Grade 1 STEAM Unit 2 - Adapt, Design, Invent: STEAM Adventures in Nature and Technology

Unit Focus

Using Lego Education Spike and Lego Education Science, Grade 1 students begin by designing a solution to a human problem by mimicking how animals use their external parts to meet their needs. This foundational activity introduces the connection between nature and problem-solving, helping students observe patterns and understand how animals adapt to survive.

Next, students engage in the technology component of the engineering process, building prototypes and programming their functions. They learn to develop programs using sequencing and loops, test whether their programs work, and debug any issues that arise. Through these experiences, students see how technology and engineering can be used to solve real-world problems creatively.

Alongside the engineering and technology work, students explore behavioral patterns in parents and offspring that support survival. They develop their collaborative discussion skills by referring to story elements, identifying a character's problem, and applying those insights to their design and programming tasks. Having a clear understanding of the problem helps students grow into effective problem-solvers.

Finally, the MakerSpace component brings students full circle, asking them to apply their scientific understanding of animal adaptations and create new defense mechanisms for plant or animal survival. This culminating activity integrates knowledge, creativity, and collaboration while highlighting the ways nature inspires innovation.

Stage 1: Desired Results - Key Understandings

Standard(s)

Common Core
English Language Arts: 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)

Next Generation Science Standards
Performance Expectations: 1

- 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)
- Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. (1-LS1-1)
- Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. (1- LS1-2)
- 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. (K-2-ETS1-2)

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 Leverage technology to demonstrate learning competencies.
T3 Use the engineering design process to invent or innovate solutions.
T4 Exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.
T5 Work collaboratively and contribute constructively to project teams with a broader or global perspective.

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 can explain decisions, why they might work, and how they impacted designs.
U3 Effective communicators can relate their results to real-world concepts.

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

CSTA: Computer Science Standards (2017)
K-2
- Develop programs with sequences and simple loops, to express ideas or address a problem. (1A-AP-10)
- Debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops. (1A-AP-14)

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.)
- Break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving. (1.5.c.)
- 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)

U4 Scientific concepts and patterns can be used to inspire technological designs and solutions to problems.
U5 Engineers utilize the engineering design process to solve problems and develop new ideas.
U6 Collaborative problem-solvers share ideas and respect the ideas of others.
U7 Effective problem-solvers break apart challenges into small, manageable tasks, evaluating their process along the way.
U8 Effective problem solvers persevere by trying new ideas, gathering new information, or collaborating with others.
U9 Technological methods can be used to develop and test solutions.

Acquisition of Knowledge and Skill

Knowledge	Skill(s)
Students will know... **K1** Good problem-solving starts with a clear understanding of the problem. **K2** The design of my product directly relates to the need. **K3** Plant and animal parts help them to survive. **K4** Events trigger actions and can make programs responsive. **K5** If the program isn't working, there's a mistake in the instructions (not the computer). **K6** Automation saves time and effort, and it relies on accurate programming. **K7** Designers use visuals to plan, test, and improve their ideas. **K8** Everyone's ideas are valuable in group discussions. **K9** Following discussion rules helps conversations be respectful and productive. **K10** Decomposition makes complex tasks less overwhelming and more solvable.	*Students will be skilled at...* **S1** Identifying and discussing animal parts and how they help an animal survive. **S2** Identifying a problem that needs to be solved. **S3** Developing programs with teacher guidance that include sequences, events, and simple loops. **S4** Developing a program to solve a problem. **S5** Solving a problem by breaking it down into manageable parts. **S6** Identifying cause and effect. **S7** Building a device that uses light or sound to solve a problem. **S8** Participating in collaborative conversations. **S9** Asking and answering questions to clarify understanding. **S10** Identifying and fixing errors in a program. **S11** Testing to ensure the program works correctly.