STEM AT ST. MARY PARISH SCHOOL

4K

Spatial Sense and Coding: Students develop spatial sense as they engage in activities that explore directional movement – over, under, through, and around. They begin to develop coding skills as they plan a path, create wearable code, and code an interactive robotic device. Using the engineering design process, students create code that will lead a robot to the location of a hidden item.

5K

Animals and Algorithms: Students explore the nature of computers and the ways that humans control and use technology. Students learn about the sequential nature of computer programs. Then, students work in small groups to design and program a simple digital animation about an animal in its habitat.

Structure and Function: Exploring Design: Students discover the design process and how engineers influence their lives. They explore the elements of structure and function by identifying products around them designed by engineers and asking questions engineers might ask. Students apply their knowledge from the module to design their own paintbrushes.

FIRST GRADE

Animal Adaptations: Students explore animal adaptations for protection, camouflage, food obtainment, and locomotion. Students learn what it means for an organism to be adapted to its environment and how different adaptations can be categorized. Students are challenged to design the ideal shoe for travelers to wear in extreme environments, applying what they have learned and looking to plant and animal adaptations to guide their designs.

Light and Sound: Students investigate the properties of light and sound, including vibration from sound waves and the effect of different materials on the path of a beam of light. After students develop an understanding of light and sound, they are challenged to solve a design problem from a story. In the story, the characters are lost and must use only the materials in their backpack to communicate over a distance by using light and/or sound. Students use the design process to sketch, build, test, and reflect on a device that solves this design problem.

Animated Storytelling: Students explore the sequential nature of computer programs through hands-on activities. They explore the basic fundamentals of programming using Scratch Jr., a block-based programming language to create their own projects. The Use-Modify-Create framework strengthens programming skills as students use a practice program, modify the program, and then create their own program according to the constraints provided. Applying skills and knowledge learned from the activities and projects in this module, students work together to design and program a digital animated story.

SECOND GRADE

Materials Science: Properties of Matter: Students investigate and classify different kinds of materials by their observable properties, including color and texture, and heat conduction. Students learn about states of matter and properties of materials. They investigate which materials are good insulators and which are good conductors. After building their knowledge and skills throughout the module, students determine the best materials to use as they design a prototype to keep an ice pop frozen for at least 30 minutes.

The Changing Earth: Students explore how the surface of the Earth is always changing. They are introduced to different types of maps and explore how these maps convey different information about the world in which we live, including where water is found on Earth. Students investigate the different forces that shape the surface of the Earth and design solutions to limit the impact of erosion on this fictional community, which is located at the bottom of a hill that was recently destabilized by a fire.

Materials Science: Form and Function: Students research the variety of ways animals disperse seeds and pollinate plants. They expand their understanding of properties of matter as they consider the form and function involved in seed dispersal and pollination. Students apply their knowledge and skills to design, build, test, and reflect on a device that mimics a way in which animals disperse seeds or pollinate plants.

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Living Things: Diversity of Life: Students learn about the diversity of life in habitats, or biodiversity. They observe different habitats and the living things that grow in them. They engage in three scenarios to learn the importance of having many different organisms in a habitat. Next, students investigate how much water and sunlight plants need to grow in an environment. They use the design process to design a planter garden to grow in a specific environment.

Grids and Games: Students explore the sequential nature of computer programs through hands-on activities. Then, students develop an understanding of computer science, computer scientists, and the impacts of computing. After building an understanding of computer science, students create programs using a block-based programming language. Students follow the Use-Modify-Create Framework to write programs with sequences, loops, and triggers. Applying skills and knowledge learned from the activities and project, students work together to design and program a game that can be played on a digital device.

THIRD GRADE

Stability and Motion: Forces and Interactions: Students explore simple machines such as wheel and axles, levers, the inclined plane, and more. They investigate the effects of balanced and unbalanced forces on the motion of an object. Friends in a story go on a field trip to the zoo and are faced with the design problem of how to rescue a trapped tiger. Students then apply their knowledge of forces and devise a way to rescue a heavy zoo animal while keeping it safe throughout the process.

Weather: Factors and Hazards: Students explore, collect, and classify data related to three factors that affect weather: precipitation, temperature, and wind. They contrast weather and climate, using the three factors in their descriptions. Students explore different types of weather hazards, including those in their region. They design a solution that reduces the impact of a weather-related hazard.

Environmental Changes: Students explore different habitats and how they support life, examine what fossils reveal about how organisms and habitats adapt and change over time, and learn about environmental changes and simulate the effect they have on living things. They take a deeper look at specific examples of environmental changes in their own habitat and use the design process to explore one problem caused by environmental change and develop an action plan to reduce or stop future damage.

Programming Patterns: Students explore control structures such as events, loops, and conditionals. These structures specify the sequence in which instructions are executed within a program. Starting with computer-free activities and progressing to programming in a block-based language on a device, students learn how to think computationally about a program. Students are challenged to use computer programming to write a story with different endings. Combining their writing and programming skills, students develop interactive stories on a device with multiple plots.

FOURTH GRADE

Input/Output: Human Brain: Students discover how signals passing from cell to cell allow us to receive stimuli from the outside world, transmit this information to the brain for processing, and then send out a signal to generate a response. Inspired by a design problem about concussion awareness in a story they read, students work as part of a team to design, plan, and create a video or podcast to educate children on identifying and preventing concussions.

Energy Exploration: Students investigate energy phenomena like transfers and transformations through activities such as colliding marbles and designing simple devices, learning to observe, question, and apply the design process to solve problems related to energy in their world, connecting to real-world careers and sustainability

Input/Output: Computer Systems: Students become computer scientists exploring computing systems. They learn how data is represented in computing systems and that computers can only store 0s and 1s using the binary system. Students create programs using a block-based coding language and use their knowledge and skills to design and program a digital game.

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FIFTH GRADE

Matter: Properties and Reactions: Students learn about the three states of matter. They investigate mixtures of different materials that lead to new substances and conserve mass. Students design a test that demonstrates that an item has the required mechanical properties.

Ecosystems: Flow of Matter and Energy: Students learn about Earth's ecosystems and how energy flows from the sun to plants, and from plants to animals. Students create a model to describe photosynthesis and explain how energy from the sun is introduced into an ecosystem. Students use evidence to defend the claim that plants get the materials they need for growth mainly from air and water. Students learn how energy flows through an ecosystem and explore a simulation about how an ecosystem can become unbalanced. Finally, students use the design process to develop an action plan to protect plants and animals in an ecosystem that has become unbalanced due to human activity.

Earth's Water and Interconnected Systems: Students learn about Earth's systems: the atmosphere, hydrosphere, geosphere, and biosphere. Students examine how these systems interact and examine the role of gravity within each system. They take an in-depth look at how the processes of the water cycle intersect with each of the systems and apply this knowledge to investigate factors that impact the rate of evaporation. Students use the design process to develop a method for producing clean drinking water from samples of contaminated water.

Robotics and Automation: Students explore the ways robots are used in today's world and their impact on society and the environment. Students learn about a variety of robotic components as they build and test mobile robots that may be controlled remotely. Students are tasked with designing a mobile robot that can remove hazardous materials from a disaster site. They are then challenged to design, model, and test a mobile robot that solves this design problem.

Robotics and Automation Challenge: Students expand their understanding of robotics as they explore mechanical design and computer programming. This module focuses on developing skills needed to build and program autonomous robots. Classmates in a story are tasked with designing an automatic-guided vehicle to deliver supplies to a specific area in a hospital without being remotely controlled by a person. Inspired by this design problem, students work with a group to apply their knowledge to design, build, test, and refine a mobile robot that meets a set of design constraints.