
STEMAZing Saturday 4/16
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Welcome!

Introductions:

Choose a rock at your table that "speaks" to you. For our introductions, please state:

- your name
- where you teach and what grade level
- and one reason why you chose the rock that you did.

The 5 E Instructional Model

http://bscs.org/bscs-5e-instructional-model

5 E: Engage

Bill Nye video excerpts (Just introduction) https://youtu.be/J-ULcVdeqgE
Grand Canyon Erosion (3 minutes) https://edpuzzle.com/media/556f10827b0261c04eaf0049

5 E: Explore

Erosion Activities

1. Preventing Erosion
2. Dissolving Rock
3. Water Weight/Splash Erosion
4. More Soil Erosion

Explore Continued/ "Digestion" Time

What questions do you still have? -Whiteboards

Connecting the learning:

- What happened in the Explore phase?
- What processes did you observe?
- What did you see?
- What did you think?
- What questions do you still have?
- Looking/Listening for misconceptions

The Three Dimensions of the K-12 Framework for Science Education

SCIENTIFIC & ENGINEERING PRACTICES

1. Asking questions (science) and defining problems (engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (science) and designing solutions (engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating and communicating information

CROSS-CUTTING CONCEPTS

1. Patterns
2. Cause and effect: Mechanisms & Explanations
3. Scale, proportion, and quantity
4. Systems and system models
5. Energy and matter: Flows, cycles, and conservation
6. Structure and function
7. Stability & Change

DISCIPLINARY CORE IDEAS

1. Physical Sciences
2. Life Sciences
3. Earth and Space Sciences
4. Engineering, Technology, and Applications of Science

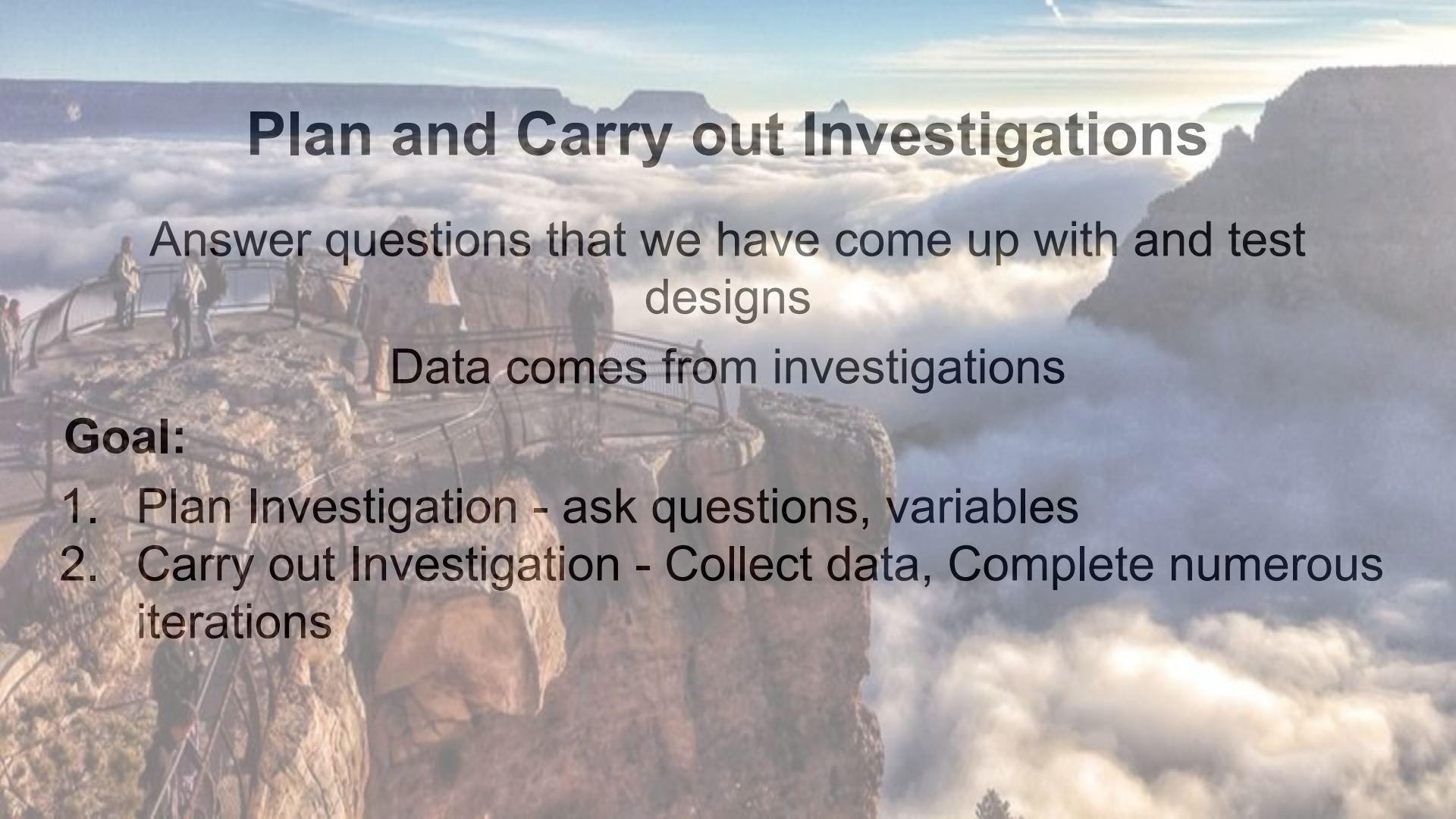
Ask questions (science)
Define problems (engineering)

Ask questions to explain

Define problem to provide possible solutions

Goal: Teach students to ask better questions by starting broad then defining and refining.

Ultimately want students to do this on their own.



Plan and Carry out Investigations

Answer questions that we have come up with and test designs

Data comes from investigations

Goal:

1. Plan Investigation - ask questions, variables
2. Carry out Investigation - Collect data, Complete numerous iterations

Develop and Use Models

Purpose is to explain, analyze and share understanding

Conceptual Models - diagram, replica, analogy, mathematical, simulation

Goal: Construct drawings, represent phenomenon, create simulations, test

Analyze and Interpret Data

Science - for purpose of getting meaning

Engineering - to test possible solutions

Goal: to gather data, organize data, and use data to create meaning, use graphs, tables, charts to demonstrate causation/correlations

Use Mathematics and Computational Thinking

Use math to explain data as it represents variables. Improve on design. Use computers to help gather large amounts of data

Goal: Start students using quantities and units (rulers, thermometers, protractors), collect and organize data on spreadsheets, graphs, see mathematical relationships, simulations

Construct Explanations (Science)
Design Solutions (Engineering)

Working with theories, hypotheses, observations, explanations based on process

Goal: Become better at constructing explanations, making guesses, modifying guesses, and design solutions

Engage in Argument from Evidence

Best explanation (Science) Best solutions (Engineering)

Formulating and critiquing arguments

Goal: Using questions to construct and critique to come up with answers. Then use investigations, put forward a guess/explanation based on evidence

Obtain, Evaluate and Communicate Information\

Sharing explanations (Science) Share solutions (Engineering)

Goal: Consume information using scientific literature, create and share own scientific and/or engineering information

5E: Explain

Explain:

- Read for information
- Capture your thinking using the annotation cards
- Connect the reading
- Support Ideas with Evidence
- Teacher support/ Misconceptions

Elaborate

http://tinyurl.com/geo-tour-gray-mt-black-mesa

Elaboration Continued...Fossil Lake

https://youtu.be/6EMRujEbhQQ

Fish Identification Challenge

Wrap Up with DaNel