Califon Public School
Curriculum

Subject: Technology	Grade: 7th	Unit #: 1	Pacing: 1 Marking Period

Unit Title: Computer Science – Part 1 (Computing Systems, Networks, the Internet, & Impacts of Computing)

OVERVIEW OF UNIT:

Computer Science outlines a comprehensive set of concepts and skills, such as data and analysis, algorithms and programming, and computing systems.

Big Ideas

- The study of human–computer interaction can improve the design of devices and extend the abilities of humans.
- Software and hardware determine a computing system's capability to store and process information. The design or selection of a computing system involves multiple considerations and potential trade-offs.
- Troubleshooting a problem is more effective when knowledge of the specific device, along with a systematic process, is used to identify the source of a problem.
- Protocols, packets, and addressing are the key components for the reliable delivery of information across networks.
- The information sent and received across networks can be protected from unauthorized access and modification in a variety of ways.
- The evolution of malware leads to understanding the key security measures and best practices needed to proactively address the threat to digital data.
- Advancements in computing technology can change individuals' behaviors.
- Society is faced with trade-offs due to the increasing globalization and automation that computing brings.

Essential Questions

- How can the study of human–computer interaction improve the design of devices and extend the abilities of humans?
- In what ways does software and hardware determine a computing system's capability to store and process information?
- Why does the knowledge of a specific device, along with a systematic process used to identify the source of a problem, make troubleshooting more effective?
- What are the key components for the reliable delivery of information across networks?
- How can the information sent and received across networks be protected from unauthorized access and modification?
- Why is the evolution of malware important to understanding key security measures?

- How do advancements in computing technology change individuals' behaviors?
- What impact does increasing globalization and automation have on society?

Objectives

- Students will be able to identify the ways in which the study of human–computer interaction can improve the design of devices and extend the abilities of humans.
- Students will be able to differentiate the ways in which software and hardware determine a computing system's capability to store and process information.
- Students will be able to describe why troubleshooting a problem is more effective when knowledge of the specific device, along with a systematic process, is used to identify the source of a problem.
- Students will be able to explain how protocols, packets, and addressing are the key components for the reliable delivery of information across networks.
- Students will be able to illustrate the ways in which information sent and received across networks can be protected from unauthorized access and modification in a variety of ways.
- Students will be able to conclude how the evolution of malware leads to understanding the key security measures and best practices needed to proactively address the threat to digital data.
- Students will be able to interpret how the advancements in computing technology can change individuals' behaviors.
- Students will be able to describe how society is faced with trade-offs due to the increasing globalization and automation that computing brings.

Assessment

Formative Assessment:

- observation
- self-reflections
- teacher-student conferences

Summative Assessment:

- online quizzes & tests
- projects

Benchmark:

- Unit Pre-Test

Alternative:

- performance tasks
- projects

Key Vocabulary

- computing devices
- trade-offs
- software components
- hardware components
- troubleshooting
- transmitted
- addressed packets
- networks
- protocols
- secure
- network security

- security measures
- bias
- accesibility

Resources & Materials
● Promethean Board ● Teacher-made resources

Technology Infusion

Teacher Technology:

- Chromebook
- Google Classroom
- Promethean Board

Student Technology:

- Google Classroom
- Chromebooks
- Internet Sources

Activities:

- Students will research the process that information follows in order to be transmitted to another destination and then create a visual display showing this process.

Standard	Standard Description
8.1.8.NI.1	Model how information is broken down into smaller pieces, transmitted as addressed packets through multiple devices over networks and the Internet, and reassembled at the destination.

Interdisciplinary Integration

Activities:

- Students will research the process that information follows in order to be transmitted to another destination and then create a visual display showing this process.

Resources:

- Teacher Vision Cross-Curricular Theme Map - https://www.teachervision.com/teaching-methods/curriculum-planning/7167.html
- Engineering Go For It! - http://egfi-k12.org/
- US Department of Education STEM - http://www.ed.gov/stem
- Intel STEM Resource - http://www.intel.com/content/www/us/en/education/k12/stem.html
- NASA STEM - http://www.nasa.gov/audience/foreducators/expeditions/stem/#.VYrO2flViko
- PBS STEM - http://www.pbs.org/teachers/stem/#content
- STEM Works - http://stem-works.com/activities
- What Every Educator Should Know About Using Google by Shell Education

- Promoting Literacy in all Subjects by Glencoe - http://www.glencoe.com/sec/teachingtoday/subject/promoting_literacy.phtml
- International Literacy Association Read Write Think - http://www.readwritethink.org/

Standard	Standard Description
NJSLS-ELA W.RW.7.7	Write routinely over extended time frames (time for research, reflection, metacognition/self-correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

21st Century Life Skills Standards

Activities:

- Students will research the process that information follows in order to be transmitted to another destination and then create a visual display showing this process.

Standard	Student Learning Objectives
9.4.8.IML.12	Use relevant tools to produce, publish, and deliver information supported with evidence for an authentic audience.

Careers

Activities:

- Students will research the process that information follows in order to be transmitted to another destination and then create a visual display showing this process.

Practice	Description
Use technology to enhance productivity increase collaboration and communicate effectively.	Students find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
Demonstrate creativity and innovation.	Students regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
Utilize critical thinking to make sense of problems and persevere in solving them.	Students readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of the problem and carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through this when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. Their own actions or the actions of others.

Standards	
Standard #	**Standard Description**
8.1.8.CS.1	Recommend improvements to computing devices in order to improve the ways users interact with the devices.
8.1.8.CS.2	Design a system that combines hardware and software components to process data.
8.1.8.CS.3	Justify design decisions and explain potential system trade-offs
8.1.8.CS.4	Systematically apply troubleshooting strategies to identify and resolve hardware and software problems in computing systems.
8.1.8.NI.1	Model how information is broken down into smaller pieces, transmitted as addressed packets through multiple devices over networks and the Internet, and reassembled at the destination.
8.1.8.NI.2	Model the role of protocols in transmitting data across networks and the Internet and how they enable secure and errorless communication.
8.1.8.NI.3	Explain how network security depends on a combination of hardware, software, and practices that control access to data and systems.
8.1.8.NI.4	Explain how new security measures have been created in response to key malware events.
8.1.8.IC.1	Compare the trade-offs associated with computing technologies that affect individual's everyday activities and career options.
8.1.8.IC.2	Describe issues of bias and accessibility in the design of existing technologies.

Differentiation
Students with 504 plans
• Preferential seating • Guided notes • Extra time • Teacher check-ins • Use graphic organizers • Redirect attention • Prioritize tasks • Small group testing • Provide modifications & accommodations per individual student's 504 plan
Special Education
• Provide modifications & accommodations as listed in the student's IEP • Position the student near a helping peer or have quick access to the teacher • Modify or reduce assignments/tasks • Reduce the length of the assignment for different modes of delivery • Increase one-to-one time • Prioritize tasks • Use graphic organizers • Use online resources for skill-building • Provide teacher notes • Use collaborative grouping strategies, such as small groups

- NJDOE resources - http://www.state.nj.us/education/specialed/

Response to Intervention (RTI)

- Tiered interventions following the RTI framework
- Effective RTI strategies for teachers - http://www.specialeducationguide.com/pre-k-12/response-to-intervention/effective-rti-strategies-for-teachers/
- Intervention Central - http://www.interventioncentral.org/

English Language Learners (ELL)

- Provide text-to-speech
- Use of a translation dictionary or software
- Provide graphic organizers
- NJDOE resources - http://www.state.nj.us/education/aps/cccs/ELL.htm
- Adapt a Strategy – Adjusting strategies for ESL students - http://www.teachersfirst.com/content/esl/adaptstrat.cfm

Enrichment

- Process should be modified: higher order thinking skills, open-ended thinking, discovery
- Utilize project-based learning for greater depth of knowledge
- Utilize exploratory connections to higher-grade concepts
- Contents should be modified: real-world problems, audiences, deadlines, evaluations, transformations
- Learning environments should be modified: student-centered learning, independence, openness, complexity, and groups should be varied
- NJDOE resources

Califon Public School
Curriculum

Subject: Technology	Grade: 7th	Unit #: 2	Pacing: 1 Marking Period

Unit Title: Computer Science – Part 2 (Data, Analysis, Algorithms, and Programming)

OVERVIEW OF UNIT:

Computer Science outlines a comprehensive set of concepts and skills, such as data and analysis, algorithms and programming, and computing systems.

Big Ideas

- People use digital devices and tools to automate the collection, use, and transformation of data.
- The manner in which data is collected and transformed is influenced by the type of digital device(s) available and the intended use of the data.
- Data is represented in many formats. Software tools translate the low-level representation of bits into a form understandable by individuals. Data is organized and accessible based on the application used to store it.
- The purpose of cleaning data is to remove errors and make it easier for computers to process.
- Computer models can be used to simulate events, examine theories and inferences, or make predictions.
- Individuals design algorithms that are reusable in many situations.
- Algorithms that are readable are easier to follow, test, and debug.
- Programmers create variables to store data values of different types and perform appropriate operations on their values.
- Control structures are selected and combined in programs to solve more complex problems.
- Programs use procedures to organize code and hide implementation details. Procedures can be repurposed in new programs. Defining parameters for procedures can generalize behavior and increase reusability.
- Individuals design and test solutions to identify problems, taking into consideration the diverse needs of the users and the community.

Essential Questions

- How are digital devices and tools used to automate the collection, use, and transformation of data?
- How does the type of digital device(s) available and the intended use of the data influence the manner in which data is collected and transformed?
- What are the ways in which data can be represented?
- What is the reason behind needing to clean data?
- How can computer models be used to simulate events, examine theories and inferences, or make predictions?
- How are algorithms designed so that they are reusable in many situations?

- Why is it important for algorithms to be readable?
- In what ways can programmers create variables to store data values of different types and perform appropriate operations on their values?
- How are control structures selected and combined in programs to solve more complex problems?
- Why are procedures important to computer programs?
- How do individuals design and test solutions to identify problems, taking into consideration the diverse needs of the users and the community?

Objectives

- Students will be able to give examples of how digital devices and tools are used to automate the collection, use, and transformation of data.
- Students will be able to explain how the type of digital device(s) available and the intended use of the data influence the manner in which data is collected and transformed.
- Students will be able to differentiate the ways in which data can be represented.
- Students will be able to explain the reasons behind needing to clean data.
- Students will be able to illustrate how computer models can be used to simulate events, examine theories and inferences, or make predictions.
- Students will be able to describe how algorithms are designed so that they are reusable in many situations.
- Students will be able to explain why it is important for algorithms to be readable.
- Students will be able to illustrate the ways programmers can create variables to store data values of different types and perform appropriate operations on their values.
- Students will be able to classify how control structures are selected and combined in programs to solve more complex problems.
- Students will be able to outline the importance of procedures to computer programs.
- Students will be able to design and test solutions to identify problems, taking into consideration the diverse needs of the users and the community.

Assessment

Formative Assessment:

- observation
- self-reflections
- teacher-student conferences

Summative Assessment:

- online quizzes & tests
- projects

Benchmark:

- Unit Pre-Test

Alternative:

- performance tasks
- projects

Key Vocabulary

- computational tools
- bits
- file format
- accuracy
- algorithms
- flowcharts
- pseudocode
- nested loops

- analyze
- computational model
- climate change
- refinements
- compound conditionals
- decompose
- parameters
- debug

Resources & Materials

- Promethean Board
- Teacher-made resources

Technology Infusion

Teacher Technology:

- Chromebook
- Google Classroom
- Promethean Board

Student Technology:

- Google Classroom
- Chromebooks
- Internet Sources

Activities:

- Students will research and present about the differences between how the computer stores data as bits and how the data is displayed.

Standard	Standard Description
8.1.8.DA.2	Explain the difference between how the computer stores data as bits and how the data is displayed.

Interdisciplinary Integration

Activities:

- Students will research and present about the differences between how the computer stores data as bits and how the data is displayed.

Resources:

- Teacher Vision Cross-Curricular Theme Map - https://www.teachervision.com/teaching-methods/curriculum-planning/7167.html
- Engineering Go For It! - http://egfi-k12.org/
- US Department of Education STEM - http://www.ed.gov/stem
- Intel STEM Resource - http://www.intel.com/content/www/us/en/education/k12/stem.html
- NASA STEM - http://www.nasa.gov/audience/foreducators/expeditions/stem/#.VYrO2flViko
- PBS STEM - http://www.pbs.org/teachers/stem/#content
- STEM Works - http://stem-works.com/activities
- What Every Educator Should Know About Using Google by Shell Education

- Promoting Literacy in all Subjects by Glencoe - http://www.glencoe.com/sec/teachingtoday/subject/promoting_literacy.phtml
- International Literacy Association Read Write Think - http://www.readwritethink.org/

Standard	Standard Description
NJSLS-ELA W.RW.7.7	Write routinely over extended time frames (time for research, reflection, metacognition/self-correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

21st Century Life Skills Standards

Activities:

- Students will research and present about the differences between how the computer stores data as bits and how the data is displayed.

Standard	Student Learning Objectives
9.4.8.IML.12	Use relevant tools to produce, publish, and deliver information supported with evidence for an authentic audience.

Careers

Activities:

- Students will research and present about the differences between how the computer stores data as bits and how the data is displayed.

Practice	Description
Use technology to enhance productivity increase collaboration and communicate effectively.	Students find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
Demonstrate creativity and innovation.	Students regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
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Standards	
Standard #	**Standard Description**
8.1.8.DA.1	Organize and transform data collected using computational tools to make it usable for a specific purpose.
8.1.8.DA.2	Explain the difference between how the computer stores data as bits and how the data is displayed.
8.1.8.DA.3	Identify the appropriate tool to access data based on its file format.
8.1.8.DA.4	Transform data to remove errors and improve the accuracy of the data for analysis.
8.1.8.DA.5	Test, analyze, and refine computational models.
8.1.8.DA.6	Analyze climate change computational models and propose refinements.
8.1.8.AP.1	Design and illustrate algorithms that solve complex problems using flowcharts and/or pseudocode.
8.1.8.AP.2	Create clearly named variables that represent different data types and perform operations on their values.
8.1.8.AP.3	Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.
8.1.8.AP.4	Decompose problems and sub-problems into parts to facilitate the design, implementation, and review of programs.
8.1.8.AP.5	Create procedures with parameters to organize code and make it easier to reuse.
8.1.8.AP.6	Refine a solution that meets users' needs by incorporating feedback from team members and users.
8.1.8.AP.7	Design programs, incorporating existing code, media, and libraries, and give attribution.
8.1.8.AP.8	Systematically test and refine programs using a range of test cases and users.
8.1.8.AP.9	Document programs in order to make them easier to follow, test, and debug.

Differentiation
Students with 504 plans
● Preferential seating ● Guided notes ● Extra time ● Teacher check-ins ● Use graphic organizers ● Redirect attention ● Prioritize tasks ● Small group testing ● Provide modifications & accommodations per individual student's 504 plan
Special Education
● Provide modifications & accommodations as listed in the student's IEP ● Position the student near a helping peer or have quick access to the teacher ● Modify or reduce assignments/tasks ● Reduce the length of the assignment for different modes of delivery ● Increase one-to-one time

- Prioritize tasks
- Use graphic organizers
- Use online resources for skill-building
- Provide teacher notes
- Use collaborative grouping strategies, such as small groups
- NJDOE resources - http://www.state.nj.us/education/specialed/

Response to Intervention (RTI)

- Tiered interventions following the RTI framework
- Effective RTI strategies for teachers - http://www.specialeducationguide.com/pre-k-12/response-to-intervention/effective-rti-strategies-for-teachers/
- Intervention Central - http://www.interventioncentral.org/

English Language Learners (ELL)

- Provide text-to-speech
- Use of a translation dictionary or software
- Provide graphic organizers
- NJDOE resources - http://www.state.nj.us/education/aps/cccs/ELL.htm
- Adapt a Strategy – Adjusting strategies for ESL students - http://www.teachersfirst.com/content/esl/adaptstrat.cfm

Enrichment

- Process should be modified: higher order thinking skills, open-ended thinking, discovery
- Utilize project-based learning for greater depth of knowledge
- Utilize exploratory connections to higher-grade concepts
- Contents should be modified: real-world problems, audiences, deadlines, evaluations, transformations
- Learning environments should be modified: student-centered learning, independence, openness, complexity, and groups should be varied
- NJDOE resources

Califon Public School
Curriculum

Subject: Technology	Grade: 7th	Unit #: 3	Pacing: 1 Marking Period

Unit Title: Design Thinking (Engineering Design & Nature of Technology)

OVERVIEW OF UNIT:

Design thinking outlines the technological design concepts and skills essential for technological and engineering literacy.

Big Ideas

- Engineering design is a systematic, creative, and iterative process used to address local and global problems.
- The process includes generating ideas, choosing the best solution, making, testing, and redesigning models or prototypes.
- Engineering design requirements and specifications involve making trade-offs between competing requirements and desired design features.
- Technology advances through the processes of innovation and invention, which rely upon the imaginative and inventive nature of people.
- Sometimes a technology developed for one purpose is adapted to serve other purposes.
- Engineers use a systematic process of creating or modifying technologies that is fueled and constrained by physical laws, cultural norms, and economic resources. Scientists use systematic investigation to understand the natural world.

Essential Questions

- How is the engineering design a systematic, creative, and iterative process used to address local and global problems?
- What steps are involved when following an iterative process?
- What trade-offs between competing requirements and desired design features are involved when using engineering design requirements and specifications?
- What technology advances rely upon the imaginative and inventive nature of people?
- How can technology developed for one purpose be adapted to serve other purposes?
- How do engineers and scientists use a systematic process?

Objectives

- Students will be able to describe how the engineering design is a systematic, creative, and iterative process used to address local and global problems.
- Students will be able to explain in detail the steps involved when following an iterative process.
- Students will be able to identify the trade-offs between competing requirements and desired design features that are involved when using engineering design requirements and specifications.

- Students will be able to assess how technological advances rely upon the imaginative and inventive nature of people.
- Students will be able to defend how technology can be developed for one purpose and be adapted to serve other purposes.
- Students will be able to contrast how engineers and scientists use a systematic process.

Assessment

Formative Assessment:

- observation
- self-reflections
- teacher-student conferences

Summative Assessment:

- online quizzes & tests
- projects

Benchmark:

- Unit Pre-Test

Alternative:

- performance tasks
- projects

Key Vocabulary

- aesthetics
- design process
- malfunctioning system
- troubleshoot
- optimization
- trade-offs
- iterative design process
- repurposed
- upcycled
- ethical issues
- ethical
- unethical

Resources & Materials

- Promethean Board
- Teacher-made resources

Technology Infusion

Teacher Technology:

- Chromebook
- Google Classroom
- Promethean Board

Student Technology:

- Google Classroom
- Chromebooks
- Internet Sources

Activities:

- Google Classroom and Internet sources will be used by students to research and create visuals that explain the need for optimization in a design process.

Standard	Standard Description

8.2.8.EC.2	Examine the effects of ethical and unethical practices in product design and development.

Interdisciplinary Integration	
Activities: ● Students will research and create visuals that explain the need for optimization in a design process. **Resources:** ● Teacher Vision Cross-Curricular Theme Map - https://www.teachervision.com/teaching-methods/curriculum-planning/7167.html ● Engineering Go For It! - http://egfi-k12.org/ ● US Department of Education STEM - http://www.ed.gov/stem ● Intel STEM Resource - http://www.intel.com/content/www/us/en/education/k12/stem.html ● NASA STEM - http://www.nasa.gov/audience/foreducators/expeditions/stem/#.VYrO2flViko ● PBS STEM - http://www.pbs.org/teachers/stem/#content ● STEM Works - http://stem-works.com/activities ● What Every Educator Should Know About Using Google by Shell Education ● Promoting Literacy in all Subjects by Glencoe - http://www.glencoe.com/sec/teachingtoday/subject/promoting_literacy.phtml ● International Literacy Association Read Write Think - http://www.readwritethink.org/	
Standard	**Standard Description**
NJSLS-ELA W.RW.7.7	Write routinely over extended time frames (time for research, reflection, metacognition/self-correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

21st Century Life Skills Standards	
Activities: ● Students will research and create visuals that explain the need for optimization in a design process.	
Standard	**Student Learning Objectives**
9.4.8.IML.12	Use relevant tools to produce, publish, and deliver information supported with evidence for an authentic audience.

Careers	
Activities: ● Students will research and create visuals that explain the need for optimization in a design process.	
Practice	**Description**
Use technology to enhance productivity increase collaboration and communicate effectively.	Students find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.

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Standards	
Standard #	**Standard Description**
8.2.8.ED.1	Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem.
8.2.8.ED.3	Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).
8.2.8.ED.4	Investigate a malfunctioning system, identify its impact, and explain the step-by-step process used to troubleshoot, evaluate, and test options to repair the product in a collaborative team.
8.2.8.ED.5	Explain the need for optimization in a design process.
8.2.8.ED.6	Analyze how trade-offs can impact the design of a product.
8.2.8.ED.7	Design a product to address a real-world problem and document the iterative design process, including decisions made as a result of specific constraints and trade-offs (e.g., annotated sketches).
8.2.8.NT.1	Examine a malfunctioning tool, product, or system and propose solutions to the problem.
8.2.8.NT.2	Analyze an existing technological product that has been repurposed for a different function.
8.2.8.NT.3	Examine a system, consider how each part relates to other parts, and redesign it for another purpose.
8.2.8.NT.4	Explain how a product designed for a specific demand was modified to meet a new demand and led to a new product.

Differentiation
Students with 504 plans
• Preferential seating • Guided notes

- Extra time
- Teacher check-ins
- Use graphic organizers
- Redirect attention
- Prioritize tasks
- Small group testing
- Provide modifications & accommodations per individual student's 504 plan

Special Education

- Provide modifications & accommodations as listed in the student's IEP
- Position the student near a helping peer or have quick access to the teacher
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English Language Learners (ELL)

- Provide text-to-speech
- Use of a translation dictionary or software
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Enrichment

- Process should be modified: higher order thinking skills, open-ended thinking, discovery
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- Contents should be modified: real-world problems, audiences, deadlines, evaluations, transformations
- Learning environments should be modified: student-centered learning, independence, openness, complexity, and groups should be varied
- NJDOE resources

Califon Public School
Curriculum

Subject: Technology	Grade: 7th	Unit #: 4	Pacing: 1 Marking Period

Unit Title: Design Thinking (Interaction of Tech & Humans, Effects of Tech on the Natural World, Ethics & Culture)

OVERVIEW OF UNIT:

Design thinking outlines the technological design concepts and skills essential for technological and engineering literacy.

Big Ideas

- Economic, political, social, and cultural aspects of society drive the development of new technological products, processes, and systems.
- Technology interacts with society, sometimes bringing about changes in a society's economy, politics, and culture, and often leading to the creation of new needs and wants.
- New needs and wants may create strains on local economies and workforces.
- Improvements in technology are intended to make the completion of tasks easier, safer, and/or more efficient.
- Resources need to be utilized wisely to have a positive effect on the environment and society.
- Some technological decisions involve tradeoffs between environmental and economic needs, while others have positive effects for both the economy and the environment.
- Technological disparities have consequences for public health and prosperity.

Essential Questions

- How have economic, political, social, and cultural aspects of society driven the development of new technological products, processes, and systems?
- How has the interaction of technology with society brought about changes in a society's economy, politics, and culture?
- In what ways have new needs and wants created potential strains on local economies and workforces?
- What are the ways in which the improvements in technology make the completion of tasks easier, safer, and/or more efficient?
- How can resources be utilized wisely to have positive effects on the environment and society?
- In what ways do technological decisions involve tradeoffs or have positive effects on environmental and economic needs?
- How do technological disparities have consequences for public health and prosperity?

Objectives

- Students will be able to identify economic, political, social, and cultural aspects of society that drive the development of new technological products, processes, and systems.

- Students will be able to describe how technology interacts with society, sometimes bringing about changes in a society's economy, politics, and culture, and often leading to the creation of new needs and wants.
- Students will be able to explain how new needs and wants may create strains on local economies and workforces.
- Students will be able to explain how improvements in technology are intended to make the completion of tasks easier, safer, and/or more efficient.
- Students will be able to identify why resources need to be utilized wisely to have positive effects on the environment and society.
- Students will be able to compare how technological decisions involve tradeoffs between environmental and economic needs, while others have positive effects for both the economy and the environment.
- Students will be able to describe how technological disparities have consequences for public health and prosperity.

Assessment

Formative Assessment:

- observation
- self-reflections
- teacher-student conferences

Summative Assessment:

- online quizzes & tests
- projects

Benchmark:

- Unit Pre-Test

Alternative:

- performance tasks
- projects

Key Vocabulary

- computing devices
- hardware
- software
- computing systems
- networks
- Internet
- protocols
- network security

Resources & Materials

- Promethean Board
- Teacher-made resources

Technology Infusion

Teacher Technology:

- Chromebook
- Google Classroom
- Promethean Board

Student Technology:

- Google Classroom

- Chromebooks
- Internet Sources

Activities:

- Students will utilize Chromebooks to access Internet sources in order to research and create visuals that demonstrate the ethical and unethical practices in product design and development.

Standard	Standard Description
8.2.8.EC.2	Examine the effects of ethical and unethical practices in product design and development.

Interdisciplinary Integration

Activities:

- Students will research and create visuals that demonstrate the ethical and unethical practices in product design and development.

Resources:

- Teacher Vision Cross-Curricular Theme Map - https://www.teachervision.com/teaching-methods/curriculum-planning/7167.html
- Engineering Go For It! - http://egfi-k12.org/
- US Department of Education STEM - http://www.ed.gov/stem
- Intel STEM Resource - http://www.intel.com/content/www/us/en/education/k12/stem.html
- NASA STEM - http://www.nasa.gov/audience/foreducators/expeditions/stem/#.VYrO2flViko
- PBS STEM - http://www.pbs.org/teachers/stem/#content
- STEM Works - http://stem-works.com/activities
- What Every Educator Should Know About Using Google by Shell Education
- Promoting Literacy in all Subjects by Glencoe - http://www.glencoe.com/sec/teachingtoday/subject/promoting_literacy.phtml
- International Literacy Association Read Write Think - http://www.readwritethink.org/

Standard	Standard Description
NJSLS-ELA W.RW.7.7	Write routinely over extended time frames (time for research, reflection, metacognition/self-correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

21st Century Life Skills Standards

Activities:

- Students will research and create visuals that demonstrate the ethical and unethical practices in product design and development.

Standard	Student Learning Objectives
9.4.8.IML.12	Use relevant tools to produce, publish, and deliver information supported with evidence for an authentic audience.

Careers	
Activities: ● Students will research and create visuals that demonstrate the ethical and unethical practices in product design and development.	
Practice	**Description**
Use technology to enhance productivity increase collaboration and communicate effectively.	Students find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
Demonstrate creativity and innovation.	Students regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
Utilize critical thinking to make sense of problems and persevere in solving them.	Students readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of the problem and carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through this when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. Their own actions or the actions of others.

Standards	
Standard #	**Standard Description**
8.2.8.ITH.1	Explain how the development and use of technology influences economic, political, social, and cultural issues.
8.2.8.ITH.2	Compare how technologies have influenced society over time.
8.2.8.ITH.3	Evaluate the impact of sustainability on the development of a designed product or system.
8.2.8.ITH.4	Identify technologies that have been designed to reduce the negative consequences of other technologies and explain the change in impact.
8.2.8.ITH.5	Compare the impacts of a given technology on different societies, noting factors that may make a technology appropriate and sustainable in one society but not in another.
8.2.8.ETW.1	Illustrate how a product is upcycled into a new product and analyze the short- and long-term benefits and costs.
8.2.8.ETW.2	Analyze the impact of modifying resources in a product or system (e.g., materials, energy, information, time, tools, people, capital).
8.2.8.ETW.3	Analyze the design of a product that negatively impacts the environment or society and develop possible solutions to lessen its impact.

8.2.8.ETW.4	Compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best.
8.2.8.EC.1	Explain ethical issues that may arise from the use of new technologies.
8.2.8.EC.2	Examine the effects of ethical and unethical practices in product design and development.

Differentiation
Students with 504 plans
• Preferential seating • Guided notes • Extra time • Teacher check-ins • Use graphic organizers • Redirect attention • Prioritize tasks • Small group testing • Provide modifications & accommodations per individual student's 504 plan
Special Education
• Provide modifications & accommodations as listed in the student's IEP • Position the student near a helping peer or have quick access to the teacher • Modify or reduce assignments/tasks • Reduce the length of the assignment for different modes of delivery • Increase one-to-one time • Prioritize tasks • Use graphic organizers • Use online resources for skill-building • Provide teacher notes • Use collaborative grouping strategies, such as small groups • NJDOE resources - http://www.state.nj.us/education/specialed/
Response to Intervention (RTI)
• Tiered interventions following the RTI framework • Effective RTI strategies for teachers - http://www.specialeducationguide.com/pre-k-12/response-to-intervention/effective-rti-strategies-for-teachers/ • Intervention Central - http://www.interventioncentral.org/
English Language Learners (ELL)
• Provide text-to-speech • Use of a translation dictionary or software • Provide graphic organizers • NJDOE resources - http://www.state.nj.us/education/aps/cccs/ELL.htm • Adapt a Strategy – Adjusting strategies for ESL students - http://www.teachersfirst.com/content/esl/adaptstrat.cfm
Enrichment

- Process should be modified: higher order thinking skills, open-ended thinking, discovery
- Utilize project-based learning for greater depth of knowledge
- Utilize exploratory connections to higher-grade concepts
- Contents should be modified: real-world problems, audiences, deadlines, evaluations, transformations
- Learning environments should be modified: student-centered learning, independence, openness, complexity, and groups should be varied
- NJDOE resources