assignments.</p> <p>Primary interdisciplinary connections: language arts/science/social studies/technology</p> <p>21st century themes: Civic Literacy</p>
<p>Unit Rationale</p> <ul style="list-style-type: none"> • All students will learn digital tools and apply an understanding of technology to compete in the digital world • All students will integrate technology into their specific curriculum subjects in order to complete classwork in an efficient, innovative manner
Learning Targets
<p>Standards & Strands</p> <p>8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.</p> <p>Strand:</p> <ul style="list-style-type: none"> A. Technology Operations and Concepts: <i>Students demonstrate a sound understanding of technology concepts, systems and operations.</i> B. Creativity and Innovation: <i>Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.</i> D. Digital Citizenship: <i>Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.</i> E. Research and Information Fluency: <i>Students apply digital tools to gather, evaluate, and use information.</i> <p>8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: 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.</p> <p>Strand:</p> <ul style="list-style-type: none"> A. The Nature of Technology: Creativity and Innovation <i>Technology systems impact every aspect of the world in which we live.</i>

- B. Technology and Society:** *Knowledge and understanding of human, cultural and society values are fundamental when designing technology systems and products in the global society.*
- C. Design:** *The design process is a systematic approach to solving problems.*
- D. Abilities for a Technological World:** *The designed world is the product of a design process that provides the means to convert resources into products and systems.*
- E. Computational Thinking: Programming:** *Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.*

Content Statements

Students will:

- Understand and use technology systems.
- Select and use applications effectively and productively
- Create original works as a means of personal or group expression
- Advocate and practice safe, legal, and responsible use of information and technology.
- Demonstrate personal responsibility for lifelong learning.
- Exhibit leadership for digital citizenship.
- Plan strategies to guide inquiry.
- Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
- Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.
- The characteristics and scope of technology.
- The relationships among technologies and the connections between technology and other fields of study.
- The cultural, social, economic and political effects of technology.
- The effects of technology on the environment.
- The role of society in the development and use of technology.
- The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.
- Use and maintain technological products and systems.
- Assess the impact of products and systems.
- Computational thinking and computer programming as tools used in design and engineering.

CPI #	Cumulative Progress Indicator (CPI)
8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
8.1.5.A.2	Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.

8.1.5.A.3	Use a graphic organizer to organize information about problem or issue.
8.1.5.B.1	Collaborative to produce a digital story about a significant local event or issue based on first-person interviews.
8.1.5.D.1	Understand the need for and use of copyrights.
8.1.5.D.2	Analyze the resource citations in online materials for proper use.
8.1.5.D.3	Demonstrate an understanding of the need to practice cyber safety, cyber security, and cyber ethics when using technologies and social media.
8.1.5.D.4	Understand digital citizenship and demonstrate an understanding of the personal consequences of inappropriate use of technology and social media.
8.1.5.E.1	Use digital tools to research and evaluate the accuracy of, relevance to, and appropriateness of using print and non-print electronic information sources to complete a variety of tasks.
8.2.5.A.1	Compare and contrast how products made in nature differ from products that are human made in how they are produced and used.
8.2.5.A.2	Investigate and present factors that influence the development and function of a product and a system.
8.2.5.A.3	Investigate and present factors that influence the development and function of products and systems, e.g., resources, criteria and constraints.
8.2.5.A.4	Compare and contrast how technologies have changed over time due to human needs and economic, political and/or cultural influences.
8.2.5.A.5	Identify how improvement in the understanding of materials science impacts technologies.
8.2.5.B.1	Examine ethical considerations in the development and production of a product through its life cycle.
8.2.5.B.2	Examine systems used for recycling and recommend simplification of the systems and share with product developers.
8.2.5.B.3	Investigate ways that various technologies are being developed and used to reduce improper use of resources.
8.2.5.B.4	Research technologies that have changed due to society's changing needs and wants.
8.2.5.C.7	Work with peers to redesign an existing product for a different purpose.
8.2.5.D.1	Collaborate and apply a design process to solve a simple problem from everyday experiences.

8.2.5.D.2	Discover how a product works by taking it apart, sketching how parts fit, and putting it back together.
8.2.5.D.3	Follow step-by-step directions to assemble a product or solve a problem.
8.2.5.D.4	Identify the resources needed to create technological products or systems.
8.2.5.D.5	Identify how using a tool (such as a bucket or wagon) aids in reducing work.
8.2.5.D.7	Explain the impact that resources such as energy and materials used in a process to produce products or system have on the environment.
8.2.5.E.1	Identify how computer programming impacts our everyday lives.
8.2.5.E.2	Demonstrate an understanding of how a computer takes input of data, processes and stores the data through a series of commands, and outputs information.
8.2.5.E.3	Using a simple, visual programming language, create a program using loops, events and procedures to generate specific output.
8.2.5.E.4	Use appropriate terms in conversation (e.g., algorithm, program, debug, loop, events, procedures, memory, storage, processing, software, coding, procedure, and data).
<div> <div> Unit Essential Questions <ul style="list-style-type: none"> ● How can a person use the computer to convey knowledge of a particular subject? ● How does technology impact learning and daily life? How can technology be used to creatively express ideas? ● How can a cooperative group effectively work to create a multimedia presentation? ● How has technology changed society? What is its impact on daily life? ● How do individuals protect themselves on the Internet? What steps can be taken to increase safety? ● How can relevant materials be located and managed? </div> <div> Unit Enduring Understandings <ul style="list-style-type: none"> ● Communicating knowledge and ideas through technology is a productive and useful skill ● Completing favorable tasks improves schoolwork and increases the likelihood of success ● Using the computer properly will improve the overall quality of completed work ● Working cooperatively in groups will assist future workplace readiness ● Practicing cyber safety, cyber security, and cyber ethics will help protect the global community ● Conducting research and verifying sources is necessary ● Checking for the appropriateness and validity of sources is essential to quality products <p>Accessing and applying data through digital tools will assist in generating solutions and making decisions</p> </div> </div>	

<ul style="list-style-type: none"> ● Will the use of technology benefit the final product? 	
Unit Learning Targets <i>Students will...</i> <ul style="list-style-type: none"> ● Use the computer as a tool ● Learn software- Keynote ● Use proper “netiquette” ● Create a multimedia presentation using the topic-My Home, New Jersey 	
Evidence of Learning	
Summative Assessment (X days) 8-10 classes Equipment needed: Computer per student, printer, SmartBoard Programs needed: Kidspiration, Keynote and Pages software, internet access Teacher Resources: www.state.nj.us www.netstate.com www.google.com/images www.50states.com	
Formative Assessments <ul style="list-style-type: none"> ● Teacher Observation ● Portfolio ● Project Rubric ● Self-Assessment ● Peer Assessment ● Classroom Subject Grade 	
Lesson Plans	
Lesson	Timeframe
Lesson 1 A Hunt for New Jersey’s Counties	40 minute period per week/1-2 weeks
Lesson 2 Creating a “County List”	40 minute period per week/4-5 weeks
Lesson 3 Knowledge of the Counties of New Jersey	40 minute period per week/1-2 weeks
Teacher Notes: Depending on the level of the students, this project’s timeframe may vary. The objective is to prepare the students to learn and memorize the counties, in order to successfully complete the classroom teacher’s evaluation/test.	
Curriculum Development Resources Click the links below to access additional resources used to design this unit: http://www.state.nj.us	
Lesson Plan 1 Template	
Content Area: Computers	
Lesson Title: New Jersey Counties	Timeframe: 40 minute period/ 1x per week for 9-10 weeks

Lesson Components							
<u>21st Century Themes</u>							
	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy	x	Civic Literacy		Health Literacy
<u>21st Century Skills</u>							
X	Creativity and Innovation	X	Critical Thinking and Problem Solving	X	Communication and Collaboration	X	Information Literacy
X	Media Literacy	X	ICT Literacy	X	Life and Career Skills		
Interdisciplinary Connections: Science, Language Arts							
Integration of Technology: research, completed project							
Equipment needed: computer, printer, Smart Board							

Goals/Objectives	Learning Activities/Instructional Strategies	Formative Assessment Tasks
Students will: <ul style="list-style-type: none"> ● Research the 21 counties of NJ ● Pinpoint and learn each county's name and location on a map ● Create a document depicting the counties in a creative way ● Review county names ● Take a written test with their classroom teachers 	Lesson Sequence <ol style="list-style-type: none"> 1) Students will open a new Pages document and save properly 2) Introduce a map of the 21 counties using the SmartBoard 3) Play "Find the County" game. Name each county and have a team member locate each on the map for points 4) After the game, discuss ideas for displaying the counties 5) Review Pages tools and arrangement of shapes/drawings 	<ul style="list-style-type: none"> ● Teacher Observation ● Rubric Assessment ● Graded Classroom Evaluation/Test ● Self Assessment

	6) Remind the students to use the copy/paste procedure if necessary 7) Begin construction of county page 8) Play “County Count” as a group to review for test 9) Individual classroom teacher will administer the formal assessment	
Differentiation Lesser skilled students may be tutored by more advanced students. Extra time to complete the project is permitted and available.		
Resources Provided <ul style="list-style-type: none"> • www.state.nj.us • www.netstate.com • www.50states.com 		

LESSON REFLECTION

Reflect on the lesson you have developed and rate the degree to which the lesson ***Strongly, Moderately*** or ***Weakly*** meets the criteria below.

Lesson Activities:	Strongly	Moderately	Weakly
Are challenging and require higher order thinking and problem solving skills		<u>X</u>	
Allow for student choice	<u>X</u>		
Provide scaffolding for acquiring targeted knowledge/skills	<u>X</u>		
Integrate global perspectives			<u>X</u>
Integrate 21 st century skills		<u>X</u>	
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	<u>X</u>		
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	<u>X</u>		
Are varied to address different student learning styles and preferences	<u>X</u>		
Are differentiated based on student needs	<u>X</u>		
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	<u>X</u>		
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	<u>X</u>		
Provide opportunities for student reflection and self-assessment	<u>X</u>		
Provide data to inform and adjust instruction to better meet the varying needs of learners	<u>X</u>		

MIDDLE SCHOOL COMPUTER CURRICULUM

Grade 5

Unit Overview
Content Area: Computer Education
Unit Title: Introduction to Computer Basics and Applications using a real world theme of the Environment
Target Course/Grade Level: 5th Grade Cycle Class
<p>Unit Summary</p> <p>A global issue that not only affects the United States, that in fact, is a concern among all countries in the world, is the environment. While learning about the non-living and living things of our environment and its effects it has on the world, students will learn the basic uses of computer applications. During this cycle, students will be taught basic applications and programs to create a foundational core of computer skills to be utilized in future grades. Integrated into this unit will also be in-depth analysis of our environment, as well as learning about other environments from all around the world. This will be accomplished through research and the use of blogging.</p> <p>Primary interdisciplinary connections: Science, Literacy, Social Studies, & Technology</p> <p>21st century themes: Global Awareness</p>
<p>Unit Rationale</p> <p>Basic computer applications are vital in building college and workplace readiness skills. The basis and issues associated with the environment will allow a student to become aware of a global issue, as well as to work collaboratively with peers in order to come up with possible solutions to these issues.</p>
Learning Targets
<p>Standards & Strands</p> <p>8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.</p> <p>Strand:</p> <p>A. Technology Operations and Concepts: <i>Students demonstrate a sound understanding of technology concepts, systems and operations.</i></p>

- B. Creativity and Innovation:** *Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.*
- C. Communication and Collaboration:** *Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others*
- D. Digital Citizenship:** *Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.*
- F: Critical thinking, problem solving, and decision making:** *Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.*

Content Statements

Students will be able to understand:

- Understand and use technology systems.
- Select and use applications effectively and productively.
- Apply existing knowledge to generate new ideas, products, or processes.
- Create original work as means of personal or group expression.
- Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.
- Communicate information and ideas to multiple audiences using a variety of media and formats.
- Develop cultural understanding and global awareness by engaging with learners of other cultures.
- Advocate and practice safe, legal, and responsible use of information and technology.
- Demonstrate personal responsibility for lifelong learning.
- Exhibit leadership for digital citizenship.
- Identify and define authentic problems and significant questions for investigation.
- Plan and manage activities to develop a solution or complete a project.
- Collect and analyze data to identify solutions and/or make informed decisions.
- Use multiple processes and diverse perspectives to explore alternative solutions.

CPI #	Cumulative Progress Indicator (CPI)
8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.

8.1.5.A.2	Format a document using a word processing application to enhance text and include graphics, symbols, and/or pictures.		
8.1.5.A.3	Use a graphic organizer to organize information about a problem or issue.		
8.1.5.A.4	Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.		
8.1.5.A.5	Create and use a database to answer basic questions.		
8.1.5.A.6	Export data from a database to answer basic questions.		
8.1.5.B.1	Collaborate to produce a digital story about a significant local event or issue based on first-person interviews.		
8.1.5.C.1	Engage in online discussions with learners of other cultures to investigate a worldwide issue from multiple perspectives and sources, evaluate findings and present possible solutions, using digital tools and online resources for all steps.		
8.1.5.D.1	Understand the need for and use of copyrights.		
8.1.5.D.2	Analyze the resource citations in online materials for proper use.		
8.1.5.D.3	Demonstrate an understanding of the need to practice cyber safety, cyber security, and cyber ethics when using technologies and social media.		
8.1.5.D.4	Understand digital citizenship and demonstrate an understanding of personal consequences of inappropriate use of technology and social media.		
8.1.5.F.1	Apply digital tools to collect, organize, and analyze data that support a scientific finding.		
<table border="1"> <tr> <td> Unit Essential Questions <ul style="list-style-type: none"> ● What are basic functions of computer applications? ● How does our environment differ from others? ● How does the environment impact communities? </td><td> Unit Enduring Understandings <ul style="list-style-type: none"> ● Basic functions of applications are important in understanding how programs work, how they are related, and how they can aid us in professional and daily life. ● Our specific environment is unique to our location; however, it still shares similarities with various other environments. ● The environment affects local and global issues, as well as daily life. </td></tr> </table>		Unit Essential Questions <ul style="list-style-type: none"> ● What are basic functions of computer applications? ● How does our environment differ from others? ● How does the environment impact communities? 	Unit Enduring Understandings <ul style="list-style-type: none"> ● Basic functions of applications are important in understanding how programs work, how they are related, and how they can aid us in professional and daily life. ● Our specific environment is unique to our location; however, it still shares similarities with various other environments. ● The environment affects local and global issues, as well as daily life.
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Unit Learning Targets <i>Students will ...</i>			

<ul style="list-style-type: none"> ● Learn how to create a basic word document incorporating the following tools and terminology: <i>font style, size, and color, textboxes, borders, backgrounds, auto-shapes, WordArt, alignment, clipart, graphics, tables, and QR codes.</i> ● Learn how to create a basic spreadsheet incorporating the following tools and terminology: cells, columns, rows, charts, merging, and mathematical functions, including sum. ● Learn how to construct a visual database to organize and present data collected in the spreadsheet. ● Learn how to research and create their own current event news story using photos, interviews, and audio clips. 	
Evidence of Learning	
<p>Summative Assessment (Marking Period consisting of eight to nine weeks of 62 minute blocks every other day.)</p> <p>Equipment needed: Computer with Internet access per student, printer, iPads, Smart Board, Smart Board camera, microphone, and speakers.</p> <p>Programs Needed: Microsoft Word, Microsoft Excel, Google Chrome, Google Earth, Google Hangouts, Narrable, Audio Recorder, Camera Application, and a database builder.</p> <p>Teacher Resources:</p> <ul style="list-style-type: none"> ● NJ TAP-IN Support, NJTAP-IN General Rubric, Student Readiness Rubric, http://www.nj.gov/education/cccs/standards/8/, various websites 	
<p>Formative Assessments</p> <ul style="list-style-type: none"> ● Portfolio Assessment ● Exit Tickets & Do Now Activities ● Benchmark Assessments ● Hands On Projects ● Class Discussions and Demonstrations ● Checklists ● Student Readiness Rubric <p>NJ Tap-In Rubric</p>	
Lesson Plans	
Lesson	Timeframe
<p><i>Lesson 1</i></p> <p>Microsoft Word Table</p>	62 Minute Period every other day/ 3 Weeks

<i>Lesson 2</i>						
Microsoft Excel & Database		62 Minute Period every other day/ 3-4 Weeks				
<i>Lesson 3</i>						
Narrable Significant Event		62 Minute Period every other day/ 1-2 Weeks				
Teacher Notes: The schedule may vary depending upon the learning level of the particular class.						
Curriculum Development Resources Click the links below to access additional resources used to design this unit: http://www.nj.gov/education/techno/techlit/tapin/ (NJ TAP-IN Support) http://www.nj.gov/education/techno/techlit/tapin/2biii_rubric.pdf (NJTAP-IN General Rubric) http://www.nj.gov/education/techno/techlit/tapin/2bii_rubric.pdf (Student Readiness Rubric) http://www.learn.narrable.com						
Timeframe: 62 minute period every other day/ 3 weeks						
Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
Creativity and Innovation		Critical Thinking and Problem Solving		Communication and Collaboration	X	Information Literacy
Media Literacy	X	ICT Literacy		Life and Career Skills		

Goals/Objectives	Learning Activities/Instructional Strategies	Formative Assessment Tasks
Students will: ● Evaluate living vs. non-living things in Hamburg School.	1. Students will brainstorm and discuss living and nonliving components of their environment.	● Teacher observation ● Rubric Assessment ● Exit Tickets & Do Now Activates

<ul style="list-style-type: none"> ● Characterize New Jersey's environment. ● Create a table displaying a handful of characteristics, including information and representational pictures. ● Use a variety of MS Word tools to make the table visually appealing. 	<ol style="list-style-type: none"> 2. Research distinguishing attributes of New Jersey's environment. 3. Create a table in MS Word after reviewing tables, rows, and columns, and using basic features, including margins, merging, and text formatting.. 4. Complete the table with facts, opinions, and photos. 5. Use backgrounds, borders, and WordArt to make the table visually appealing. 	<ul style="list-style-type: none"> ● Benchmark Assessments ● Hands On Projects ● Class Discussions and Demonstrations ● Checklists ● Student Readiness Rubric ● NJ Tap-In Rubric
<p>Differentiation</p> <p>Although this is an independent project, students are encouraged to help one another. Specific students will be seated next to each other according to strengths and weaknesses. Extra time to complete the project is permitted and available. Students will be self-paced, using a checkpoint list as they go.</p>		
<p>Resources Provided</p> <p>Microsoft Word</p> <p>Various Websites</p> <p>Edmodo</p> <p>School garden</p>		

Grade 6

Unit Overview
Content Area: Computer Education
Unit Title: Computer Novice Level, with a focus on Coding and using Technology to Capture Supportive Evidence
Target Course/Grade Level: 6th Grade Cycle Class
Unit Summary <p>As our world grows more and more dependent on technology each day, it is crucial for students to understand how technology works and how to apply gained skills to new innovations, as well as to find their place in our technologically advanced world and to see how they can use technology in becoming global citizens. While learning basic coding foundations, students will evaluate technology's impact on society (past, present, and future), learn how programs are written, discuss the role that technology has already and will play in their personal lives. While students practice capturing and presenting evidence with iPads, they will also evaluate different applications and their uses, providing multiple resources for future use and learning. In addition, students will be using the Internet as a publishing and collaborative tool through use of a class blog that they will each have a turn in being responsible for.</p> <p>Primary interdisciplinary connections: Math, Literacy, Art, & Technology</p> <p>21st century themes: Global Awareness & Financial, Economic, Business, and Entrepreneurial Literacy</p>
Unit Rationale <p>Novice computer applications are vital in building college and workplace readiness skills. The basis and issues associated with computer programming and new technological innovations will allow a student to become knowledgeable and competitive with regard to how computers and computer programming work, which will be incredibly important as new advances are made, as well as to work collaboratively with peers and to learn how to use each other as additional resources.</p>
Learning Targets
Standards & Strands <p>8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.</p>

Strand:

A. Technology Operations and Concepts: *Students demonstrate a sound understanding of technology concepts, systems and operations.*

B. Creativity and Innovation: *Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.*

D. Digital Citizenship: *Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.*

F. Critical thinking, problem solving, and decision making: *Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.*

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming:

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.

Strand:

E. Computational Thinking: Programming: *Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.*

Content Statements

Students will be able to understand:

- Understand and use technology systems.
- Select and use applications effectively and productively.
- Apply existing knowledge to generate new ideas, products, or processes.
- Create original works as a means of personal or group expression.
- Advocate and practice safe, legal, and responsible use of information and technology.
- Exhibit leadership for digital citizenship.
- Identify and define authentic problems and significant questions for investigation.
- Plan and manage activities to develop a solution or complete a project.
- Collect and analyze data to identify solutions and/or make informed decisions.
- Use multiple processes and diverse perspectives to explore alternative solutions.
- Use computational thinking and computer programming as tools in design and engineering.

CPI #	Cumulative Progress Indicator (CPI)
8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

8.1.8.B.1	Synthesize and publish information about a local or global issue or event (ex. Tele-collaborative project, blog, school web).
8.1.8.D.1	Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.
8.1.8.D.5	Understand appropriate uses for social media and the negative consequences of misuse.
8.1.8.F.1	Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.
8.2.8.E.1	Identify ways computers are used that have had an impact across the range of human activity and within different careers where they are used.
8.2.8.E.2	Demonstrate an understanding of the relationship between hardware and software.
8.2.8.E.3	Develop an algorithm to solve an assigned problem using a specified set of commands and use peer review to critique the solution.
8.2.8.E.4	Use appropriate terms in conversation (e.g., programming, language, data, RAM, ROM, Boolean logic terms).
Unit Essential Questions <ul style="list-style-type: none"> ● What are the basic and novice functions of computer applications? ● How can different tools, applications, and programs help capture a variety of supportive evidence? ● What are the basic concepts, components, and terminology of computer programming? 	Unit Enduring Understandings <ul style="list-style-type: none"> ● Basic and novice functions of applications are important in understanding how programs work, how they are related, and how they can aid us in professional and daily life, as well as how they can be applied to solve world problems. ● Supportive evidence can be presented in a way that supports an overall idea, theory, or opinion in order to prove a point, examine a problem, or provide solutions. ● Computer programming is important for understanding how computers and applications work, as well as for problem-solving, perseverance, creativity, and critical thinking skills.
Unit Learning Targets <i>Students will ...</i>	

<ul style="list-style-type: none"> ● Learn how to use iPad applications to record media including, but not limited to, photos, video, and audio, as well as to construct coherent and sequential presentations. ● Learn how use media as supportive evidence and identify exactly what evidence would best support their ideas and opinions. ● Learn basic computer programming concepts, including loops, conditional statements, and binomial numbers/binary code. ● Learn how computer programming affects and enables technology, and how we as humans depend upon and live off of technology. 	
Evidence of Learning	
<p>Summative Assessment (Marking Period consisting of eight to nine weeks of 62 minute blocks every other day)</p> <p>Equipment needed: Computer per student with network access, printer, Smart Board, iPad per student</p> <p>Programs needed: Google Chrome/Safari, Microsoft Word, Audio Recorder, Camera Application</p> <p>Teacher Resources:</p> <ul style="list-style-type: none"> ● NJ TAP-IN Support, NJTAP-IN General Rubric, Students Readiness Rubric, http://www.nj.gov/education/cccs/standards/8/, various websites 	
<p>Formative Assessments</p> <ul style="list-style-type: none"> ● Portfolio Assessment ● Exit Tickets & Do Now Activities ● Benchmark Assessments ● Hands-On Projects ● Class Discussions and Demonstrations ● Checklists ● Student Readiness Rubric ● NJ Tap-In Rubric 	
Lesson Plans	
Lesson	Timeframe
Lesson 1	

Capturing Evidence with iPads	62 Minute Period every other day/ 3-4 Weeks
Lesson 2 Introduction to Coding	62 Minute Period every other day/ 4-5 Weeks
Teacher Notes: The schedule may vary depending upon the learning level of the particular class.	
Curriculum Development Resources Click the links below to access additional resources used to design this unit: http://www.nj.gov/education/techno/techlit/tapin/ (NJ TAP-IN Support) http://www.nj.gov/education/techno/techlit/tapin/2biii_rubric.pdf (NJTAP-IN General Rubric) http://www.nj.gov/education/techno/techlit/tapin/2bii_rubric.pdf (Student Readiness Rubric) http://studio.code.org (Coding Curriculum)	

Lesson Plan 1 Template							
Content Area: Computer Education							
Lesson Title: Capturing Supportive Evidence with iPods					Timeframe: 62 minute period every other day/ 3-4 weeks		
Lesson Components							
21 st Century Themes							
	Global Awareness	X	Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy
21 st Century Skills							
X	Creativity and Innovation	X	Critical Thinking and Problem Solving	X	Communication and Collaboration		Information Literacy
X	Media Literacy	X	ICT Literacy	X	Life and Career Skills		
Interdisciplinary Connections: Art, Literacy, Technology							

Integration of Technology: Research, Capturing Evidence, Final Project/Presentation

Equipment needed: iPads with Internet, Smart Board

Goals/Objectives	Learning Activities/Instructional Strategies	Formative Assessment Tasks
<p>Students will:</p> <ul style="list-style-type: none">● Evaluate and take a position on an issue or idea.● Determine what evidence will best support their position and ideas.● Collect supportive evidence in various media formats.● Present their position and/or idea with supportive evidence.	<ol style="list-style-type: none">1. Students will brainstorm, discuss, and develop an opinion on an issue or idea.2. Brainstorm different possible sources of evidence that would support their opinion.3. Gather and organize data, including photos, videos, interviews, and audio clips.4. Evaluate evidence and organize into a coherent sequence.5. Utilize an application or program to construct a presentation of their ideas with the supporting evidence.	<ul style="list-style-type: none">● Teacher Observation● Rubric Assessment● Exit Tickets & Do Now Activities● Benchmark Assessments● Hands Activities● Class Discussions and Demonstrations● Checklists● Student Readiness Rubric● NJ Tap-In Rubric
<p>Differentiation</p> <p>Although this is an independent project, students are encouraged to help one another. Specific students will be seated next to each other according to strengths and weaknesses. Extra time to complete the project is permitted and available.</p>		
<p>Resources Provided</p> <p>Various Websites</p> <p>Various Applications</p> <p>The School Community & Members</p> <p>Démodé</p>		

Grade 7

Unit Overview
Content Area: Computer Education
Unit Title: Advanced Computer Level, with a focus on the Inquiry Process
Target Course/Grade Level: 7th Grade Cycle Class
<p>Unit Summary</p> <p>Being able to analyze, evaluate, investigate, and create conclusions are important skills for students to have in order to be productive and contributive members of society. It is even more important that students know how to use technology in order to utilize these skills. While understanding how their actions can have immediate community and global impacts, students will use the inquiry method to analyze a specific, given problem, brainstorm and investigate possible solutions, and create concrete recommendations for action. In addition, students will use the Internet as a publishing and collaborative tool through the use of group blog that they will each have a turn in being responsible for.</p> <p>Primary interdisciplinary connections: Math, Literacy, Science, Social Studies, & Technology</p> <p>21st century themes: Global Awareness, Civic Literacy, and Financial, Economic, Business, and Entrepreneurial Literacy</p>
<p>Unit Rationale</p> <p>Advanced computer applications are vital in building college and workplace readiness skills. The basis and issues associated utilizing technology and the inquiry process is to prepare students to be the analytical, resourceful, and innovative problem solvers needed in today's ever-changing world. Students will develop first hand knowledge of decomposing a problem, evaluating solutions, and creating a plan of action that will help impact their school community, as well as working collaboratively with peers and learning how to use each other as additional resources.</p>
Learning Targets
<p>Standards & Strands</p> <p>8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.</p> <p>Strand:</p> <p>A. Technology Operations and Concepts: <i>Students demonstrate a sound understanding of technology concepts, systems and operations.</i></p>

- B. Creativity and Innovation:** *Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.*
- C. Communication and Collaboration:** *Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others*
- D. Digital Citizenship:** *Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.*
- E. Research and Information Fluency:** *Students apply digital tools to gather, evaluate, and use information.*
- F. Critical thinking, problem solving, and decision making:** *Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.*

Content Statements

Students will be able to understand:

- Understand and use technology systems.
- Select and use applications effectively and productively.
- Apply existing knowledge to generate new ideas, products, or processes.
- Create original works as a means of personal or group expression.
- Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.
- Communicate information and ideas to multiple audiences using a variety of media and formats.
- Contribute to project teams to produce original works or solve problems.
- Advocate and practice safe, legal, and responsible use of information and technology.
- Demonstrate personal responsibility for lifelong learning.
- Exhibit leadership for digital citizenship.
- Plan strategies to guide inquiry.
- Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
- Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.
- Process data and report results.
- Identify and define authentic problems and investigate significant questions for investigation.
- Plan and manage activities to develop a solution or complete a project.
- Collect and analyze data to identify solutions and/or make informed decisions.
- Use multiple processes and diverse perspectives to explore alternative solutions.

CPI #	Cumulative Progress Indicator (CPI)
8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
8.1.8.A.2	Create a document using one or more digital applications to be critiqued by professionals for usability.
8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
8.1.8.A.4	Graph and calculate data within a spreadsheet and present a summary of the results.
8.1.8.A.5	Create a database query, sort and create a report and describe the process, and explain the report results.
8.1.8.B.1	Synthesize and publish information about a local or global issue or event (ex. tele-collaborative project, blog, school web).
8.1.8.C.1	Collaborate to develop and publish work that provides perspectives on a global problem for discussions with learners from other countries.
8.1.8.D.1	Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.
8.1.8.D.2	Demonstrate the application of appropriate citations to digital content.
8.1.8.D.3	Demonstrate an understanding of fair use and Creative Commons to intellectual property.
8.1.8.D.4	Assess the credibility and accuracy of digital content.
8.1.8.D.5	Understand appropriate uses for social media and the negative consequences of misuse.
8.1.8.E.1	Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.
8.1.8.F.1	Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.
Unit Essential Questions <ul style="list-style-type: none"> • What are the advanced functions of computer applications? 	Unit Enduring Understandings <ul style="list-style-type: none"> • Advanced functions of applications are important in understanding how programs work, how they are related, and how they can aid us in professional and

<ul style="list-style-type: none"> ● How can we use technology to help us decompose and analyze a problem or situation, and then brainstorm, investigate, and present our solutions? ● How can we be publishers of our own content using Web 2.0 tools. 	<p>daily life, as well as how they can be applied to solve world problems.</p> <ul style="list-style-type: none"> ● Various applications, programs, and websites can help us research an issue, communicate with community members, organize our information and data, and present our information to the public. ● Through creating presentations, blogging, and sharing our data, we can publish not only our findings, but also our own conclusions and opinions that we make during the process.
<p>Unit Learning Targets</p> <p><i>Students will ...</i></p> <ul style="list-style-type: none"> ● Learn how to analyze a problem or situation, using computer applications to research and establish the core problem and variables involved., by following the inquiry method. ● Learn how to use computer applications and Web 2.0 tools to communicate and collaborate with peers, community members, stakeholders, and individuals who live in different parts of the world. ● Learn how to display and publish research, data, conclusions and recommendations using various computer applications. ● Learn how to not only find solutions, but also how to go about implementing change on a community level. 	
<p>Evidence of Learning</p>	
<p>Summative Assessment (Marking Period consisting of eight to nine weeks of 62 minute blocks every other day)</p> <p>Equipment needed: Computer per student with network access, printer, Smart Board, iPad per student</p> <p>Programs needed: Google Chrome/Safari, Audio Recorder, Camera Application, Survey program, Video Chat program, Google Apps</p> <p>Teacher Resources:</p> <ul style="list-style-type: none"> ● NJ TAP-IN Support, NJTAP-IN General Rubric, Students Readiness Rubric, http://www.nj.gov/education/cccs/standards/8/, various websites, the Yell Curriculum 	
<p>Formative Assessments</p>	

<ul style="list-style-type: none"> • Presentations • Portfolio Assessment • Exit Tickets & Do Now <p>Activities</p> <ul style="list-style-type: none"> • Benchmark Assessments • Hands-On Projects • Class Discussions and <p>Demonstrations</p> <ul style="list-style-type: none"> • Checklists • Student Readiness Rubric • NJ Tap-In Rubric • Blogs 	
Lesson Plans	
Lesson	Timeframe
Lesson 1 Analyzing the Problem	62 Minute Period every other day/ 3 Weeks
Lesson 2 Finding a Solution	62 Minute Period every other day/ 4 Weeks
Lesson 3 Presenting Recommendations and Conclusions	62 Minute Period every other day/ 2 Weeks
Teacher Notes: The schedule may vary depending upon the learning level of the particular class.	
Curriculum Development Resources Click the links below to access additional resources used to design this unit: http://www.nj.gov/education/techno/techlit/tapin/ (NJ TAP-IN Support) http://www.nj.gov/education/techno/techlit/tapin/2biii_rubric.pdf (NJTAP-IN General Rubric) http://www.nj.gov/education/techno/techlit/tapin/2bii_rubric.pdf (Student Readiness Rubric)	

Lesson Plan 1	
Content Area: Computer Education	
Lesson Title: Analyzing the Problem	Timeframe: 62 minute period every other day/ 3 weeks
Lesson Components	
<u>21st Century Themes</u>	

X	Global Awareness	X	Financial, Economic, Business, and Entrepreneurial Literacy	X	Civic Literacy		Health Literacy
<u>21st Century Skills</u>							
X	Creativity and Innovation	X	Critical Thinking and Problem Solving	X	Communication and Collaboration	X	Information Literacy
X	Media Literacy	X	ICT Literacy	X	Life and Career Skills		
Interdisciplinary Connections: Math, Literacy, Science, Social Studies, & Technology							
Integration of Technology: Research, Collecting and Sorting Data, Findings Presentation							
Equipment needed: iPads with Internet, Computers, Smart Board							

Goals/Objectives	Learning Activities/Instructional Strategies	Formative Assessment Tasks
<p>Students will:</p> <ul style="list-style-type: none"> ● Identify and analyze parts of a problem, including the variables and issues involved. ● Communicate with community members, as well as peers, to gain insight into the problem, as well as varying perspectives. ● Conduct research to identify and evaluate the causes and 	<ol style="list-style-type: none"> 1. Learn the steps within the inquiry method and identify a sequence of steps to follow. 2. Conduct research to learn about the problem and who is involved. 3. Communicate with community 	<ul style="list-style-type: none"> ● Teacher Observation ● Rubric Assessment ● Exit Tickets & Do Now Activities ● Benchmark Assessments ● Hands Activities ● Class Discussions and Demonstrations ● Checklists ● Student Readiness Rubric ● NJ Tap-In Rubric ● Blogs

<p>effects within the problem.</p> <ul style="list-style-type: none"> ● Present and publish their findings in an exploratory way. 	<p>members through emails, surveys, and blogs to gain further insight into the situation, as well as opinions as to the cause of the problem.</p> <ol style="list-style-type: none"> 4. Brainstorm a cause and effect web to understand how each part of the problem is connected to each other, as well as the core part of the problem. 5. Create a small presentation to show others the breakdown of the problem, as well as overall findings and opinions. 	
<p>Differentiation</p> <p>Although this is an independent project, students are encouraged to help one another. Specific students will be seated next to each other according to strengths and weaknesses. Extra time to complete the project is permitted and available.</p>		

Grade 8

Unit Overview
Content Area: Computer Education
Unit Title: Advanced Computer Level, with a focus on Publishing
Target Course/Grade Level: 8th Grade Cycle Class
<p>Unit Summary</p> <p>Being able to use technology as a publishing and collaborating tool and resources is important for students to thrive and adapt in our technologically-based world. While utilizing the inquiry method learned and practiced in previous grades to conduct research on a community issue, analyze the situation, brainstorm and evaluate solutions, and provide their own recommendations for actions, students will also be focused on publishing and presenting their findings and conclusions through professional presentation tools and creating their own computer applications and/or websites. This will simulate a real-world situation of informing others, presenting solutions, and creating change in a professional setting. In addition, students will use the Internet as a publishing and collaborative tool through use of podcasts that each group will be responsible for.</p> <p>Primary interdisciplinary connections: Math, Literacy, Science, Social Studies, & Technology</p> <p>21st century themes: Global Awareness, Civic Literacy, and Financial, Economic, Business, and Entrepreneurial Literacy</p>
<p>Unit Rationale Advanced computer applications are vital in building college and workplace readiness skills. The basis and issue associated with utilizing technology in before, during, and after using the inquiry process is to allow students the experience to find, evaluate, and publish information on a professional level. This unit is focused on not only evaluating a given problem or situation, but then also sharing and publishing that information in a professional manner that will help students experience real-world problem solving, a skill and experience set needed in any career path. Students will develop first hand knowledge of organizing and presenting their information by creating visually appealing presentations, building applications and/or websites, and recording podcasts, as well as working collaboratively with peers and learning how to use each other as additional resources.</p>

Learning Targets

Standards & Strands

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

Strand:

- A. Technology Operations and Concepts:** *Students demonstrate a sound understanding of technology concepts, systems and operations.*
- B. Creativity and Innovation:** *Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.*
- C. Communication and Collaboration:** *Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others*
- D. Digital Citizenship:** *Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.*
- E. Research and Information Fluency:** *Students apply digital tools to gather, evaluate, and use information.*

Critical thinking, problem solving, and decision making: *Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.*

Content Statements

Students will be able to understand:

- Understand and use technology systems.
- Select and use applications effectively and productively.
- Apply existing knowledge to generate new ideas, products, or processes.
- Create original works as a means of personal or group expression.
- Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.
- Communicate information and ideas to multiple audiences using a variety of media and formats.
- Contribute to project teams to produce original works or solve problems.
- Advocate and practice safe, legal, and responsible use of information and technology.
- Demonstrate personal responsibility for lifelong learning.
- Exhibit leadership for digital citizenship.
- Plan strategies to guide inquiry.
- Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.

<ul style="list-style-type: none"> ● Evaluate and select information sources and digital tools based on the appropriateness for specific tasks. ● Process data and report results. ● Identify and define authentic problems and investigate significant questions for investigation. ● Plan and manage activities to develop a solution or complete a project. ● Collect and analyze data to identify solutions and/or make informed decisions. ● Use multiple processes and diverse perspectives to explore alternative solutions. 	
CPI #	Cumulative Progress Indicator (CPI)
8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
8.1.8.A.2	Create a document using one or more digital applications to be critiqued by professionals for usability.
8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
8.1.8.A.4	Graph and calculate data within a spreadsheet and present a summary of the results.
8.1.8.A.5	Create a database query, sort and create a report and describe the process, and explain the report results.
8.1.8.B.1	Synthesize and publish information about a local or global issue or event (ex. tele-collaborative project, blog, school web).
8.1.8.C.1	Collaborate to develop and publish work that provides perspectives on a global problem for discussions with learners from other countries.
8.1.8.D.1	Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.
8.1.8.D.2	Demonstrate the application of appropriate citations to digital content.
8.1.8.D.3	Demonstrate an understanding of fair use and Creative Commons to intellectual property.
8.1.8.D.4	Assess the credibility and accuracy of digital content.
8.1.8.D.5	Understand appropriate uses for social media and the negative consequences of misuse.

8.1.8.E.1	Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.
8.1.8.F.1	Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.
Unit Essential Questions <ul style="list-style-type: none"> • What are the advanced functions of computer applications? • How can we use technology to identify, analyze, investigate, and solve a community issue? • How can we present our findings and conclusions in an organized and professional way? • What are the basic parts of creating website? How can publishing our own websites help us reach other members of both our local and global community? 	Unit Enduring Understandings <ul style="list-style-type: none"> • Advanced functions of applications are important in understanding how programs work, how they are related, and how they can aid us in professional and daily life, as well as how they can be applied to solve world problems. • Various computer programs and applications can help us research, collect data, and organize information when using the inquiry method to solve a community problem or issue. • By using different presentation applications, we can create presentations that are visually appealing, organized, structured, and persuasive on a professional level. • Creating a website can help us reach members of our school, local, and global communities. They can allow us to share our information on a broader scale, in addition to helping us learn how websites are designed and made for specific purposes and audiences.
Unit Learning Targets <i>Students will ...</i> <ul style="list-style-type: none"> • Learn how to analyze a problem or situation, using computer applications to research and establish the core problem and variables involved, by following the inquiry method. • Learn how to use computer applications and Web 2.0 tools to communicate and collaborate with peers, community members, stakeholders, and individuals who live in different parts of the world. • Learn how to display and publish research, data, conclusions and recommendations using various computer applications. • Learn how to not only find solutions, but also how to go about implementing change on a community level. • Learn how to create professional and organized presentations using Prezi. 	

<ul style="list-style-type: none"> Learn how to design, create, and organize a website to showcase findings on a public level, while keeping in mind purpose and audience. 	
Evidence of Learning	
<p>Summative Assessment (Marking Period consisting of eight to nine weeks of 62 minute blocks every other day)</p> <p>Equipment needed: Computer per student with network access, printer, Smart Board, iPad per student</p> <p>Programs needed: Google Chrome/Safari, Audio Recorder, Camera Application, Survey program, Video Chat program, Google Apps</p> <p>Teacher Resources:</p> <ul style="list-style-type: none"> NJ TAP-IN Support, NJTAP-IN General Rubric, Students Readiness Rubric, http://www.nj.gov/education/cccs/standards/8/, various websites, the Yell Curriculum 	
<p>Formative Assessments</p> <ul style="list-style-type: none"> Presentations Portfolio Assessment Exit Tickets & Do Now Activities Benchmark Assessments Hands-On Projects Class Discussions and Demonstrations Checklists Student Readiness Rubric NJ Tap-In Rubric Podcasts 	
Lesson Plans	
Lesson	Timeframe
Lesson 1: Community Issue Breakdown with Prezi	62 Minute Period every other day/ 4 Weeks
Lesson 2: Community Issue Recommendation with Apps and/or Websites	62 Minute Period every other day/ 4-5 Weeks
<p>Teacher Notes:</p> <p>The schedule may vary depending upon the learning level of the particular class.</p>	

Curriculum Development Resources

Click the links below to access additional resources used to design this unit:

<http://www.nj.gov/education/techno/techlit/tapin/> (NJ TAP-IN Support)

http://www.nj.gov/education/techno/techlit/tapin/2biii_rubric.pdf (NJTAP-IN General Rubric)

http://www.nj.gov/education/techno/techlit/tapin/2bii_rubric.pdf (Student Readiness Rubric)

Lesson Plan 1							
Content Area: Computer Education							
Lesson Title: Community Issue Breakdown with Prezi				Timeframe: 62 minute period every other day/ 3 weeks			
Lesson Components							
<u>21st Century Themes</u>							
X	Global Awareness	X	Financial, Economic, Business, and Entrepreneurial Literacy	X	Civic Literacy	X	Health Literacy
<u>21st Century Skills</u>							
X	Creativity and Innovation	X	Critical Thinking and Problem Solving	X	Communication and Collaboration	X	Information Literacy
X	Media Literacy	X	ICT Literacy	X	Life and Career Skills		
Interdisciplinary Connections: Math, Literacy, Science, Social Studies, & Technology							
Integration of Technology: Research, Communication & Collaboration, Data Collection & Organization, Presentations (Prezi), App/ Website Building, Podcasts							
Equipment needed: Computers, iPads with Internet, SmartBoard							

Goals/Objectives	Learning Activities/Instructional Strategies	Formative Assessment Tasks
Students:	1. Identify the problem and break it into smaller pieces or areas.	● Teacher Observation

<ul style="list-style-type: none"> ● Identify, break down, and analyze a community issue or problem. ● Communicate with community members, as well as peers, to gain insight into the problem, as well as varying perspectives. ● Create an informative presentation, using Prezi, to showcase the cause, variables, and people involved in the issue. 	<ol style="list-style-type: none"> 2. Research the problem and find out who is involved, its causes and effects, and what variables change the situation. 3. Organize your data using a spreadsheet, web, or other organizer. 4. Create a visual presentation to summarize information and display facts and variable data. 	<ul style="list-style-type: none"> ● Rubric Assessment ● Exit Tickets & Do Now Activities ● Benchmark Assessments ● Hands Activates ● Class Discussions and Demonstrations ● Checklists ● Student Readiness Rubric ● NJ Tap-In Rubric ● Podcasts
<p>Differentiation</p> <p>Although this is an independent project, students are encouraged to help one another. Specific students will be seated next to each other according to strengths and weaknesses. Extra time to complete the project is permitted and available.</p>		
<p>Resources Provided</p> <p>Various Websites</p> <p>Various Applications</p> <p>The School Community & Members</p> <p>Edmodo</p> <ul style="list-style-type: none"> ● 		

Middle School STEAM Curriculum (Grades 6-8)

Unit Overview	
Content Area: Technology	
Unit Title: Simple Machines	
Target Course/Grade Level: 6-8	
Unit Summary <p>The students will investigate simple machines. Students will learn how simple machines work and how they can be used to make work easier. Students will be able to identify examples of simple machines. Students will build working models of simple machines. As a final project, students will build an obstacle for a miniature golf course that uses at least two simple machines for animation purposes.</p> <p>Primary interdisciplinary connections: Language Arts/ Math/ Science</p> <p>21st century themes: Global Awareness/ Civic Literacy</p>	
Unit Rationale: An understanding of simple machines provides students with core concepts of mechanical design. Many of the projects students complete in class will require an understanding of how simple machines work and how they are applied in mechanical design.	
Learning Targets	
Standards & Strands <p>8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.</p> <p>Strand:</p> <p>A. Technology Operations and Concepts: <i>Students demonstrate a sound understanding of technology concepts, systems and operations.</i></p> <p>8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: 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.</p> <p>Strand:</p> <p>A. The Nature of Technology: Creativity and Innovation <i>Technology systems impact every aspect of the world in which we live.</i></p> <p>D. Abilities for a Technological World: <i>The designed world is the product of a design process that provides the means to convert resources into products and systems.</i></p> <p>E. Computational Thinking: Programming: <i>Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.</i></p>	
Content Statements: <i>Students will be able to understand:</i>	

<ul style="list-style-type: none"> ● Understand and use technology systems. ● Select and use applications effectively and productively. ● The characteristics and scope of technology. ● The core concepts of technology. ● The relationships among technologies and the connections between technology and other fields of study. ● Apply the design process. ● Use and maintain technological products and systems. ● Computational thinking and computer programming as tools used in design and engineering 			
CPI #	Cumulative Progress Indicator (CPI)		
8.1.8.A.1	Demonstrate knowledge of real world problems using digital tools.		
8.1.8.A.2	Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.		
8.2.8.A.1	Research a product that was designed for a specific demand and identify how the product has changed to meet new demands (i.e. telephone for communication - smart phone for mobility needs).		
8.2.8.A.2	Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.		
8.2.8.A.3	Investigate a malfunction in any part of a system and identify its impacts.		
8.2.8.A.5	Describe how resources such as material, energy, information, time, tools, people, and capital contribute to a technological product or system.		
8.2.8.D.1	Design and create a product that addresses a real world problem using a design process under specific constraints.		
8.2.8.D.3	Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.		
8.2.8.D.4	Research and publish the steps for using and maintaining a product or system and incorporate diagrams or images throughout to enhance user comprehension.		
8.2.8.E.4	Use appropriate terms in conversation (e.g., programming, language, data, RAM, ROM, Boolean logic terms).		
<table border="1"> <tr> <td> Unit Essential Questions <ul style="list-style-type: none"> ● What are simple machines? ● How do simple machines make work easier? ● Where are simple machines found? </td><td> Unit Enduring Understandings <ul style="list-style-type: none"> ● Simple machines fall into the following classifications: levers, pulleys, incline plane, wheel and axle and gears. ● Simple machines generally help reduce the amount of effort required to do work. ● Simple machines are all around us; from basic tools to complex machines. </td></tr> </table>		Unit Essential Questions <ul style="list-style-type: none"> ● What are simple machines? ● How do simple machines make work easier? ● Where are simple machines found? 	Unit Enduring Understandings <ul style="list-style-type: none"> ● Simple machines fall into the following classifications: levers, pulleys, incline plane, wheel and axle and gears. ● Simple machines generally help reduce the amount of effort required to do work. ● Simple machines are all around us; from basic tools to complex machines.
Unit Essential Questions <ul style="list-style-type: none"> ● What are simple machines? ● How do simple machines make work easier? ● Where are simple machines found? 	Unit Enduring Understandings <ul style="list-style-type: none"> ● Simple machines fall into the following classifications: levers, pulleys, incline plane, wheel and axle and gears. ● Simple machines generally help reduce the amount of effort required to do work. ● Simple machines are all around us; from basic tools to complex machines. 		

Unit Learning Targets <i>Students will ...</i> <ul style="list-style-type: none"> ● Identify simple machines. ● Explain how simple machines reduce effort required to do work. ● Design models of machines using simple machines. ● Use cameras and other electronic devices to document their work. 	
Evidence of Learning	
Summative Assessment (10-11 weeks) Equipment needed: K’Nex kits, Mini golf platforms, camera. Teacher Resources: K’Nex instruction cards.	
Formative Assessments	
<ul style="list-style-type: none"> ● Photographic record of five simple machine models built using K’Nex kits, including description of how model works. ● Design sketch of mini golf obstacle. ● Application of problem solving loop ● Completion of mini golf obstacle ● Student evaluation of mini golf obstacle 	
Lesson Plans	
Lesson	Timeframe
Lesson 1 What is a simple machine	62 minute period/1 week
Lesson 2 Build Simple Machine Models	62 minute period/5 weeks
Lesson 3 Photo Documentation	62 minute period/2 weeks
Lesson 4 Mini golf obstacle design	62 minute period/3 weeks
Teacher Notes: The schedule may vary dependent upon the learning level of the particular class.	
Curriculum Development Resources Click the links below to access additional resources used to design this unit: http://www.edheads.org/activities/simple-machines/	
Lesson Plans 1 and 2	
Content Area: Integrated Science	
Lesson Title: Simple Machines	Timeframe: 62 minute period/2-3 per week for 4-5 weeks
Lesson Components	

<u>21st Century Themes</u>							
x	Global Awareness		Financial, Economic, Business, and Entrepreneurial Literacy	x	Civic Literacy		
<u>21st Century Skills</u>							
X	Creativity and Innovation	X	Critical Thinking and Problem Solving	X	Communication and Collaboration	X	Information Literacy
X	Media Literacy	X	ICT Literacy	X	Life and Career Skills		
Interdisciplinary Connections: Science, Language Arts, Math							
Integration of Technology: research, completed project							
Equipment needed: computer, camera, printer, K’Nex build cards and building sets							

Goals/Objectives	Learning Activities/Instructional Strategies	Formative Assessment Tasks
Students will: <ul style="list-style-type: none"> ● Research simple machines ● Build models of simple machines ● Complete a photographic documentation sheet 	Lesson Sequence F. Students will locate the correct website: http://www.edheads.org/activities/simple-machines/ G. With a partner, the students will locate the correct terms to complete the facts list. H. Students will build models of simple machines with K'Nex building sets. I. Each partnership will create a documentation sheet explaining how the simple machine is used	<ul style="list-style-type: none"> ● Teacher Observation ● Rubric Assessment ● Graded Project ● Self-Assessment
Differentiation The children will be paired according to their individual strengths and weaknesses. Extra time to complete the project is permitted and available.		

Middle School Robotics Curriculum (Grades 6-8)

Unit Overview
Content Area: Technology
Unit Title: Robotics Engineering
Target Course/Grade Level: 6-8
<p>Unit Summary Students will learn how to build and program a robot for a specific purpose. Students will identify a global issue, research the problem and develop a solution for the problem.</p> <p>Primary interdisciplinary connections: Science and Math</p> <p>21st century themes: Global Awareness/ Financial, Economic, Business & Entrepreneurial Literacy/ Civic Literacy/ Health Literacy</p> <p>Unit Rationale: Successful technology is based on the ability to manipulate the engineering design process. Basic problem solving is a skill that students need to learn in order to be successful adults and citizen in our communities. In this unit students will become familiar with the engineering design process.</p>
Learning Targets
<p>Standards & Strands</p> <p>8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.</p> <p>Strand:</p> <ul style="list-style-type: none"> A. Technology Operations and Concepts: <i>Students demonstrate a sound understanding of technology concepts, systems and operations.</i> F. Critical thinking, problem solving, and decision making: <i>Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.</i> <p>8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: 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.</p> <p>Strand:</p> <ul style="list-style-type: none"> A. The Nature of Technology: Creativity and Innovation <i>Technology systems impact every aspect of the world in which we live.</i>

<p>B. Technology and Society: <i>Knowledge and understanding of human, cultural and society values are fundamental when designing technology systems and products in the global society.</i></p> <p>C. Design: <i>The design process is a systematic approach to solving problems.</i></p> <p>D. Abilities for a Technological World: <i>The designed world is the product of a design process that provides the means to convert resources into products and systems.</i></p> <p>E. Computational Thinking: Programming: <i>Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.</i></p>	
<p>Content Statements: <i>Students will be able to understand:</i></p> <ul style="list-style-type: none"> ● Understand and use technology systems. ● Select and use applications effectively and productively. ● Identify and define authentic problems and significant questions for investigation. ● Plan and manage activities to develop a solution or complete a project. ● Collect and analyze data to identify solutions and/or make informed decisions. ● Use multiple processes and diverse perspectives to explore alternative solutions. ● The characteristics and scope of technology. ● The core concepts of technology. ● The relationships among technologies and the connections between technology and other fields of study. ● The cultural, social, economic and political effects of technology. ● The effects of technology on the environment. ● The role of society in the development and use of technology. ● The influence of technology on history. ● The attributes of design. ● The application of engineering design. ● The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving. ● Apply the design process. ● Use and maintain technological products and systems. ● Assess the impact of products and systems. ● Computational thinking and computer programming as tools used in design and engineering. 	
CPI #	Cumulative Progress Indicator (CPI)
8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
8.1.8.A.2	Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
8.1.8.F.1	Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.

8.2.8.A.1	Research a product that was designed for a specific demand and identify how the product has changed to meet new demands (i.e. telephone for communication - smart phone for mobility needs).
8.2.8.A.2	Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.
8.2.8.A.3	Investigate a malfunction in any part of a system and identify its impacts.
8.2.8.A.4	Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.
8.2.8.A.5	Describe how resources such as material, energy, information, time, tools, people, and capital contribute to a technological product or system.
8.2.8.B.2	Identify the desired and undesired consequences from the use of a product or system.
8.2.8.B.3	Research and analyze the ethical issues of a product or system on the environment and report findings for review by peers and /or experts.
8.2.8.B.4	Research examples of how humans can devise technologies to reduce the negative consequences of other technologies and present your findings.
8.2.8.B.5	Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries and societies.
8.2.8.B.6	Compare and contrast the different types of intellectual property including copyrights, patents and trademarks.
8.2.8.B.7	Analyze the historical impact of waste and demonstrate how a product is up cycled, reused or remanufactured into a new product.
8.2.8.C.1	Explain how different teams/groups can contribute to the overall design of a product.
8.2.8.C.2	Explain the need for optimization in a design process.
8.2.8.C.3	Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
8.2.8.C.4	Identify the steps in the design process that would be used to solve a designated problem.
8.2.8.C.5	Explain the interdependence of a subsystem that operates as part of a system.
8.2.8.C.6	Collaborate to examine a malfunctioning system and identify the step-by-step process used to troubleshoot, evaluate and test options to repair the product, presenting the better solution.
8.2.8.C.7	Collaborate with peers and experts in the field to research and develop a product using the design process, data analysis and trends, and maintain a design log with annotated sketches to record the developmental cycle.
8.2.8.C.8	Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers.
8.2.8.D.1	Design and create a product that addresses a real world problem using a design process under specific constraints.

8.2.8.D.2	Identify the design constraints and trade-offs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation, design portfolio or engineering notebook.		
8.2.8.D.3	Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.		
8.2.8.D.4	Research and publish the steps for using and maintaining a product or system and incorporate diagrams or images throughout to enhance user comprehension		
8.2.8.D.5	Explain the impact of resource selection and the production process in the development of a common or technological product or system.		
8.2.8.D.6	Identify and explain how the resources and processes used in the production of a current technological product can be modified to have a more positive impact on the environment.		
8.2.8.E.1	Identify ways computers are used that have had an impact across the range of human activity and within different careers where they are used.		
8.2.8.E.2	Demonstrate an understanding of the relationship between hardware and software.		
8.2.8.E.3	Develop an algorithm to solve an assigned problem using a specified set of commands and use peer review to critique the solution.		
8.2.8.E.4	Use appropriate terms in conversation (e.g., programming, language, data, RAM, ROM, Boolean logic terms).		
<table border="1"> <tr> <td> Unit Essential Questions <ul style="list-style-type: none"> What steps do we take to solve a problem? <p>How is communicating ideas and teamwork important to the problem solving process?</p> </td><td> Unit Enduring Understandings <ul style="list-style-type: none"> Problem solving is a continuous cycle. Good communication skills are imperative for problem solving success. </td></tr> </table>		Unit Essential Questions <ul style="list-style-type: none"> What steps do we take to solve a problem? <p>How is communicating ideas and teamwork important to the problem solving process?</p>	Unit Enduring Understandings <ul style="list-style-type: none"> Problem solving is a continuous cycle. Good communication skills are imperative for problem solving success.
Unit Essential Questions <ul style="list-style-type: none"> What steps do we take to solve a problem? <p>How is communicating ideas and teamwork important to the problem solving process?</p>	Unit Enduring Understandings <ul style="list-style-type: none"> Problem solving is a continuous cycle. Good communication skills are imperative for problem solving success. 		
Unit Learning Targets <i>Students will ...</i> <ul style="list-style-type: none"> Identify a real world problem. Research the problem and generate ideas for possible solutions (including contact with and expert in the field). Develop a solution to the problem. Present their solution using multimedia sources. 			
Evidence of Learning			
Summative Assessment 3 months (12 wks.) on going assessment <ul style="list-style-type: none"> Students will be assessed on their ability to participate in a group. Students will be assessed on demonstration of skill in robot design and programming. Students will be assessed on their presentation. 			

Equipment needed: LEGO NXT kits, Competition table, various other tools and resources

Teacher Resources: LEGO Mind storm software, rubric,
<http://www.nj.gov/education/cccs/standards/8/>, various websites including
www.firstlegoleague.org

Formative Assessments

- Students will be scored on robot performance
- Students will be scored on ability to work as a group.
- Students will be scored on presentation.
- Teacher observation
- Final Project grade
- Subject grade

Lesson Plans

Lesson	Timeframe
Lesson 1 Internet Research	62 minute period/ 12 weeks (ongoing)
Lesson 2 Robot Build	62 minute period/ 12 weeks (ongoing)
Lesson 3 Robot Programming	62 minute period/ 12 weeks (ongoing)
Lesson 4 Assembling Presentation	62 minute period/ 12 weeks (ongoing)

Teacher Notes:

The schedule may vary dependent upon the learning level of the particular class. Each lesson is integrated into the other. Since this project is competitive in nature, the teacher needs to stay on top of student activities and dictate which component of the project needs work during the 12 week period.

Curriculum Development Resources

Click the links below to access additional resources used to design this unit:

www.firstlegoleague.org

<http://youtu.be/u7k5lxsixO4>

<http://youtu.be/zwKI6bIS1M8>

It is important to note that special materials and registration fees must be paid for in order to actually participate in the First Lego League Competition.

Lesson Plan 1 Template							
Content Area: Integrated Science, Language Arts, Math, Social Studies							
Lesson Title: Programming your NXT				Timeframe: 62 minute period/2-3x per week for 12 weeks			
Lesson Components							
21 st Century Themes							
x	Global Awareness	x	Financial, Economic, Business, and Entrepreneurial Literacy	x	Civic Literacy	x	Health Literacy
21 st Century Skills							
X	Creativity and Innovation	X	Critical Thinking and Problem Solving	X	Communication and Collaboration	X	Information Literacy
X	Media Literacy	X	ICT Literacy	X	Life and Career Skills		
Interdisciplinary Connections: Science, Language Arts, Math, Social Studies							
Integration of Technology: research, completed project, robot construction and programming							
Equipment needed: computer, printer, Lego NXT kit, FLL materials, various other tools							

Goals/Objectives	Learning Activities/Instructional Strategies	Formative Assessment Tasks
Students will: <ul style="list-style-type: none"> Learn the difference between input and output devices. Program a robot to use a rotation sensor Program a robot to use a touch sensor 	Lesson Sequence <ol style="list-style-type: none"> Students will open the LEGO NXT software. Students will select use icons to write a simple program (drive robot in square) Students will modify the program to complete a successful change (faster speed or larger square) Students will create a touch sensor program so robot backs up if sensor is bumped. 	<ul style="list-style-type: none"> Teacher Observation Rubric Assessment Graded Project Self-Assessment
Differentiation The children will be paired according to their individual strengths and weaknesses. Extra time to complete the project is permitted and available.		

Middle School Maglev Transportation Curriculum (Grades 6-8)

Unit Overview
Content Area: Technology
Unit Title: Maglev transportation
Target Course/Grade Level: 6-8
<p>Unit Summary: The students will research Magnetic Levitation technology as used for transportation. Students will also research high-speed rail service in the U.S. Students will compare the two modes of transportation and create a presentation (glog or podcast) supporting one mode of transportation over the other.</p> <p>Primary interdisciplinary connections: Language Arts/ Math Science/ Social Studies</p> <p>21st century themes: Civic Literacy, Financial, Economic, Business & Entrepreneurial Literacy.</p>
<p>Unit Rationale: Students will understand that while technology may be available it may not always be the best choice for our needs. Maglev transportation, while has many benefits, may be too expensive for our country to establish in these economic times. Just because a “new” technology is available does not make it feasible or even necessary.</p>
Learning Targets
<p>Standards & Strands</p> <p>8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: 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.</p> <p>Strand:</p> <p>A. The Nature of Technology: Creativity and Innovation <i>Technology systems impact every aspect of the world in which we live.</i></p> <p>B. Technology and Society: <i>Knowledge and understanding of human, cultural and society values are fundamental when designing technology systems and products in the global society.</i></p> <p>D. Abilities for a Technological World: <i>The designed world is the product of a design process that provides the means to convert resources into products and systems.</i></p>
<p>Content Statements: <i>Students will be able to understand:</i></p> <ul style="list-style-type: none"> ● The characteristics and scope of technology ● The core concepts of technology ● The relationships among technologies and the connections between technology and other fields of study. ● The cultural, social, economic and political effects of technology. ● The effects of technology on the environment. ● Apply the design process.

CPI #	Cumulative Progress Indicator (CPI)		
8.2.8.A.1	Research a product that was designed for a specific demand and identify how the product has changed to meet new demands (i.e. telephone for communication - smart phone for mobility needs).		
8.2.8.A.4	Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.		
8.2.8.A.5	Describe how resources such as material, energy, information, time, tools, people, and capital contribute to a technological product or system.		
8.2.8.B.1	Evaluate the history and impact of sustainability on the development of a designed product or system over time and present results to peers.		
8.2.8.B.2	Identify the desired and undesired consequences from the use of a product or system.		
8.2.8.B.3	Research and analyze the ethical issues of a product or system on the environment and report findings for review by peers and /or experts.		
8.2.8.B.4	Research examples of how humans can devise technologies to reduce the negative consequences of other technologies and present your findings.		
8.2.8.D.1	Design and create a product that addresses a real world problem using a design process under specific constraints		
<table border="1"> <tr> <td> Unit Essential Questions: 1. How has the development of rail transportation impacted the development and economy of our nation? 2. What role did ethics play in the development of our rail systems? 3. What impact would the development of a Maglev transportation system have on the economy of this country? 4. Is the development of Maglev transportation better than upgrading our rail system for high speed rail purposes? Is it ethical? </td><td> Unit Enduring Understandings 1. The use of technology for advancement of a nation has not always been ethical. 2. Pros and cons of using technology must be carefully examined before making a commitment. 3. There are many forms of technology in existence that may or may not be beneficial for the growth of oneself or a nation. </td></tr> </table>		Unit Essential Questions: 1. How has the development of rail transportation impacted the development and economy of our nation? 2. What role did ethics play in the development of our rail systems? 3. What impact would the development of a Maglev transportation system have on the economy of this country? 4. Is the development of Maglev transportation better than upgrading our rail system for high speed rail purposes? Is it ethical?	Unit Enduring Understandings 1. The use of technology for advancement of a nation has not always been ethical. 2. Pros and cons of using technology must be carefully examined before making a commitment. 3. There are many forms of technology in existence that may or may not be beneficial for the growth of oneself or a nation.
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Unit Learning Targets <i>Students will ...</i> <ul style="list-style-type: none"> ● Conduct tests and analyze results. ● Synthesize information to design and build a Maglev vehicle. ● Research history of rail transportation in this country. ● Research development of current rail transportation trends in other nations. ● Take a stand on a social issue and provide support for their views. 			
Evidence of Learning			

Summative Assessment (9 weeks)	
Equipment needed: Maglev tracks, maglev vehicle kits, assorted materials such as magnets, cardboard, foam board.	
Teacher Resources: YouTube, Glogster, Podcasting program	
Formative Assessments	
Presentation (podcast or Glog), Activity work sheets , Design or original product	
Lesson Plans	
Lesson	Timeframe
Lesson 1 Internet Research	62 minute period/1-2 weeks
Lesson 2 Podcast/ Glog presentation	62 minute period/2 weeks
Lesson 3 Maglev vehicle activities	62 minute period/4 weeks
Lesson 4 Maglev Competitions	62 minute period/1 week
Teacher Notes:	
The schedule may vary dependent upon the learning level of the particular class.	
Curriculum Development Resources	
Click the links below to access additional resources used to design this unit:	
http://science.howstuffworks.com/transport/engines-equipment/maglev-train.htm	
http://www.ic.sunysb.edu/Stu/ppoggio/maglev/index.html	
http://www.bnl.gov/education/contests/magLev/rules.asp	
http://news.yahoo.com/s/ap/20110208/ap_on_re_us/us_obama_high_speed_rail/	
Various high speed rail videos on DVD	

Lesson Plan 1							
Content Area: Integrated Science, History							
Lesson Title: What is Maglev?				Timeframe: 62 minute period/ 1-2 weeks			
Lesson Components							
<u>21st Century Themes</u>							
x	Global Awareness	x	Financial, Economic, Business, and Entrepreneurial Literacy		Civic Literacy		Health Literacy

<u>21st Century Skills</u>							
x	Creativity and Innovation	x	Critical Thinking and Problem Solving	x	Communication and Collaboration	x	Information Literacy
x	Media Literacy	x	ICT Literacy	x	Life and Career Skills		
Interdisciplinary Connections: Science, Language Arts, History, Ethics							
Integration of Technology: research, completed project							
Equipment needed: computer, printer, maglev track and materials							

Goals/Objectives	Learning Activities/Instructional Strategies	Formative Assessment Tasks
Students will: <ul style="list-style-type: none"> Research the difference between traditional vs. high speed vs. maglev rail travel Complete facts list to use for a Venn diagram Create a presentation using podcasting software or online presentation software such as Glogster or Prezi 	Lesson Sequence: <ol style="list-style-type: none"> Students will locate the correct website: http://science.howstuffworks.com/transport/engines-equipment/maglev-train.htm With a partner, the students will locate the correct terms to complete the facts list Students will log on to Glogster with provided user name and password Students will begin construction of a glog or podcast to be added to through the completion of the project. 	<ul style="list-style-type: none"> Teacher Observation Rubric Assessment Graded Project Self-Assessment
Differentiation The children will be paired according to their individual strengths and weaknesses. Extra time to complete the project is permitted and available.		

Middle School Solar Sprints Curriculum (Grades 6-8)

Unit Overview
Content Area: Technology
Unit Title: Solar Sprints
Target Course/Grade Level: 6-8
<p>Unit Summary: The students will experiment with solar panels and learn how they are used to produce energy. Students will use what they learned to power a model of a solar vehicle. Students will be responsible for designing the vehicle, testing and making modifications for the vehicle. Students will compete for a spot in the Junior Solar Sprints competition team.</p> <p>Primary interdisciplinary connections: Science/ Math/ LAL</p> <p>21st century themes: Global Awareness/ Economic Literacy/ Civic Literacy</p>
<p>Unit Rationale: Alternate energy is going to be a big part of the lives of future generations. Students will be learning about solar energy, how it can be used and how to optimize its potential.</p>
Learning Targets
<p>Standards & Strands</p> <p>8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.</p> <p>Strand:</p> <ul style="list-style-type: none"> A. Technology Operations and Concepts: <i>Students demonstrate a sound understanding of technology concepts, systems and operations.</i> <p>8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: 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.</p> <p>Strand:</p> <ul style="list-style-type: none"> A. The Nature of Technology: <i>Creativity and Innovation Technology systems impact every aspect of the world in which we live.</i> B. Technology and Society: <i>Knowledge and understanding of human, cultural and society values are fundamental when designing technology systems and products in the global society.</i> C. Design: <i>The design process is a systematic approach to solving problems.</i>

D. Abilities for a Technological World: *The designed world is the product of a design process that provides the means to convert resources into products and systems.*

E. Computational Thinking: Programming: *Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.*

Content Statements: *Students will be able to understand:*

- Select and use applications effectively and productively
- The characteristics and scope of technology.
- The core concepts of technology.
- The relationships among technologies and the connections between technology and other fields of study.
- The cultural, social, economic and political effects of technology.
- The effects of technology on the environment.
- The role of society in the development and use of technology.
- The influence of technology on history.
- The attributes of design.
- The application of engineering design
- The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.
- Apply the design process.
- Use and maintain technological products and systems.
- Assess the impact of products and systems.
- Computational thinking and computer programming as tools used in design and engineering

CPI #	Cumulative Progress Indicator (CPI)
8.1.8.A.4	Graph and calculate data within a spreadsheet and present a summary of the results
8.2.8.A.1	Research a product that was designed for a specific demand and identify how the product has changed to meet new demands (i.e. telephone for communication - smart phone for mobility needs).
8.2.8.A.2	Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.
8.2.8.A.3	Investigate a malfunction in any part of a system and identify its impacts.
8.2.8.A.4	Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.
8.2.8.A.5	Describe how resources such as material, energy, information, time, tools, people, and capital contribute to a technological product or system.
8.2.8.B.1	Evaluate the history and impact of sustainability on the development of a designed product or system over time and present results to peers.
8.2.8.B.2	Identify the desired and undesired consequences from the use of a product or system.

8.2.8.B.3	Research and analyze the ethical issues of a product or system on the environment and report findings for review by peers and /or experts.		
8.2.8.B.4	Research examples of how humans can devise technologies to reduce the negative consequences of other technologies and present your findings.		
8.2.8.B.5	Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries and societies.		
8.2.8.C.1	Brainstorm ideas on how to solve a problem or build a product.		
8.2.8.C.2	Explain the need for optimization in a design process.		
8.2.8.C.3	Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.		
8.2.8.C.4	Identify the steps in the design process that would be used to solve a designated problem.		
8.2.8.C.5	Explain the interdependence of a subsystem that operates as part of a system.		
	Create a technical sketch of a product with materials and measurements labeled.		
8.2.8.C.6	Collaborate to examine a malfunctioning system and identify the step-by-step process used to troubleshoot, evaluate and test options to repair the product, presenting the better solution.		
8.2.8.C.8	Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers.		
8.2.8.D.1	Design and create a product that addresses a real world problem using a design process under specific constraints.		
8.2.8.D.2	Identify the design constraints and trade-offs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation, design portfolio or engineering notebook.		
8.2.8.D.3	Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.		
8.2.8.D.4	Research and publish the steps for using and maintaining a product or system and incorporate diagrams or images throughout to enhance user comprehension.		
8.2.8.D.5	Explain the impact of resource selection and the production process in the development of a common or technological product or system.		
8.2.8.E.4	Use appropriate terms in conversation (e.g., programming, language, data, RAM, ROM, Boolean logic terms).		
<table border="1"> <tr> <td> Unit Essential Questions <ul style="list-style-type: none"> ● How can solar energy positively impact our lives? ● How does design impact efficiency and effectiveness of technology? </td><td> Unit Enduring Understandings <ul style="list-style-type: none"> ● Solar Energy is a powerful and useful source of energy. ● To make best use of solar energy, design must be carefully researched and tested for optimization. </td></tr> </table>		Unit Essential Questions <ul style="list-style-type: none"> ● How can solar energy positively impact our lives? ● How does design impact efficiency and effectiveness of technology? 	Unit Enduring Understandings <ul style="list-style-type: none"> ● Solar Energy is a powerful and useful source of energy. ● To make best use of solar energy, design must be carefully researched and tested for optimization.
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Unit Learning Targets			

<p><i>Students will ...</i></p> <ul style="list-style-type: none"> ● Learn how to use a solar panel efficiently and effectively. ● Learn how design plays an important role in using technology effectively. 	
Evidence of Learning	
<p>Summative Assessment (9-10 weeks)</p> <p>Equipment needed: solar panels, digital multi-meters, Microsoft Office Software, Google Sketchup, spring scales, digital scales, solar sprint kits, 3d printer</p>	
<p>Formative Assessments</p> <ul style="list-style-type: none"> ● Lab reports ● Google Sketchup ● Model solar sprint car 	
Lesson Plans	
Lesson	Timeframe
Lesson 1 Internet Research	62 minute period/1 week
Lesson 2 Experiments	62 minute period/2-3 weeks
Lesson 3 Vehicle Design (Design Process)	62 minute period/1week
Lesson 4 Vehicle Construction	62 minute period/3-4 weeks
Lesson 5 Modifications (Design Process)	62 minute period/1 week
<p>Teacher Notes:</p> <p>The schedule may vary dependent upon the learning level of the particular class.</p>	
<p>Curriculum Development Resources</p> <p>Click the links below to access additional resources used to design this unit:</p> <p>http://www.transoptions.org/?p=junior-solar-sprints</p> <p>http://youtu.be/x2zjdtxrisc</p> <p>http://www.nrel.gov/learning/re_photovoltaics.html</p>	

Lesson Plan 1							
Content Area: Integrated Science							
Lesson Title: What is a Photovoltaic Solar Cell?					Timeframe: 62 minute period/2-3x per week for 3-4 weeks		
Lesson Components							
21 st Century Themes							
x	Global Awareness	x	Financial, Economic, Business, and Entrepreneurial Literacy	x	Civic Literacy		Health Literacy
21 st Century Skills							
X	Creativity and Innovation	X	Critical Thinking and Problem Solving	X	Communication and Collaboration	X	Information Literacy
X	Media Literacy	X	ICT Literacy	X	Life and Career Skills		
Interdisciplinary Connections: Science, Language Arts, Math							
Integration of Technology: research, completed project, solar cell, digital multi-meter							
Equipment needed: computer, printer, solar cell, digital multi-meter, 3D printer, & other various tools							

Goals/Objectives	Learning Activities/Instructional Strategies	Formative Assessment Tasks
Students will: <ul style="list-style-type: none"> ● Learn how to read power output of a solar panel. ● Perform basic experiments with a solar panel. ● Organize data in a data table and graph 	Lesson Sequence: <ol style="list-style-type: none"> 1. Quick view of informative video. 2. Demonstration with photovoltaic solar panel. 3. Discussion of variables that may affect performance of solar panel. 4. Student experimentation with solar panel. 5. Student's organization and presentation of collected data 	<ul style="list-style-type: none"> ● Teacher Observation ● Rubric Assessment ● Graded Project ● Self-Assessment
Differentiation: The children will be paired according to their individual strengths and weaknesses. Extra time to complete the project is permitted and available.		

Appendix A

Kindergarten Pacing Guides

Content Area: Computers		
Grade Level: Kindergarten		
Unit Title	Pacing (40 minute periods)	Standards
1st Marking Period		
Introduction to Computers	1 week	8.1.2.A.1
KidPix Tools	4 weeks	8.1.2.A.4
Cloud Creations	1 week	8.1.2.B.1
Shadow Scribbles	1 week	8.1.2.D.1
Internet Introduction	2 weeks	8.2.2.A.1
Helpful Technology	1 week	8.2.2.A.2
2nd Marking Period		
Number Booklet	6 weeks	8.1.2.A.2
Funbrain Kick-off	1 week	8.1.2.A.4
Silly Creature Stories-Switcheroo Zoo	3 weeks	8.1.2.B.1
		8.1.2.D.1
3rd Marking Period		
KidPix Tools Part 2	2 weeks	8.1.2.A.2
Recycling and Reuse	2 weeks	8.1.2.A.4
Website Choices	2 weeks	8.1.2.B.1
The Me Show	4 weeks	8.1.2.D.1
		8.2.2.B.2
4th Marking Period		
The Me Show	6 weeks	8.1.2.A.2
Computer Creations (new products/systems)	3 weeks	8.1.2.A.4
“Helper Tools”	1 week	8.1.2.B.1
		8.1.2.D.1
		8.2.2.C.1
		8.2.2.C.2
		8.2.2.C.3
		8.2.2.C.4
		8.2.2.C.5
		8.2.2.C.6
		8.2.2.D.5

Hamburg School Grade 1 Pacing Guide

Content Area: Computers		
Grade Level: First Grade		
Unit Title	Pacing	Standards
1st Marking Period		
KidPix Review	2 weeks	8.1.2.A.1
Word Processing Introduction	3 weeks	8.1.2.A.2
Which “Tech” is Which?	2 weeks	8.1.2.A.3
Thankful Booklet	3 weeks	8.1.2.A.4
		8.1.2.B.1
		8.1.2.D.1
		8.1.2.E.1
		8.2.2.A.1
		8.2.2.A.2
2nd Marking Period		
Thankful Booklet	3 weeks	8.1.2.A.2
Holiday Assembly Line	4 weeks	8.1.2.A.4
Website Teams	1 week	8.1.2.B.1
Dr. Seuss Celebration	2 weeks	8.1.2.D.1
		8.1.2.E.1
		8.2.2.C.1
		8.2.2.C.2
		8.2.2.C.3
		8.2.2.C.4
		8.2.2.C.5
3rd Marking Period		
Earth Day	2 weeks	8.1.2.A.2
Terrific Technology (Group Project)	4 weeks	8.1.2.A.4
Seasons Show	4 weeks	8.1.2.B.1
		8.1.2.C.1
		8.1.2.D.1
		8.1.2.E.1
		8.2.2.B.1
		8.2.2.B.2
		8.2.2.B.3
		8.2.2.B.4
4th Marking Period		
Seasons Show (Wrap Up)	4 weeks	8.1.2.A.2
Frog and Toad Quest	4 weeks	8.1.2.A.4

Design Squad Nation	2 weeks	8.1.2.B.1 8.1.2.D.1 8.1.2.E.1 8.2.2.D.1 8.2.2.D.2 8.2.2.D.3 8.2.2.D.4
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***Hamburg School
Grade 2 Pacing Guide***

Content Area: Computers Grade Level: Second Grade		
Unit Title	Pacing	Standards
1st Marking Period		8.1.2.A.2
Word Processing Skills	2 weeks	8.1.2.A.3
Internet Ethics	2 weeks	8.1.2.A.4
Autumnal Leaf Project	6 weeks	8.2.2.A.1 8.2.2.A.2
2nd Marking Period		8.1.2.A.2
Spreadsheet-Create and Sort	2 weeks	8.1.2.A.4
iPad-Create and illustrate story	5 weeks	8.1.2.A.5
Problem Deducers	2 weeks	8.1.2.A.6
Helpful Tech	1 week	8.1.2.A.7 8.1.2.B.1 8.1.2.D.1 8.1.2.E.1 8.2.2.A.3 8.2.2.A.4 8.2.2.A.5
3rd Marking Period		8.1.2.A.2
Mapping Tools-Travel Log	5 weeks	8.1.2.A.4
Spreadsheet/Database	3 weeks	8.1.2.A.5
Earth Day	2 weeks	8.1.2.A.6 8.1.2.A.7 8.1.2.B.1 8.1.2.D.1 8.1.2.E.1 8.1.2.F.1 8.2.2.B.1

		8.2.2.B.2 8.2.2.B.3 8.2.2.B.4
4th Marking Period Collaborative Story with Peers Solar System-Out of this World Show	5 weeks 5 weeks	8.1.2.A.2 8.1.2.A.4 8.1.2.B.1 8.1.2.C.1 8.1.2.D.1 8.1.2.E.1

***Hamburg School
Grade 3 Pacing Guide***

Content Area: Computers Grade Level: 3 rd Grade		
Unit Title	Pacing	Standards
1st Marking Period Keyboarding-proper form Word Processing/Graphics- Pages documents with graphics, symbols, or pictures-America the Beautiful Cyber Capers	8 weeks (combined) 2 weeks	8.1.5.A.1 8.1.5.A.2 8.1.5.D.1 8.1.5.D.2 8.1.5.D.3 8.1.5.D.4
2nd Marking Period Pages documents (continued) Thanksgiving Hunt Graphic Organizer-Pilgrim Problems	5 weeks 2 weeks 3 weeks	8.1.5.A.1 8.1.5.A.2 8.1.5.A.3
3rd Marking Period Earth Day Celebration Group Interview-Pollution Cyber Academy Rotary to Cell...Bell to ????	2 weeks 3 weeks 2 weeks 1 weeks	8.1.5.A.1 8.1.5.A.2 8.1.5.B.1 8.2.5.A.1 8.2.5.A.4 8.2.5.A.5 8.2.5.B.1 8.2.5.B.2 8.2.5.B.3 8.2.5.B.4 8.2.5.D.6 8.2.5.D.7

4th Marking Period		
Research Project:	10 weeks	8.1.5.A.1
Internet Research	(combined)	8.1.5.A.2
Assembling documents		8.1.5.A.3
Presenting Slide show-Keynote		8.1.5.D.1
		8.1.5.D.2
		8.1.5.D.3
		8.1.5.D.4
		8.1.5.E.1

***Hamburg School
Grade 4 Pacing Guide***

Content Area: Computers		
Grade Level: 4th Grade		
Unit Title	Pacing	Standards
1st Marking Period		
Keyboarding-proper form	8 weeks	8.1.5.A.1
Word Processing-Personal letter writing	(combined)	8.1.5.A.2
Internet Safety and Digital Citizenship Squad	2 weeks	8.1.5.D.1
		8.1.5.D.2
		8.1.5.D.3
		8.1.5.D.4
2nd Marking Period		
NJ Research	2 weeks	8.1.5.A.1
Pages documents with graphics, symbols, or pictures-New Jersey Symbols	3 weeks	8.1.5.A.2
Graphic Organizer-Positive NJ		8.1.5.A.3
Graphic Organizer-Positive NJ	2 weeks	8.1.5.B.1
First Person-If I were President...	3 weeks	8.1.5.D.1
		8.1.5.D.2
		8.1.5.D.3
		8.1.5.D.4
		8.1.5.E.1
3rd Marking Period		
New Jersey Project (wrap-up)	3 weeks	8.1.5.A.1
New Jersey Presents... (Keynote presentations)	1 week	8.1.5.A.2
Environmental Month		8.1.5.A.3
Redesign and Reassign	2 weeks	8.1.5.D.1
	4 weeks	8.1.5.D.2
		8.1.5.D.3

		8.1.5.D.4 8.2.5.B.1 8.2.5.B.2 8.2.5.B.3 8.2.5.B.4 8.2.5.C.7 8.2.5.D.7
4th Marking Period Products and Systems Tech Over Time Intro to Scratch Step by Step Directions-How to Draw Cartoon Characters Online	2 weeks 2 weeks 3 weeks 3 weeks	8.1.5.A.1 8.1.5.A.2 8.1.5.D.1 8.1.5.D.2 8.1.5.D.3 8.1.5.D.4 8.2.5.A.1 8.2.5.A.4 8.2.5.A.5 8.2.5.D.3 8.2.5.E.1 8.2.5.E.2 8.2.5.E.3 8.2.5.E.4

***Hamburg School
Grade 5 Pacing Guide***

Content Area: Computer Education		
Grade Level: 5th Grade Cycle Class		
One Marking Period = Approx. 8 weeks	Pacing	Standards
Project 1: Environment Table Microsoft Word	Approx. 3 weeks	8.1.5.A.1 8.1.5.A.2 8.1.5.A.3 8.1.5.C.1 8.1.5.D.1 8.1.5.D.2 8.1.5.D.3

		8.1.5.D.4 8.1.5.F.1
Project 2: Analyzing Different Environments Microsoft Excel & Databases	Approx. 3-4 weeks	8.1.5.A.4 8.1.5.A.5 8.1.5.A.6 8.1.5.C.1 8.1.5.D.3 8.1.5.D.4 8.1.5.F.1
Project 3: Telling the Store Narrable	Approx. 1 -2 weeks	8.1.5.B.1 8.1.5.D.3 8.1.5.F.1

Hamburg School
Grade 6 Pacing Guide

Content Area: Computer Education		
Grade Level: 6th Grade Cycle Class		
Unit Title	Pacing	Standards
Project 1: Capturing Evidence to Support Conclusions iPad Project	3-4 Weeks	8.1.8.A.1 8.1.8.A.3 8.1.8.B.1 8.1.8.D.1 8.1.8.D.5 8.1.8.F.1
Project 2: Introduction to Coding Code.org	4-5 Weeks	8.2.8.E.1 8.2.8.E.2 8.2.8.E.3 8.2.8.E.4

Hamburg School
Grade 7 Pacing Guide

Content Area: Computer Education		
Grade Level: 7th Grade Cycle Class		
Unit Title	Pacing	Standards
Project 1: Analyzing the Problem	3 Weeks	8.1.8.A.1 8.1.8.A.2 8.1.8.A.3
Project 2: Finding a Solution	4 Weeks	8.1.8.A.4 8.1.8.A.5 8.1.8.B.1
Project 3: Presenting Recommendations and Conclusions	2 Weeks	8.1.8.C.1 8.1.8.D.1 8.1.8.D.2 8.1.8.D.3 8.1.8.D.4 8.1.8.D.5 8.1.8.E.1 8.1.8.F.1

Hamburg School Grade 8 Pacing Guide

Content Area: Computer Education Grade Level: 8th Grade Cycle Class		
Unit Title	Pacing	Standards
Project 1: Community Issue Breakdown with Prezi	4 Weeks	8.1.8.A.1 8.1.8.A.2
Project 2: Community Issue Recommendation with Apps and/or Websites	4-5 Weeks	8.1.8.A.3 8.1.8.A.4 8.1.8.A.5 8.1.8.B.1 8.1.8.C.1 8.1.8.D.1 8.1.8.D.2 8.1.8.D.3 8.1.8.D.4 8.1.8.D.5 8.1.8.E.1 8.1.8.F.1

Hamburg School Grades 6-8 STEAM Pacing Guide

Content Area: STEAM Grade Level: 6-8		
Unit Title	Pacing	Standards
1st Marking Period First Lego League	1 Marking Period	8.2.8.A.1, 8.2.8.A.2, 8.2.8.A.3, 8.2.8.A.4, 8.2.8.A.5,8.2.8.B.1, 8.2.8.B.2, 8.2.8.B.3,

		8.2.8.B.4, 8.2.8.B.5, 8.2.8.B.7, 8.2.8.C.1, 8.2.8.C.2, 8.2.8.C.3, 8.2.8.C.4, 8.2.8.C.5, 8.2.8.C.6, 8.2.8.C.7, 8.2.8.C.8, 8.2.8.D.1, 8.2.8.D.2, 8.2.8.D.3, 8.2.8.D.5, 8.2.8.E.3, 8.2.8.E.4
2nd Marking Period Simple Machines/ Rube Goldberg	1 Marking Period	8.A.2, 8.2.8.A.3, 8.A.5,8.2.8.B.1, 8.B.2, 8.2.8.B.4, 8.B.5, 8.2.8.C.1, 8.C.2, 8.2.8.C.3, 8.C.4, 8.2.8.C.5, 8.2.8.C.6, 8.C.8,8.2.8.D.2, 8.2.8.D.3, 8.D.58.2.8.D.6,8.2. 8.E.4
3rd Marking Period Alternate Energy/ Solar Sprints	1 Marking Period	8.A.1, 8.2.8.A.2, 8.2.8.A.3, 8.A.4,8.2.8.A.5, 8.B.1, 8.2.8.B.2, 8.B.3,8.2.8.B.4, 8.B.5, 8.2.8.B.7, 8.C.2, 8.2.8.C.3, 8.C.4, 8.2.8.C.5, 8.C.6, 8.2.8.C.7, 8.2.8.C.8, 8.D.1, 8.2.8.D.2, 8.D.3, 8.2.8.D.5, 8.D.6, 8.2.8.E.4

<p>4th Marking Period</p> <p>3D Design/ Manufacturing</p>	<p>1 Marking Period</p>	<p>8.A.1, 8.2.8.A.1, 8.A.3, 8.2.8.A.4, 8.A.5, 8.2.8.B.1, 8.2.8.B.2, 8.2.8.B.3, 8.2.8.B.5, 8.2.8.B.6, 8.2.8.B.7, 8.2.8.C.1, 8.2.8.C.2, 8.2.8.C.3, 8.2.8.C.4, 8.2.8.C.5, 8.2.8.C.7, 8.2.8.C.8, 8.2.8.D.1, 8.2.8.D.2, 8.2.8.D.3, 8.2.8.D.4, 8.2.8.E.1, 8.2.8.E.2, 8.2.8.E.4</p>
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Appendix B

Technology Benchmark Guides

Content Area: Computers Grade Level: Kindergarten			
Benchmark Name/Unit Assessment	Period of Time	Standards Covered	Scoring Scale (ex. Based on 100 pt scale)
Computer Navigation and KidPix Tools	September-November	8.1.2.A.1 8.1.2.A.4	checklist
Silly Creature Stories	December-February	8.1.2.A.2 8.1.2.A.4 8.1.2.B.1	rubric
The Me Show	February-April	8.1.2.A.2 8.1.2.A.4 8.1.2.B.1	rubric
Computer Creations	May-June	8.1.2.A.2 8.1.2.A.4 8.1.2.B.1 8.1.2.D.1 8.2.2.C.1-6	rubric

Content Area: Computers Grade Level: 1 st Grade			
Benchmark Name/Unit Assessment	Period of Time	Standards Covered	Scoring Scale (ex. Based on 100 pt scale)
Thankful Booklet	September-November	8.1.2.A.1-4 8.1.2.B.1 8.1.2.D.1 8.1.2.E.1 8.2.2.A.1-2	rubric
Holiday Assembly Line	December-January	8.1.2.A.2 8.1.2.A.4 8.1.2.B.1 8.1.2.D.1 8.1.2.E.1 8.2.2.C.1-5	rubric
Dr. Seuss Celebration	February	8.1.2.A.2 8.1.2.A.4 8.1.2.B.1 8.1.2.D.1 8.1.2.E.1 8.2.2.C.1-5	checklist
Seasons Show	March-April	8.1.2.A.2 8.1.2.A.4 8.1.2.B.1 8.1.2.C.1 8.1.2.D.1 8.1.2.E.1 8.2.2.B.1-4	rubric
Design Squad Nation	May-June	8.1.2.A.2 8.1.2.A.4 8.1.2.B.1 8.1.2.D.1 8.1.2.E.1 8.2.2.D.1	rubric

Content Area: Computers Grade Level: 2 nd Grade			
Benchmark Name/Unit Assessment	Period of Time	Standards Covered	Scoring Scale (ex. Based on 100 pt scale)
Autumnal Leaf Project	September-November	8.1.2.A.2-4 8.2.2.A.1-2	rubric
Spreadsheet-Create and Sort iPad-Create and illustrate story Helpful Tech	December-February	8.1.2.A.2 8.1.2.A.4-7 8.1.2.B.1 8.1.2.D.1 8.1.2.E.1 8.2.2.A.3-5	rubric peer assessment checklist
Travel Log Earth Day	March-April	8.1.2.A.2 8.1.2.A.4-7 8.1.2.B.1 8.1.2.D.1 8.1.2.E.1 8.1.2.F.1 8.2.2.B.1-4	rubric
Collaborative Story with Peers Solar System	May-June	8.1.2.A.2 8.1.2.A.4 8.1.2.B.1 8.1.2.C.1 8.1.2.D.1 8.1.2.E.1	peer assessment rubric

Content Area: Computers Grade Level: 3rd Grade			
Benchmark Name/Unit Assessment	Period of Time	Standards Covered	Scoring Scale (ex. Based on 100 pt scale)
Keyboarding America the Beautiful	September-October	8.1.5.A.1-2	checklist rubric
Thanksgiving Hunt Graphic Organizer	November-January	8.1.5.A.1-3	100 scale rubric
Group Interview-Pollution Cyber Academy Rotary to Cell...Bell to ????	February-April	8.1.5.B.1 8.2.5.A.1, 4-5 8.2.5.B.1-4 8.2.5.D.6-7	peer assessment checklist rubric

Research Project: Internet Research	April-June	8.1.4.A.1-5 8.1.4.B.1 8.1.4.E.2	rubric checklist
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Content Area: Computers Grade Level: 4 th Grade			
Benchmark Name/Unit Assessment	Period of Time	Standards Covered	Scoring Scale (ex. Based on 100 pt scale)
Keyboarding Letter Writing	September- November	8.1.5.A.1-2	checklist rubric
New Jersey Counties New Jersey Symbols Kidspiration	December- February	8.1.5.A.1-3 8.1.5.B.1 8.1.5.D.1-4 8.1.5.E.1	rubric rubric self assessment
Keynote Presentations The Two Faces of our Home- Fragile System, Strong Sustainer	March-April	8.1.5.A.1-3 8.1.5.D.1-4 8.2.5.B.1-4 8.2.5.C.7 8.2.5.D.7	peer assessment rubric
Intro to Scratch Step by Step Directions	May-June	8.1.5.A.1-2 8.1.5.D.1-4 8.2.5.A.1,4-5 8.2.5.D.3 8.2.5.E.1-4	checklist checklist
Teachers Notes: Benchmarks shall reflect modifications within ELL, IEP, and/or 504 plans.			

Content Area: Computer Education Grade Level: 5th Grade Cycle Class			
Benchmark Name/Unit Assessment	Period of Time	Standards Covered	Scoring Scale (ex. Based on 100 pt scale)

Rubric 1: Environment Table Microsoft Word	3rd Week	8.1.5.A.1 8.1.5.A.2 8.1.5.A.3 8.1.5.C.1 8.1.5.D.1 8.1.5.D.2 8.1.5.D.3 8.1.5.D.4 8.1.5.F.1	100 pts.
Rubric 2: Analyzing Different Environments Microsoft Excel & Databases	6th-7th Week	8.1.5.A.4 8.1.5.A.5 8.1.5.A.6 8.1.5.C.1 8.1.5.D.3 8.1.5.D.4 8.1.5.F.1	100 pts.
Rubric 3: Telling the Store Narrable	8th Week	8.1.5.B.1 8.1.5.D.3 8.1.5.F.1	100pts.
Teachers Notes: Benchmarks shall reflect modifications within ELL, IEP, and/or 504 plans.			

Content Area: Computer Education			
Grade Level: 6th Grade Cycle Class			
Benchmark Name/Unit Assessment	Period of Time	Standards Covered	Scoring Scale (ex. Based on 100 pt scale)
Project 1: Capturing Evidence to Support Conclusions iPad Project	4th Week	8.1.8.A.1 8.1.8.A.3 8.1.8.B.1 8.1.8.D.1	100 pts.

		8.1.8.D.5 8.1.8.F.1	
Project 2: Introduction to Coding Code.org	8th Week	8.2.8.E.1 8.2.8.E.2 8.2.8.E.3 8.2.8.E.4	100 pts.
Teachers Notes: Benchmarks shall reflect modifications within ELL, IEP, and/or 504 plans.			

Content Area: Computer Education Grade Level: 7th Grade Cycle Class			
Benchmark Name/Unit Assessment	Period of Time	Standards Covered	Scoring Scale (ex. Based on 100 pt scale)
Project 1: Analyzing the Problem	3rd Week	8.1.8.A.1	30 pts.
Project 2: Finding a Solution	7th Week	8.1.8.A.2	40 pts.
Project 3: Presenting Recommendations and Conclusions	9th Week	8.1.8.A.3 8.1.8.A.4 8.1.8.A.5 8.1.8.B.1 8.1.8.C.1 8.1.8.D.1 8.1.8.D.2 8.1.8.D.3 8.1.8.D.4 8.1.8.D.5 8.1.8.E.1 8.1.8.F.1	30 pts.
Teachers Notes: Benchmarks shall reflect modifications within ELL, IEP, and/or 504 plans.			

Content Area: Computer Education			
Grade Level: 8 th Grade			
Benchmark Name/Unit Assessment	Period of Time	Standards Covered	Scoring Scale (ex. Based on 100 pt scale)
Project 1: Community Issue Breakdown with Prezi	5th Week	8.1.8.A.1 8.1.8.A.2 8.1.8.A.3 8.1.8.A.4 8.1.8.A.5 8.1.8.B.1 8.1.8.C.1	100
Project 2: Community Issue Recommendation with Apps and/or Websites	9th Week	8.1.8.D.1 8.1.8.D.2 8.1.8.D.3 8.1.8.D.4 8.1.8.D.5 8.1.8.E.1 8.1.8.F.1	100
Teachers Notes: Benchmarks shall reflect modifications within ELL, IEP, and/or 504 plans.			

Content Area: STEAM			
Grade Level: 6-8			
Benchmark Name/Unit Assessment	Period of Time	Standards Covered	Scoring Scale (ex. Based on 100 pt scale)
First Lego League	First Marking Period	8.2.8.A.1, 8.2.8.A.2, 8.2.8.A.3, 8.2.8.A.4, 8.2.8.A.5,8.2.8.B.1, 8.2.8.B.2,	100

		8.2.8.B.3, 8.2.8.B.4, 8.2.8.B.5, 8.2.8.B.7, 8.2.8.C.1, 8.2.8.C.2, 8.2.8.C.3, 8.2.8.C.4, 8.2.8.C.5, 8.2.8.C.6, 8.2.8.C.7, 8.2.8.C.8, 8.2.8.D.1, 8.2.8.D.2, 8.2.8.D.3, 8.2.8.D.5, 8.2.8.E.3, 8.2.8.E.4	
Simple Machines	8 weeks	8.2.8.A.2, 8.2.8.A.3, 8.2.8.A.5,8.2.8. B.1, 8.2.8.B.2, 8.2.8.B.4, 8.2.8.B.5, 8.2.8.C.1, 8.2.8.C.2, 8.2.8.C.3, 8.2.8.C.4, 8.2.8.C.5, 8.2.8.C.6, 8.2.8.C.8,8.2.8. D.2, 8.2.8.D.3, 8.2.8.D.58.2.8. D.6,8.2.8.E.4	100
Alternate Energy	10 weeks	8.2.8.A.1, 8.2.8.A.2, 8.2.8.A.3, 8.2.8.A.4,8.2.8. A.5, 8.2.8.B.1, 8.2.8.B.2, 8.2.8.B.3,8.2.8.	100

		B.4, 8.2.8.B.5, 8.2.8.B.7, 8.2.8.C.2, 8.2.8.C.3, 8.2.8.C.4, 8.2.8.C.5, 8.2.8.C.6, 8.2.8.C.7, 8.2.8.C.8, 8.2.8.D.1, 8.2.8.D.2, 8.2.8.D.3, 8.2.8.D.5, 8.2.8.D.6, 8.2.8.E.4	
Solar Sprints/3D DESIGN/ PRINTING	10 WEEKS	8.2.8.A.1, 8.2.8.A.1, 8.2.8.A.3, 8.2.8.A.4, 8.2.8.A.5, 8.2.8.B.1, 8.2.8.B.2, 8.2.8.B.3,8.2.8. B.5, 8.2.8.B.6, 8.2.8.B.7, 8.2.8.C.1,8.2.8. C.2, 8.2.8.C.3, 8.2.8.C.4, 8.2.8.C.5, 8.2.8.C.7, 8.2.8.C.8, 8.2.8.D.1, 8.2.8.D.2, 8.2.8.D.3, 8.2.8.D.4, 8.2.8.E.1, 8.2.8.E.2, 8.2.8.E.4	100
Teachers Notes: Benchmarks shall reflect modifications within ELL, IEP, and/or 504 plans.			

Appendix C

2014 NJCCCS Technology

Pre-School Standards are addressed in the Hamburg Pre-School Curriculum

Content Area		Technology	
Standard		8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.	
Strand		A. Technology Operations and Concepts: <i>Students demonstrate a sound understanding of technology concepts, systems and operations.</i>	
Grade Level bands	Content Statement Students will:	Indicator	Indicator
P	Understand and use technology systems.	8.1.P.A.1	Use an input device to select an item and navigate the screen
		8.1.P.A.2	Navigate the basic functions of a browser.
	Select and use applications effectively and productively.	8.1.P.A.3	Use digital devices to create stories with pictures, numbers, letters and words.
		8.1.P.A.4	Use basic technology terms in the proper context in conversation with peers and teachers (e.g., camera, tablet, Internet, mouse, keyboard, and printer).
		8.1.P.A.5	Demonstrate the ability to access and use resources on a computing device.
K-2	Understand and use technology systems.	8.1.2.A.1	Identify the basic features of a digital device and explain its purpose.
	Select and use applications effectively and productively.	8.1.2.A.2	Create a document using a word processing application.
		8.1.2.A.3	Compare the common uses of at least two different digital applications and identify the advantages and disadvantages of using each.

		8.1.2.A.4	Demonstrate developmentally appropriate navigation skills in virtual environments (i.e. games, museums).
		8.1.2.A.5	Enter information into a spreadsheet and sort the information.
		8.1.2.A.6	Identify the structure and components of a database.
		8.1.2.A.7	Enter information into a database or spreadsheet and filter the information.
3-5	Understand and use technology systems.	8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
	Select and use applications effectively and productively.	8.1.5.A.2	Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
		8.1.5.A.3	Use a graphic organizer to organize information about problem or issue.
		8.1.5.A.4	Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.
		8.1.5.A.5	Create and use a database to answer basic questions.
		8.1.5.A.6	Export data from a database into a spreadsheet; analyze and produce a report that explains the analysis of the data.
6-8	Understand and use technology systems.	8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
	Select and use applications effectively and productively.	8.1.8.A.2	Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
		8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

		8.1.8.A.4	Graph and calculate data within a spreadsheet and present a summary of the results
		8.1.8.A.5	Create a database query, sort and create a report and describe the process, and explain the report results.
Content Area		Technology	
Standard		8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.	
Strand		B. Creativity and Innovation: <i>Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.</i>	
Grade Level bands	Content Statement Students will:	Indicator	Indicator
P	Apply existing knowledge to generate new ideas, products, or processes. Create original works as a means of personal or group expression.	8.1.P.B.1	Create a story about a picture taken by the student on a digital camera or mobile device.
K-2		8.1.2.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and <u>resources</u> .
3-5		8.1.5.B.1	Collaborative to produce a digital story about a significant local event or issue based on first-person interviews.
6-8		8.1.8.B.1	Synthesize and publish information about a local or global issue or event (ex. tele-collaborative project, blog, school web).
Content Area		Technology	
Standard		8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.	
Strand		C. Communication and Collaboration: <i>Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.</i>	

Grade Level bands	Content Statement	Indicator	Indicator
P	Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media. Communicate information and ideas to multiple audiences using a variety of media and formats. Develop cultural understanding and global awareness by engaging with learners of other cultures. Contribute to project teams to produce original works or solve problems.	8.1.P.C.1	Collaborate with peers by participating in interactive digital games or activities.
K-2		8.1.2.C.1	Engage in a variety of developmentally appropriate learning activities with students in other classes, schools, or countries using various media formats such as online collaborative tools, and social media.
3-5		8.1.5.C.1	Engage in online discussions with learners of other cultures to investigate a worldwide issue from multiple perspectives and sources, evaluate findings and present possible solutions, using digital tools and online resources for all steps.
6-8		8.1.8.C.1	Collaborate to develop and publish work that provides perspectives on a global problem for discussions with learners from other countries.
Content Area		Technology	
Standard		8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.	
Strand		D. Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.	
Grade Level bands	Content Statement	Indicator	Indicator
K-2	Advocate and practice safe, legal, and responsible use of	8.1.2.D.1	Develop an understanding of ownership of print and non-print information.

	information and technology.		
3-5	Advocate and practice safe, legal, and responsible use of information and technology.	8.1.5.D.1	Understand the need for and use of copyrights.
		8.1.5.D.2	Analyze the resource citations in online materials for proper use.
	Demonstrate personal responsibility for lifelong learning.	8.1.5.D.3	Demonstrate an understanding of the need to practice cyber safety, cyber security, and cyber ethics when using technologies and social media.
	Exhibit leadership for digital citizenship.	8.1.5.D.4	Understand digital citizenship and demonstrate an understanding of the personal consequences of inappropriate use of technology and social media.
6-8	Advocate and practice safe, legal, and responsible use of information and technology.	8.1.8.D.1	Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.
	Demonstrate personal responsibility for lifelong learning.	8.1.8.D.2	Demonstrate the application of appropriate citations to digital content.
		8.1.8.D.3	Demonstrate an understanding of fair use and Creative Commons to intellectual property.
	Exhibit leadership for digital citizenship.	8.1.8.D.4	Assess the credibility and accuracy of digital content.
		8.1.8.D.5	Understand appropriate uses for social media and the negative consequences of misuse.
Content Area		Technology	
Standard		8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.	

Strand		E: Research and Information Fluency: <i>Students apply digital tools to gather, evaluate, and use information.</i>	
Grade Level bands	Content Statement Students will:	Indicator	Indicator
P	Plan strategies to guide inquiry.	8.1.P.E.1	Use the Internet to explore and investigate questions with a teacher's support.
K-2	Plan strategies to guide inquiry Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.	8.1.2.E.1	Use digital tools and online resources to explore a problem or issue.
3-5	Plan strategies to guide inquiry. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.	8.1.5.E.1	Use digital tools to research and evaluate the accuracy of, relevance to, and appropriateness of using print and non-print electronic information sources to complete a variety of tasks.
6-8	Plan strategies to guide inquiry. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a	8.1.8.E.1	Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.

	<p>variety of sources and media.</p> <p>Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.</p> <p>Process data and report results.</p>		
Content Area	Technology		
Standard	8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.		
Strand	F: Critical thinking, problem solving, and decision making: <i>Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.</i>		
Grade Level bands	Content Statement Students will:	Indicator	Indicator
K-2	<p>Identify and define authentic problems and significant questions for investigation.</p> <p>Plan and manage activities to develop a solution or complete a project.</p> <p>Collect and analyze data to identify solutions and/or make informed decisions.</p> <p>Use multiple processes and diverse perspectives to explore alternative solutions.</p>	8.1.2.F.1	Use geographic mapping tools to plan and solve problems.
3-5	<p>Identify and define authentic problems and significant questions for investigation.</p>	8.1.5.F.1	Apply digital tools to collect, organize, and analyze data that support a scientific finding.

	Plan and manage activities to develop a solution or complete a project. Collect and analyze data to identify solutions and/or make informed decisions. Use multiple processes and diverse perspectives to explore alternative solutions		
6-8	Identify and define authentic problems and significant questions for investigation. Plan and manage activities to develop a solution or complete a project. Collect and analyze data to identify solutions and/or make informed decisions. Use multiple processes and diverse perspectives to explore alternative solutions.	8.1.8.F.1	Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.

Content Area		Technology	
Standard		8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.	
Strand		A. The Nature of Technology: Creativity and Innovation <i>Technology systems impact every aspect of the world in which we live.</i>	
Grade Level bands	Content Statement Students will be able to understand:	Indicator	Indicator

K-2	The characteristics and scope of technology.	8.2.2.A.1	Define products produced as a result of technology or of nature.
		8.2.2.A.2	Describe how designed products and systems are useful at school, home and work.
	The core concepts of technology.	8.2.2.A.3	Identify a system and the components that work together to accomplish its purpose.
		8.2.2.A.4	Choose a product to make and plan the tools and materials needed.
	The relationships among technologies and the connections between technology and other fields of study.	8.2.2.A.5	Collaborate to design a solution to a problem affecting the community.
3-5	The characteristics and scope of technology.	8.2.5.A.1	Compare and contrast how products made in nature differ from products that are human made in how they are produced and used.
		8.2.5.A.2	Investigate and present factors that influence the development and function of a product and a system.
	The core concepts of technology.	8.2.5.A.3	Investigate and present factors that influence the development and function of products and systems, e.g., resources, criteria and constraints.
	The relationships among technologies and the connections between technology and other fields of study.	8.2.5.A.4	Compare and contrast how technologies have changed over time due to human needs and economic, political and/or cultural influences.
		8.2.5.A.5	Identify how improvement in the understanding of materials science impacts technologies.
6-8	The characteristics and scope of technology.	8.2.8.A.1	Research a product that was designed for a specific demand and identify how the product has changed to meet new demands (i.e. telephone for communication - smart phone for mobility needs).

	The core concepts of technology.	8.2.8.A.2	Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.
		8.2.8.A.3	Investigate a malfunction in any part of a system and identify its impacts.
	The relationships among technologies and the connections between technology and other fields of study.	8.2.8.A.4	Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.
		8.2.8.A.5	Describe how resources such as material, energy, information, time, tools, people, and capital contribute to a technological product or system.
Content Area		Technology	
Standard		8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.	
Strand		B. Technology and Society: Knowledge and understanding of human, cultural and society values are fundamental when designing technology systems and products in the global society.	
Grade Level bands	Content Statement Students will be able to understand:	Indicator	Indicator
K-2	The cultural, social, economic and political effects of technology.	8.2.2.B.1	Identify how technology impacts or improves life.
	The effects of technology on the environment.	8.2.2.B.2	Demonstrate how reusing a product affects the local and global environment.
	The role of society in the development and use of technology.	8.2.2.B.3	Identify products or systems that are designed to meet human needs.
	The influence of technology on history.	8.2.2.B.4	Identify how the ways people live and work has changed because of technology.
3-5	The cultural, social, economic and political effects of technology.	8.2.5.B.1	Examine ethical considerations in the development and production of a product through its life cycle.

	The effects of technology on the environment.	8.2.5.B.2	Examine systems used for recycling and recommend simplification of the systems and share with product developers.
		8.2.5.B.3	Investigate ways that various technologies are being developed and used to reduce improper use of resources.
	The role of society in the development and use of technology.	8.2.5.B.4	Research technologies that have changed due to society's changing needs and wants.
		8.2.5.B.5	Explain the purpose of intellectual property law.
	The influence of technology on history.	8.2.5.B.6	Compare and discuss how technologies have influenced history in the past century.
6-8	The cultural, social, economic and political effects of technology.	8.2.8.B.1	Evaluate the history and impact of sustainability on the development of a designed product or system over time and present results to peers.
		8.2.8.B.2	Identify the desired and undesired consequences from the use of a product or system.
	The effects of technology on the environment.	8.2.8.B.3	Research and analyze the ethical issues of a product or system on the environment and report findings for review by peers and /or experts.
		8.2.8.B.4	Research examples of how humans can devise technologies to reduce the negative consequences of other technologies and present your findings.
	The role of society in the development and use of technology.	8.2.8.B.5	Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries and societies.
		8.2.8.B.6	Compare and contrast the different types of intellectual property including copyrights, patents and trademarks.
	The influence of technology on history.	8.2.8.B.7	Analyze the historical impact of waste and demonstrate how a product is upcycled,

			reused or remanufactured into a new product.
Content Area	Technology		
Standard	8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.		
Strand	C. Design: <i>The design process is a systematic approach to solving problems.</i>		
Grade Level bands	Content Statement	Indicator	Indicator
K-2	The attributes of design.	8.2.2.C.1	Brainstorm ideas on how to solve a problem or build a product.
		8.2.2.C.2	Create a drawing of a product or device that communicates its function to peers and discuss.
		8.2.2.C.3	Explain why we need to make new products.
	The application of engineering design.	8.2.2.C.4	Identify designed products and brainstorm how to improve one used in the classroom.
		8.2.2.C.5	Describe how the parts of a common toy or tool interact and work as part of a system.
	The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.	8.2.2.C.6	Investigate a product that has stopped working and brainstorm ideas to correct the problem.
3-5	The attributes of design.	8.2.5.C.1	Collaborate with peers to illustrate components of a designed system.
		8.2.5.C.2	Explain how specifications and limitations can be used to direct a product's development.
		8.2.5.C.3	Research how design modifications have lead to new products.

	The application of engineering design.	8.2.5.C.4	Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
		8.2.5.C.5	Explain the functions of a system and subsystems.
	The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.	8.2.5.C.6	Examine a malfunctioning tool and identify the process to troubleshoot and present options to repair the tool.
		8.2.5.C.7	Work with peers to redesign an existing product for a different purpose.
6-8	The attributes of design.	8.2.8.C.1	Explain how different teams/groups can contribute to the overall design of a product.
		8.2.8.C.2	Explain the need for optimization in a design process.
		8.2.8.C.3	Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
	The application of engineering design.	8.2.8.C.4	Identify the steps in the design process that would be used to solve a designated problem.
		8.2.8.C.5	Explain the interdependence of a subsystem that operates as part of a system.
			Create a technical sketch of a product with materials and measurements labeled.
	The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.	8.2.8.C.6	Collaborate to examine a malfunctioning system and identify the step-by-step process used to troubleshoot, evaluate and test options to repair the product, presenting the better solution.
		8.2.8.C.7	Collaborate with peers and experts in the field to research and develop a product using the design process, data analysis and trends, and maintain a design log with

			annotated sketches to record the developmental cycle.
		8.2.8.C.8	Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers.
Content Area		Technology	
Standard		8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.	
Strand		D. Abilities for a Technological World: <i>The designed world is the product of a design process that provides the means to convert resources into products and systems.</i>	
Grade Level bands	Content Statement Students will understand how to:	Indicator	Indicator
K-2	Apply the design process.	8.2.2.D.1	Collaborate and apply a design process to solve a simple problem from everyday experiences.
	Use and maintain technological products and systems.	8.2.2.D.2	Discover how a product works by taking it apart, sketching how parts fit, and putting it back together.
		8.2.2.D.3	Identify the strengths and weaknesses in a product or system.
		8.2.2.D.4	Identify the resources needed to create technological products or systems.
	Assess the impact of products and systems.	8.2.2.D.5	Identify how using a tool (such as a bucket or wagon) aids in reducing work.
3-5	Apply the design process.	8.2.5.D.1	Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade-offs to be considered.
		8.2.5.D.2	Evaluate and test alternative solutions to a problem using the constraints and trade-

			offs identified in the design process to evaluate potential solutions.
	Use and maintain technological products and systems.	8.2.5.D.3	Follow step by step directions to assemble a product or solve a problem.
		8.2.5.D.4	Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.
		8.2.5.D.5	Describe how resources such as material, energy, information, time, tools, people and capital are used in products or systems.
	Assess the impact of products and systems.	8.2.5.D.6	Explain the positive and negative effect of products and systems on humans, other species and the environment, and when the product or system should be used.
		8.2.5.D.7	Explain the impact that resources such as energy and materials used in a process to produce products or system have on the environment.
6-8	Apply the design process.	8.2.8.D.1	Design and create a product that addresses a real world problem using a design process under specific constraints.
		8.2.8.D.2	Identify the design constraints and trade-offs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation, design portfolio or engineering notebook.
		8.2.8.D.3	Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.
	Use and maintain technological products and systems.	8.2.8.D.4	Research and publish the steps for using and maintaining a product or system and incorporate diagrams or images throughout to enhance user comprehension.

	Assess the impact of products and systems.	8.2.8.D.5	Explain the impact of resource selection and the production process in the development of a common or technological product or system.
		8.2.8.D.6	Identify and explain how the resources and processes used in the production of a current technological product can be modified to have a more positive impact on the environment.
Content Area		Technology	
Standard		8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.	
Strand		E. Computational Thinking: Programming: <i>Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.</i>	
Grade Level bands	Content Statement Students will be able to understand:	Indicator	Indicator
K-2	Computational thinking and computer programming as tools used in design and engineering.	8.2.2.E.1	List and demonstrate the steps to an everyday task.
		8.2.2.E.2	Demonstrate an understanding of how a computer takes input through a series of written commands and then interprets and displays information as output.
		8.2.2.E.3	Create algorithms (a sets of instructions) using a pre-defined set of commands (e.g., to move a student or a character through a maze).
		8.2.2.E.4	Debug an algorithm (i.e., correct an error).

		8.2.2.E.5	Use appropriate terms in conversation (e.g., basic vocabulary words: input, output, the operating system, debug, and algorithm).
3-5	Computational thinking and computer programming as tools used in design and engineering.	8.2.5.E.1	Identify how computer programming impacts our everyday lives.
		8.2.5.E.2	Demonstrate an understanding of how a computer takes input of data, processes and stores the data through a series of commands, and outputs information.
		8.2.5.E.3	Using a simple, visual programming language, create a program using loops, events and procedures to generate specific output.
		8.2.5.E.4	Use appropriate terms in conversation (e.g., algorithm, program, debug, loop, events, procedures, memory, storage, processing, software, coding, procedure, and data).
6-8	Computational thinking and computer programming as tools used in design and engineering.	8.2.8.E.1	Identify ways computers are used that have had an impact across the range of human activity and within different careers where they are used.
		8.2.8.E.2	Demonstrate an understanding of the relationship between hardware and software.
		8.2.8.E.3	Develop an algorithm to solve an assigned problem using a specified set of commands and use peer review to critique the solution.
		8.2.8.E.4	Use appropriate terms in conversation (e.g., programming, language, data, RAM, ROM, Boolean logic terms).