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.	**By the end of Grade 2**

Strand E: Computational Thinking: Programming

Rationale: Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.

Technology CPI

8.2.2.E.1

List and demonstrate the steps to an everyday task.

Content Area CPI

CCSS.ELA-LITERACY.CCRA.SL.1
Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

CCSS.MATH.PRACTICE.MP4
Model with mathematics.

Sample Activity

Students will write an addition equation to describe a given situation. Then, students will collaboratively develop the steps to solve the equation, using whatever method they choose (10 frame, number line, manipulatives, etc). Finally, students will present their step-by-step process to the class.

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Instructional Design Ideas

- Interdisciplinary Learning: Content area standards are developed while cultivating relevant technology applications and skills.
- Multiple Means of Engagement: In pairs or small groups work together to create an algorithm (set of instructions) to make a sandwich, sharpen a pencil or brush their teeth. Students may record results using cards, paper or computers. Students may take and then sequence the pictures to show steps that produce an algorithm.

Technology Options

- Blockly Apps: Visual editor that allows students to write programs by plugging blocks together. No typing is required to program and feedback is immediate.
- Quizlet: Web app to create flash cards with commands, print and cut them apart or share online.
- Scratch: Web site program that supports critical thinking and problem solving by easily programming interactive stories, games, and animations to share with others.
- ScratchEd: An online community for teachers to share lesson plans, resources and seek assistance.
- ScratchJr for Ipad: An app to design projects and solve problems by programming interactive stories and games.
- **Tech Tip:** A quick response code (QR) can be made using free resources. Include one in activities to increase access as an online extension of the physical classroom.

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Strand E: Computational Thinking: Programming

Legend	Symbols used are a quick reference to indicate additional resources have been included. Additional information to locate resources is provided on a supplemental page.		
	Time Tips That Transform Practice		Supporting Research and Resources
	Professional Development and/or Classroom Resources		Multiple Means of Representation
	Lessons		Multiple Means of Actions and Expressions
	Technology Resources		Multiple Means of Engagement

	**Technology 8.2.2.E.3**: http://www.state.nj.us/education/aps/cccs/tech/ **CCSS.ELA-LITERACY.CCRA.SL.1**: http://www.corestandards.org/ELA-Literacy/CCRA/SL/4/ **CCSS.MATH.PRACTICE.MP4**: http://www.corestandards.org/Math/Practice/
	**Multiple Means of Engagement:** Foster Collaboration and Community - http://www.udlcenter.org/aboutudl/udlguidelines/principle3
	**Get the Turtle to the Pond**: http://illuminations.nctm.org/Lesson.aspx?id=4265 This online interactive is included as an extension to a hands-on activity. **LadyBug Adventures**: http://illuminations.nctm.org/unit.aspx?id=6121
 	**Algorithm from Academic Kids**: A teacher resource- http://academickids.com/encyclopedia/index.php/Algorithm **Blockly Apps**: https://www.brainpop.com/games/blocklymaze/ **Q. R. Code Generator**: https://www.the-qrcode-generator.com/ **Quizlet**: https://quizlet.com/teachers **Scratch**: http://scratch.mit.edu/ **ScratchEd**: http://scratched.gse.harvard.edu/ **ScratchJr. for Ipad**: http://www.scratchjr.org/

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.	**By the end of Grade 5**

Strand E: Computational Thinking: Programming

Rationale: Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.

Technology CPI

8.2.5.E.1
Identify how computer programming impacts our everyday lives.

Content Area CPI

CCSS.ELA-LITERACY.CCRA.SL.5
Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

Next Generation Science 3-5-ETS1-2

Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Instructional Design Ideas

- Interdisciplinary Learning: Content area standards are developed while cultivating relevant technology applications and skills.
- Multiple Means of Representation: To activate or supply background knowledge use tools such as videos, graphic organizers, student surveys, flow charts, and/or journals to identify computing devices in their daily lives and the impacts they have.

Sample Activity

Discuss how computer programming impacts our daily lives. The New York Times states that 8-18 year olds are online more than 7.5 hours a day. Identify the impacts of excessive time spent online and develop criteria to categorize their impacts such as costs, time, and/or the social, cultural or health impacts on people's lives. Create a graphic organizer to identify the issues and their possible constraints/ solutions in response to questions raised in discussions. Can you make better use of time spent online? Extension: Create an online resource about this to share with others.

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Technology Options

- MindMup: Supports visual learning that organizes thoughts into a diagram displaying information graphically. Mind maps can be developed individually or in groups, creating a collaborative environment, and can also be exported and shared.
- PC Glossary: This site provides definitions of technology terms and commonly used acronyms. This can be used as a class dictionary, word bank or as a quick reference guide.
- Prezi: This cloud-based presentation software allows users to create and share classroom projects.
- Teacher Vision: This site provides a collection of ready-to-use graphic organizers to help students classify ideas and communicate more effectively.
- Thunder: A free screen reader to help identify and interpret what is being displayed on the screen.

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Strand E: Computational Thinking: Programming

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	Time Tips That Transform Practice		Supporting Research and Resources
	Professional Development and/or Classroom Resources		Multiple Means of Representation
	Lessons		Multiple Means of Actions and Expressions
	Technology Resources		Multiple Means of Engagement

	**CCSS.ELA-LITERACY.SL.5**: http://www.corestandards.org/ELA-Literacy/SL/ **Next Generation Science 3-5-ETS1-2**: http://www.nextgenscience.org/3-5ets1-engineering-design **Technology 8.2.5.E.4**: http://www.state.nj.us/education/aps/cccs/tech/ **New York Times article**: http://www.nytimes.com/2010/01/20/education/20wired.html?_r=0
	**Activating Prior Knowledge**: https://www.teachervision.com/skill-builder/reading-comprehension/48540.html **Multiple Means of Representation: Activate or supply background knowledge** - http://www.udlcenter.org/aboutudl/udlguidelines/principle1
	**Technology and Society**: http://qacps.schoolwires.net/cms/lib02/MD01001006/Centricity/Domain/128/Lesson_Plan_05_Technology_and_Society.pdf **Technology at Work**: http://www.discoveryeducation.com/teachers/free-lesson-plans/technology-at-work.cfm
 	**MindMup**: https://www.mindmup.com/#m:new **PC Glossary**: http://pc.net/glossary/ **Prezi:** http://prezi.com/ **Teacher Vision printable graphic organizers**: https://www.teachervision.com/graphic-organizers/printable/6293.html **Thunder**: http://www.screenreader.net/index.php?pageid=11

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.

By the end of Grade 8

Strand E: Computational Thinking: Programming

Rationale: Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.

Technology CPI

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.

Content Area CPI

CCSS.ELA-LITERACY.CCRA.SL.4

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

Comprehensive Health and Physical Education 2.1.8.A.3

Relate advances in technology to maintaining and improving personal health.

Sample Activity

Research both negative and positive ways that computers have impacted improving and maintaining human health. Prepare for a debate, supporting the chosen claim. Use fact-based evidence as support for the claim when presenting the information.

Instructional Design Ideas

- Interdisciplinary Learning: Content area standards are developed while cultivating relevant technology applications and skills.
- Multiple Means of Engagement: Students can give each other directions and each can predict possible results for these commands. Multiple Means of Action and Expression: Students can write a play demonstrating "If/Then" decisions made and the results, create a video, or develop a flow chart demonstrating choices made for a purpose.

Technology Options

- Edublogs: An online journal where information can be posted and shared. Students can retrieve documents and interact.
- Draw.io: Web site that allows users to create flowcharts to organize thoughts, work independently, or collaborate online for group assignments.
- Quizlet: Students can create flash cards with commands (Boolean operators) on the front and functions on the back, which can be printed and/ or shared online.
- Verizon Innovative APP Challenge: Challenge that increases relevancy to learning by developing an App to solve a real world problem in school or community. Enter for the opportunity to win recognition and a financial prize.

Tech Tip: Blogs can be used to create a safe environment for sharing information, resources for teacher professional development, and student challenges.

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Strand E: Computational Thinking: Programming

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	Time Tips That Transform Practice		Supporting Research and Resources
	Professional Development and/or Classroom Resources		Multiple Means of Representation
	Lessons		Multiple Means of Actions and Expressions
	Technology Resources		Multiple Means of Engagement

	**CCSS.ELA-LITERACY.CCRA.SL.4**: http://www.corestandards.org/ELA-Literacy/CCRA/SL/ **Comprehensive Health and Physical Education 2.1.8.A.3**: http://newjersey.gov/education/cccs/2009/2.pdf **Technology 8.2.8.E.1**: http://www.state.nj.us/education/aps/cccs/tech/
	**Multiple Means of Actions and Expressions:** Vary the methods for response and navigation - http://www.udlcenter.org/aboutudl/udlguidelines/principle2
	**Algorithms - Lesson 1 - Introduction to Algorithms**: http://www.curriki.org/xwiki/bin/view/Coll_nishantgupta/Itroduction?bc **Search Engine Lessons**: http://www.trycomputing.org/lesson-plans/search-engines-lesson **Solving a Simple Maze**: http://tryengineering.org/lessons/simplemaze.pdf
 	**Basic Search Tips and Advanced Boolean Operators**: http://www.lib.berkeley.edu/TeachingLib/Guides/Internet/Boolean.pdf **Edublogs**: https://edublogs.org/why-edublogs/ **Draw.io**: https://www.draw.io/ **Edublogs free course Blogging with Students**: http://www.theedublogger.com/2015/02/03/2015-teacher-blogging-challenge/ **Quizlet**: https://quizlet.com/teachers **Verizon Innovative APP Challenge**: http://appchallenge.tsaweb.org/

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Technology CPI

8.2.12.E.4
Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).

Content Area CPI

CCSS.ELA-LITERACY.SL.11-12.2
Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

Social Studies 6.1.12.C.3.a

Analyze how technological developments transformed the economy, created international markets, and affected the environment in New Jersey and the nation.

Sample Activity

New transportation technologies (i.e., trucks, Uber, electric cars, drones, wifi, smart roads) have environmental and economic impacts. Identify how these advances (i.e., software, graphical user interfaces, embedded technologies, and alternative energy sources) impact life locally and globally. Investigate this by researching multiple sources of information and evaluating the credibility and accuracy of each source. Develop a multimedia documentary or news release informing others of your findings. Create a glossary of specialized terms for the relevant fields of study.

Instructional Design Ideas

- Interdisciplinary Learning: Content area standards are developed while cultivating relevant technology applications and skills.
- Multiple Means of Representation: Research occupations by watching employee training videos or tutorials and use guided questions to discuss how the training prepares employees to troubleshoot and diagnose problems (i.e., a car, computer, data, every day equipment). Use visual representations of each example and at the same time it is expressed verbally.

Technology Options

- AndroVid: Video editor for Android devices.
- Audacity: Audio recorder and editor that can create audio clips for a "radio" presentation.
- Google Drive: Free cloud based storage site to collaborate, share, and publish documents.
- Podmatic: A website to create quick and easy podcasts. This site is compatible with multiple devices and platforms.
- Visme: Create presentations, info graphics and much more.

Tech Tip: When copy and paste are not performing, use the control key strokes instead. First select the object (text, image, etc.) to be copied. Next hold the Crtl key on the keyboard and "C" to copy or "V" to paste.

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Strand E: Computational Thinking: Programming

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	Time Tips That Transform Practice		Supporting Research and Resources
	Professional Development and/or Classroom Resources		Multiple Means of Representation
	Lessons		Multiple Means of Actions and Expressions
	Technology Resources		Multiple Means of Engagement

	**CCSS.ELA-LITERACY.SL.11-12.2**: http://www.corestandards.org/ELA-Literacy/SL/11-12/ **Social Studies Standards 6.1.12.C.3.a**: http://www.state.nj.us/education/cccs/2014/ss/ **Technology 8.2.12.E.4**: http://www.state.nj.us/education/aps/cccs/tech/
	**Multiple Means of Actions and Engagement:** Vary demands and resources to optimize challenge- http://www.udlcenter.org/aboutudl/udlguidelines/principle2
 	**Computer Sabotage: A Lesson Plan**: http://www.educationworld.com/a_lesson/lesson/lesson141.shtml **PBS: Student reporting labs**: http://www.studentreportinglabs.com/lesson-plans - Includes multiple lesson plans examining content use, ethics, fact vs. opinion and the use of sources to produce the news. **Podcasting and the News**: http://www.educationworld.com/a_tech/techlp/techlp060.shtml
	**AndroVid**: https://play.google.com/store/apps/details?id=com.androvid **Audacity**: http://audacity.sourceforge.net/ **Google Drive**: https://www.google.com/drive/ **Podomatic**: https://www.podomatic.com/login **Visme**: http://www.visme.co/