SCHOOL DISTRICT OF THE CHATHAMS

Design & Technology
Kindergarten
Full Year

Course Overview

The essential intent of the School District of the Chathams' Design & Technology program is to empower students to think critically and creatively to develop innovative solutions to problems present in our modern world. Our Design & Technology program is a nationally award winning and comprehensive program that enables our students to engage in authentic problem solving, collaboration, innovation, and critical thinking while developing creativity and perseverance. Students gain proficiency in the application of relevant kindergarten mathematics, science, technology, and engineering concepts while engaging in the development of solutions to problems through hands-on, collaborative, project-based learning utilizing the Engineering Design and Design Thinking Processes.

New Jersey Student Learning Standards
The New Jersey Student Learning Standards (NJSLS) can be located at www.nj.gov/education/cccs/2020/.

Engineering Design
8.2.2.ED.1: Communicate the function of a product or device.
8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.
8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process.

Interaction of Technology & Humans
8.2.2.ITH.2: Explain the purpose of a product and its value.
8.2.2.ITH.3: Identify how technology impacts or improves life.
8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks.
8.2.2.ITH.5: Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution.

Technology Standards
9.4.2.TL.1: Identify the basic features of a digital tool and explain the purpose of the tool.
9.4.2.TL.2: Create a document using a word processing application.
9.4.2.TL.3: Enter information into a spreadsheet and sort the information.
9.4.2.TL.4: Navigate a virtual space to build context and describe the visual content.
9.4.2.IML.3: Use a variety of sources including multimedia sources to find information about topics such as climate change, with guidance and support from adults.

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Creativity and Innovation
9.4.2.CI.1: Demonstrate openness to new ideas and perspectives.
9.4.2.CI.2: Demonstrates originality and inventiveness in work.

Critical Thinking and Problem-Solving
9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem.
9.4.2.CT.2: Identify possible approaches and resources to execute a plan.
9.4.2.CT.3: Uses a variety of types of thinking to solve problems (e.g., inductive, deductive)

Career Ready Practices
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence.

Interdisciplinary Connections
Comprehensive Health & Physical Education
- 2.1.2.PGD.3: Explain what being "well" means and identify self-care practices that support wellness.
- 2.1.2.PP.2: Explain the ways in which parents may care for their offspring (e.g., animals, people, fish).
- 2.1.2.EH.2: Identify what it means to be responsible and list personal responsibilities.
- 2.1.2.EH.3: Demonstrate self-control in a variety of settings (e.g., in the classroom, on the playground and in an assembly).
- 2.1.2.EH.4: Demonstrate strategies for managing one's own emotions, thoughts and behaviors.
- 2.1.2.EH.5: Explain healthy ways of coping with stressful situations.
- 2.1.2.SSH.7: Explain healthy ways for friends to express feelings for and to one another.
- 2.1.2.SSH.8: Demonstrate healthy ways to respond to disagreements or conflicts with others (e.g., leave, talk to trusted adults, tell a sibling or peer).
- 2.1.2.CHSS.5: Identify situations that might result in individuals feeling sad, angry, frustrated, or scared.
- 2.2.2.MSC.6: Execute appropriate behaviors and etiquette while participating in and viewing activities, games, sports, and other events contributes to a safe environment.
- 2.2.2.MSC.7: Demonstrate kindness towards self and others during physical activity to create a caring environment.
- 2.2.2.PF.4: Demonstrate strategies and skills that enable team and group members to achieve goals.
- 2.3.2.PS.1: Demonstrate personal habits and behaviors that contribute to keeping oneself and others healthy and the environment clean and safe.
- 2.3.2.PS.3: Recognize and demonstrate safety strategies to prevent injuries at home, school, in the community.

Science
- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

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- K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.
- K-ESS3-1. Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.
- K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.
- K-ESS3-1. Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.
- K-LS1-1. - Use observations to describe patterns of what plants and animals (including humans) need to survive.

Social Studies

- 6.1.2.CivicsPD.1: Engage in discussions effectively by asking questions, considering facts, listening to the ideas of others, and sharing opinions.
- 6.1.2.CivicsPD.2: Establish a process for how individuals can effectively work together to make decisions.
- 6.1.2.CivicsPR.3: Analyze classroom rules and routines and describe how they are designed to benefit the common good.
- 6.1.2.CivicsPR.4: Explain how individuals can work together to make decisions in the classroom.
- 6.1.2.CivicsCM.2: Use examples from a variety of sources to describe how certain characteristics can help individuals collaborate and solve problems (e.g., open-mindedness, compassion, civility, persistence).

Visual Arts

- 2.2.2.CR1b: Brainstorm and improvise multiple ideas using a variety of tools, methods and materials.
- 2.2.2.CR1e: Choose ideas to create plans for media art production.
- 2.2.2.P1b: Identify, describe, and demonstrate basic creative skills, such as trial-and-error and playful practice, within media arts production.
- 2.5.2.CR1a: Engage in individual and collaborative exploration of materials and ideas through multiple approaches, from imaginative play to brainstorming, to solve art and design problems.
- 2.5.2.CR1b: Engage in individual and collaborative art making through observation and investigation of the world, and in response to personal interests and curiosity
- 2.5.2.CR3a: Through experimentation, build skills and knowledge of materials and tools through various approaches to art making.
- 2.5.2.CR3b: Demonstrate safe procedures for using and cleaning art tools, equipment and studio spaces.

Units of Study

Unit 1: Introduction to Design & Technology *(~5 days)*

- What does engineering and technology mean to you?
- What can a computer and the Internet help you to do?
- How can a computer and the Internet be used for educational purposes?
- What are some basic computer applications and programs and what do they help me do?

Unit 2: The Designed World *(~8 days)*

- What is an engineer and what do engineers do to help our communities and lives?
- What are tools and how are they used to help us with our daily lives and specific tasks?

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- How do building materials affect a design?
- How do people design things and what may be some tools and skills they need in order to engage in design?
- How have technology, inventions, and innovations influenced society and history?

Unit 3: Introduction to Habitats/ Design in the Natural World *(~10 days)*

- What are the human-made and natural worlds and how do they differ?
- What may be some necessary aspects of an animal's habitat?
- What is the purpose of a shelter?
- How does an animal adapt to its habitat?
- How do humans influence an animal's habitat?
- How do people navigate through a virtual environment?
- How has biomimicry helped humans meet different needs?

Unit 4: Animal Engineers *(~15 days)*

- What are the essential needs of animals?
- What are the essential needs of birds in their habitats?
- How and why do birds build nests?
- How does the bird habitat provide the basic needs of birds?
- How do animals solve problems?
- What are constraints an animal might encounter?
- How do animals meet their specifications?
- What can we learn from observing birds build nests?

Learning Objectives/Discipline Standards of Practice

Learning Objectives:

- Independently turn on and off a computer.
- Log in to a general account independently.
- Use the mouse and keyboard commands to navigate and utilize a computer program or application.
- Identify the steps of the Engineering Design Process.
- Utilize the Engineering design process to solve a problem.
- Build the tower as part of the Tallest Tower Design Challenge.
- Identifying everyday items or tools that have been invented through history to solve problems.
- Compare animal and human needs.
- Match a habitat to an animal. Habitat Matching Game
- Design a habitat for a specific animal.
- Research the needs of a Bluebird and design a nest based on those needs.
- Identify ways that engineers learn from animal engineers.

Discipline Standards of Practice:

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

- Networks and the Internet
    - Computing devices typically do not operate in isolation. Networks connect computing devices to share information and resources and are an increasingly integral part of computing. Networks and communication systems provide greater connectivity in the computing world.
- Impacts of Computing
    - Computing affects many aspects of the world in both positive and negative ways at local, national, and global levels. Individuals and communities influence computing through their behaviors and cultural and social interactions, and, in turn, computing influences new cultural practices.
- Data & Analysis
    - Computing systems exist to process data. The amount of digital data generated in the world is rapidly expanding, so the need to process data effectively is increasingly important. Data is collected and stored so that it can be analyzed to better understand the world and make more accurate predictions.
- Algorithms & Programming
    - An algorithm is a sequence of steps designed to accomplish a specific task. Algorithms are translated into programs, or code, to provide instructions for computing devices. Algorithms and programming control all computing systems, empowering people to communicate with the world in new ways and solve compelling problems.
- Engineering Design
    - People design for enjoyment and to solve problems, extend human capabilities, satisfy needs and wants, and improve the human condition. Engineering Design, a systematic approach to creating solutions to technological problems and finding ways to meet people's needs and desires, allows for the effective and efficient development of products and systems.
- Interaction of Technology and Humans
    - Societies influence technological development. Societies are characterized by common elements such as shared values, differentiated roles, and cultural norms, as well as by entities such as community institutions, organizations, and businesses. Interaction of Technology and Humans concerns the ways society drives the improvement and creation of new technologies, and how technologies both serve and change society.
- Nature of Technology
    - Human population, patterns and movement focus on the size, composition, distribution, and movement of human populations and how they are fundamental and active features on Earth's surface. This includes understanding that the expansion and redistribution of the human population affects patterns of settlement, environmental changes, and resource use. Patterns and movements of population also relate to physical phenomena including climate variability, landforms, and locations of various natural hazards and their effects on population size, composition, and distribution.
- Effects of Technology on the Natural World
    - Many of engineering and technology's impacts on society and the environment are widely regarded as desirable. However, other impacts are regarded as less desirable. Effects of Technology on the Natural World concerns the positive and negative ways that technologies affect the natural world.
- Ethics & Culture
    - Ethics and Culture concerns the profound effects that technologies have on people, how those effects can widen or narrow disparities, and the responsibility that people have for the societal consequences of their technological decisions.

Instructional Resources and Materials
Whole class resources have been identified with an asterisk.

Resources

- ITEEA's Engineering byDesign™ Program
- Engineering is Elementary (Museum of Science, Boston)
- Google Apps for Littles by Christine Pinto & Alice Keeler
- ABCya *(computer mouse/keyboard navigation games and activities)* *
- Headphones *
- STEM folders *
- Lesson Resources: *
    - Flexible Seating Information
    - Rules for the STEM Classroom
    - Solve Problems: Be an Engineer! Video
    - Rosie Revere Engineer by Andrea Beaty
    - Rosie Revere Engineer Challenge
    - What Is An Engineer?
    - Engineer Worksheet
    - Iggy Peck Architect by Andrea Beaty
    - Introduction to Chromebooks
    - Make a Pumpkin Mouse Control Game
    - Cup Stacking Mouse Control Game
    - Mouse Control Game
    - Make a Face Mouse Control Game
    - Google Drawing Practice Activity
    - Bear on Deserted Island Video
    - Needs of an Animal Song
    - Design Challenge Self-Assessment
    - What to Do with a Box by Jane Yolen

Materials

- Building/Modeling Materials: *
    - Crayons
    - Pencils
    - Stickers for CTRL+ALT+DELETE on keyboard.
    - Cubes
    - Blocks
    - Knex
    - Tape
    - Paper Plates
    - Tin Foil
    - Popsicle/Craft Sticks
    - Plastic Cups
    - Paper Towel Rolls
    - Clay
    - Construction Paper
    - Pipe Cleaners
    - Straws

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- Toothpicks
- Cotton Balls
- Plastic Spoons/Forks
- Index Cards
- Cardboard

Assessment Strategies
Assessment is designed to measure a student's mastery of a course standard and learning objective. Assessment can be used for both instructional purposes (formative assessment) and for evaluative purposes (summative assessment).

The following is a general list of the many forms assessment may take in learning.

- Projects
- Unit Assessments

Course Specific Assessments Include:

- Formative/Feedback/Check-Ins:
  - Peer Feedback: TAG (Tell, Ask, Give) Sticky Notes
  - Peer Feedback Form
  - Self-Reflection: 2 Stars & 1 Wish
  - Design Challenge Self-Assessment
  - Critique Guide
  - Reflective Exit Tickets/Slips
  - Rosie Revere Engineer Challenge
  - Make a Pumpkin Mouse Control Game
  - Cup Stacking Mouse Control Game
  - Mouse Control Game
  - Make a Face Mouse Control Game
  - Engineering Notebook Review/Student Work Samples
  - Class Discussions
  - Teacher Observations

- Summative Design Challenges
  - Design a Habitat Challenge
    - Students are challenged to create their own creature and design a habitat that meets all of the creature's needs.
  - Build a Bird's Nest Challenge
    - Students learn how birds are examples of animal engineers who design and construct their own nests from various materials they find in nature. Students then design and build their own nests, modeling birds as engineers.