Grade 1 STEAM Unit 1 - From Light to Sound: Creative Problem-Solving in STEAM

Unit Focus

In this introductory STEAM unit, students will become designers and problem-solvers. They will explore materials, practice teamwork and communication, and use the design process to create and test solutions. Along the way, they will build understanding of computational thinking—breaking problems into smaller steps, sequencing, and recognizing cause and effect—while connecting science concepts of light and sound to real-world applications.

Students will engage with LEGO® Education Spike Essential: Great Adventures. Through story-based challenges, they will create models that light up or make sound, learn how to build and test simple programs, and practice debugging when things don't work the first time. These activities not only strengthen problem-solving and collaboration but also give students a fun and meaningful introduction to the world of STEAM. They will also explore LEGO® Education Science investigations where they discover that objects can only be seen in the dark when illuminated and design instruments that use sound to communicate across a distance.

The unit concludes in the MakerSpace, where students tackle open-ended challenges and design solutions to real-world problems. They will discover that there are many ways to solve a problem, that designs often need to be revised and retested, and that applying scientific knowledge can lead to stronger, more effective solutions.

Stage 1: Desired Results - Key Understandings

Standard(s)

Common Core

English Language Arts: 1

- Ask and answer questions about key details in a text. (CCSS.ELA-LITERATURE.RL. 1.1)
- Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. (CCSS.ELA-LITERATURE.SL.1.1)

Mathematics: 1

- Relate counting to addition and subtraction (e.g., by counting on 2 to add 2). (CCSS.MATH.CONTENT.1.OA.C.5)

Next Generation Science Standards

Performance Expectations: 1

- Make observations to construct an evidence-based account that objects can be seen only when illuminated. (1-PS4-2)
- Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. (1-PS4-4)
- Ask questions, make observations, and gather information about a situation people want to change to define a simple problem

Transfer

Students will be able to independently use their learning to...

T1 Ask questions to gain understanding, communicate their ideas, explain their thinking process, and evaluate efficiency or connectedness to a concept.
T2 Work collaboratively and contribute constructively to project teams with a broader or global perspective.
T3 Use the engineering design process to invent or innovate solutions.
T4 Leverage technology to demonstrate learning competencies.

Meaning

Understanding(s)

Students will understand that...

U1 Effective communicators ask questions, reread for information, or think about how this problem is similar to something else I have done.
U2 Effective communicators share ideas with reasons or evidence to support them.
U3 Collaborative problem-solvers share ideas and respect the ideas of others.
U4 Engineers utilize the engineering design process to solve problems and develop new ideas.
U5 Technological methods can be used to develop and test solutions.

Essential Question(s)

Students will keep considering...

Q1 How can I better understand a problem and use what I know to design and test a solution?
Q2 How do I communicate my ideas and collaborate effectively to reach a shared goal?
Q3 How do science and technology help us solve problems in creative ways?

Stage 1: Desired Results - Key Understandings

that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)
- 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. (K-2-ETS1-2)

CSTA: Computer Science Standards (2017)
K-2
- Use appropriate terminology in identifying and describing the function of common physical components of computing systems (hardware). (1A-CS-02)
- Model daily processes by creating and following algorithms (sets of step-by-step instructions) to complete tasks. (1A-AP-08)
- Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions. (1A-AP-11)
- Develop plans that describe a program's sequence of events, goals, and expected outcomes. (1A-AP-12)

ISTE Standards (2024)
ISTE Standards (2024): K-12
- Develop, test and refine prototypes as part of a cyclical design process. (1.4.c.)
- Formulate problem definitions suited for technology assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions. (1.5.a.)
- Understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions. (1.5.d.)

Madison Public Schools Profile of a Graduate
- Design: Engaging in a process to refine a product for an intended audience and purpose. (POG.2.2)
- Collective Intelligence: Working respectfully and responsibly with others, exchanging and evaluating ideas to achieve a common objective. (POG.3.1)

Acquisition of Knowledge and Skill

Knowledge

Students will know...
K1 Hardware components have different purposes and work together to make the system function.
K2 Objects can only be seen if light is available to illuminate them.
K3 A single task can have multiple correct solutions (algorithms).
K4 Problems can be solved with tools and objects.
K5 Good communication involves both giving and receiving information.
K6 Complex problems are easier to solve when broken into smaller parts.
K7 The shape of an object affects how well it works.
K8 Computers follow exact sequences of instructions to automate tasks.
K9 Innovation and creativity come from testing and refining ideas, not just creating something once.

Skill(s)

Students will be skilled at...
S1 Identifying what each component does using age-appropriate language.
S2 Making observations to constructing an evidence-based account that objects in darkness can be seen only when illuminated.
S3 Planning and building a tool that uses light or sound.
S4 Making observations to better understand a problem.
S5 Following instructions to create a program.
S6 Creating step-by-step instructions that a computer or robot can follow.
S7 Comparing and refining multiple algorithms for the same task.
S8 Using directional vocabulary to describe a sequence.
S9 Breaking a problem down into smaller parts.
S10 Describing a program's sequence of events, goals, and expected outcome.
S11 Taking turns speaking during a conversation.
S12 Expressing ideas clearly and in complete sentences.
S13 Creating simple drawings or sketches that show ideas for solving a problem.
S14 Deciding how to use materials for a specific goal.