Grade 5 STEAM Unit 1 - Innovators in Action: Exploring STEAM Through Design and Discovery

Unit Focus

In this introductory STEAM unit, students will become young innovators, exploring a variety of materials and tools to create, test, and refine their own solutions to engaging, real-world challenges. Using Lego Education Spike and Lego Education Science, students will investigate scientific concepts while applying the engineering design process to develop inventive devices and prototypes.

Throughout the unit, students will collaborate and communicate effectively, honoring the ideas of all group members while comparing the effectiveness of diverse solutions. They will engage in hands-on design challenges, creating imaginative inventions, problem-solving with unique criteria, and iteratively testing and refining their designs. Students will also explore MakerSpace opportunities, designing devices that connect directly to scientific principles such as light, motion, and communication.

In addition, digital literacy will be integrated as students analyze online news articles to understand structure, purpose, and credibility, with a focus on distinguishing sponsored content from trustworthy information. By the end of the unit, students will have strengthened their problem-solving, collaboration, and digital literacy skills while gaining confidence in designing, testing, and improving their creations, understanding that innovation grows from curiosity, experimentation, and learning from both successes and challenges.

Stage 1: Desired Results - Key Understandings

Standard(s)

Common Core
English Language Arts: 5
- Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly. (CCSS.ELA-LITERACY.SL.5.1)

Next Generation Science Standards
Performance Expectations: 4
- Generate and compare multiple solutions that use patterns to transfer information. (4-PS4-3)

Performance Expectations: 5
- Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)
- Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (3-5-ETS1-2)

CSTA: Computer Science Standards (2017)

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

Meaning

Understanding(s)	Essential Question(s)
Students will understand that... **U1** Problem solvers use strategies like asking questions, breaking problems into parts, and trying out solutions to better understand and approach challenges **U2** Effective problem solvers recognize there can be multiple solutions, persevere through challenges, and build resilience by trying new strategies.	*Students will keep considering...* **Q1** How can I better understand a problem before trying to solve it? **Q2** What strategies help problem solvers get started, keep going when they're stuck, and persevere through challenges? **Q3** How might a design show or apply a scientific concept or pattern?

Stage 1: Desired Results - Key Understandings

3-5

- Compare and refine multiple algorithms for the same task and determine which is the most appropriate. (1B-AP-08)
- Modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features. (1B-AP-12)
- Describe choices made during program development using code comments, presentations, and demonstrations. (1BAP-17)

ISTE Standards (2024)

ISTE Standards (2024): K-12

- Manage their digital identity and understand the lasting impact of their online behaviors on themselves and others and make safe, legal and ethical decisions in the digital world. (1.2.a.)
- Demonstrate empathetic, inclusive interactions online and use technology to responsibly contribute to their communities. (1.2.b.)
- Know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems. (1.4.a.)
- Develop, test and refine prototypes as part of a cyclical design process. (1.4.c.)

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)

U3 Scientific concepts and patterns inspire technological designs and solutions.
U4 Problem solvers use the engineering design process to develop and test ideas, consider feedback to improve their work, and apply technology to create effective solutions.
U5 Collaborative problem-solvers share ideas and respect the ideas of others.
U6 Collaborative problem-solvers can adjust their thinking based on the contributions of others.
U7 Technological methods can be used to develop and test solutions.

Q4 How can I use what I know to develop and test a design?
Q5 What makes someone an effective group member, and how can groups work together toward a common goal?
Q6 How does technology help to accomplish a goal?

Acquisition of Knowledge and Skill

Knowledge

Students will know...

K1 Each part of the code has an important and specific function
K2 The engineering design process follows a series of steps to generate ideas, create prototypes, test functionality, and make modifications to best solve a problem.
K3 Control blocks can be used to write efficient programs that are automatic and/or have more control.
K4 Ideas may differ, but we show respect by honoring the contributions of others and respectfully adding or sharing other ideas to work as a collaborative group.
K5 There are multiple solutions that can be used to solve the same problem
K6 A person's online behavior greatly impacts their digital identity
K7 The difference between a news article and other parts of a news website that represent commercial interests

Skill(s)

Students will be skilled at...

S1 Generating and comparing multiple possible solutions to a problem using patterns to transfer information
S2 Defining a design problem that reflects a need or want
S3 Describing choices made in program development
S4 Using the design process to create and test a solution to a problem
S5 Developing, testing and designing prototypes as part of a cyclical design process
S6 Comparing and refining multiple algorithms
S7 Copying and adapting existing code
S8 Following rules for discussion and asking and answering questions