STEM Integration

METSETSMMSTETESM

Let’s STEM (5 Minutes]

- Form SIX teams
- One representative pick items from the table
- As a team develop a creative innovative STEM artifact

STEM - Science Technology Engineering Math

Breaking it down one word at a time…

STEM - Science Technology Engineering Math

STEM isn't a standalone class—it's a way to intentionally incorporate different subjects across an existing curriculum. **-Anne Jolly**

STEM Lessons...

- **focus on real-world issues with students seeking solutions.**
- **are guided by the engineering design process.**
- **immerse students in hands-on inquiry and open-ended exploration.**
- **involve students in productive teamwork.**
- **allow for multiple right answers and reframe failure as a necessary part of learning.**
- **apply rigorous math and science content your students are learning.**

Science in the lead

Bundle: Climate Diversity

Bundle Question: What causes climates to be so different across the Earth?

Unit: Maps and Forecasting

Unit Essential Question: How does the energy and matter that circulate Earth's systems impact weather and climate?

NGSS and Common Core Standards

MS-ESS2-5. Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions

MS-ESS2-6. Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

RST.6-8.1Cite specific textual evidence to support analysis of science and technical texts.

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

7.EE.B. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations as strategies to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

7.SP.C.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.

Crosscutting Concepts

Patterns: Patterns in rates of change and other numerical relationships can provide information about natural and human designed systems. Patterns can be used to identify cause and effect relationships. Graphs, charts, and images can be used to identify patterns in data.

Cause and Effect: Cause and effect relationships may be used to predict phenomena in natural or designed systems.

Systems and System Models: Models can be used to represent systems and their interactions such as inputs, processes and outputs and energy, matter, and information flows within systems.

Math in the lead

Modeling Activity
“Scaling the Solar System”

This lesson follows a lesson on balanced and unbalanced force in the universe.

A common theme throughout the unit is the role of gravity.

Standards

CCSS Standards:

8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.

8.EE.A.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.

8.EE.A.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.

NGSS Standard:

MS-ESS1-3 Analyze and interpret data to determine scale properties of objects in the solar system.

- Science and Engineering Practice: Analyze and interpret data to determine similarities and differences in findings.
- Disciplinary Core Idea: The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them.
- Crosscutting Concept: Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. The solar system is a large system that must be reduced in order to study it in a classroom setting.

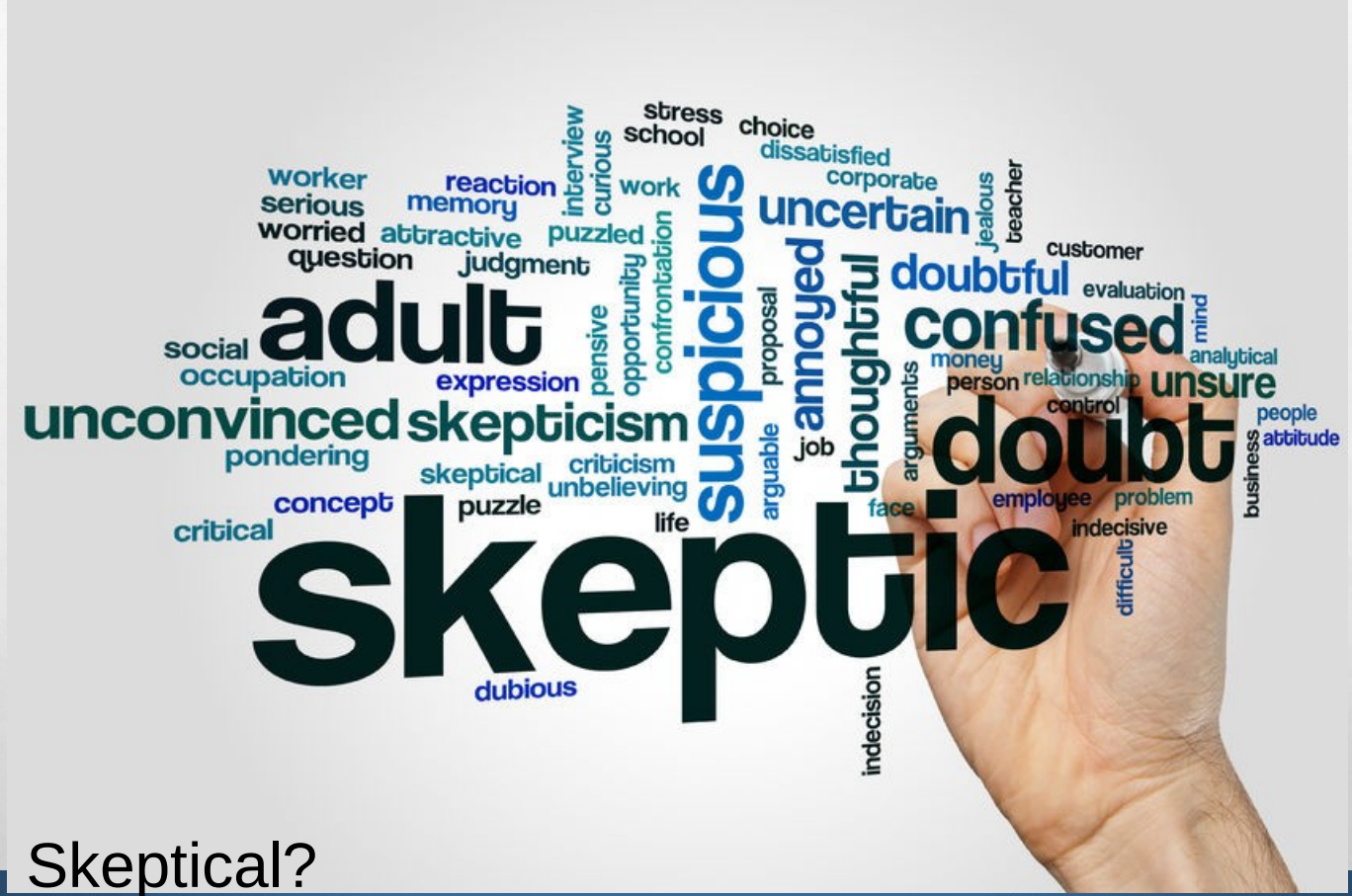
Pigeons, Pigeons, everywhere.

This one starts in an English class with the book “One Came Home”.

What do you think we are studying in science?

This Project Grew and Grew

By the end of the project we had involved virtually every student and staff member in some way.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unbelieving
concept
puzzle
critical
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arguable
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arguments
face
employee
problem
indecisive
difficult
dubious
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Skeptical?

Give It A Chance

- You don’t have to reinvent the wheel, just tweak what you’re already doing. [BE INTENTIONAL]
- You don’t have to do it all tomorrow. [PICK ONE LESSON]
- Have a conversation. [FELLOW TEACHERS/ADMIN]

STEM - a way to intentionally incorporate different subjects across an existing curriculum

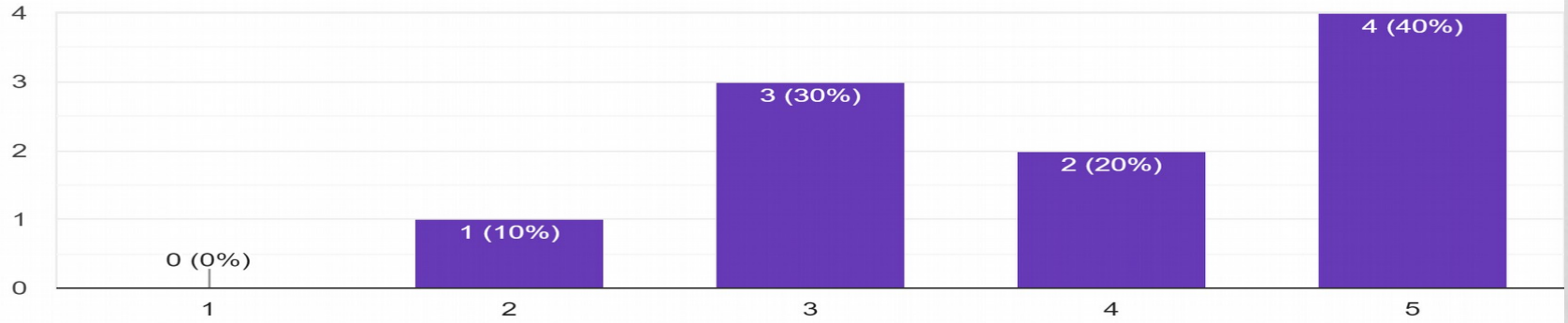
Outcomes


To what extent was attending this training worth your time?
9 responses
3
2
1
0
0 (0%)
1 (11.1%)
3 (33.3%)
3 (33.3%)
2 (22.2%)
1
2
3
4
5

Outcomes

As related to influencing your thoughts of STEM and the use of STEM in the classroom, how effective do you feel the training was?

10 responses



Outcomes

To what extent have you applied the information to your classes?

10 responses