STEM INTEGRATION

What does STEM integration look like in the classroom?

http://bit.ly/2kuPaEa

Advanced Manufacturing and Prototyping, Integrated to Unlock Potential

An NSF Partnership to Cultivate the Next Generation of STEM Innovators

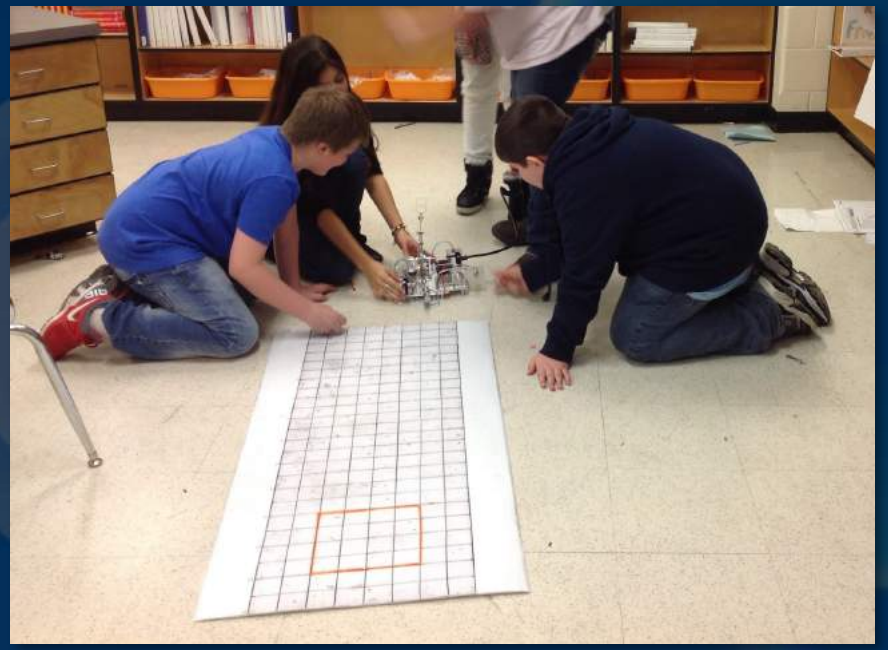
Award # 1238089
Period: 10/1/2012--9/21/2017

Griffin-Spalding County School System

Georgia Tech Center for Education Integrating Science, Mathematics & Computing

Advanced Manufacturing and Prototyping Integrated to Unlock Potential (AMP-IT-UP)

- **A National Science Foundation Math and Science Partnership to promote workforce development and to identify and cultivate the next generation of creative STEM innovators.**
  - Partnership with the Griffin Spalding County School System
  - Impact: > 11,000 students over 5 years



Integrates middle school engineering, science and mathematics to promote STEM learning and entrepreneurship.

AMP IT UP

Advanced Manufacturing & Prototyping Integrated to Unlock Potential

Georgia Tech Center for Education Integrating Science, Mathematics & Computing

The Program Components

- Middle school STEM Innovation and Design exploratory courses that enable students to explore their creativity using robotics and rapid prototyping
- **Middle school math and science modules that promote inquiry and connect with Georgia Tech High school engineering courses that focus on design-build challenges**
- Extracurricular enrichment for students and teachers
- Research on how AMP-IT-UP affects academic engagement, content understanding, knowledge transfer, and student persistence in STEM

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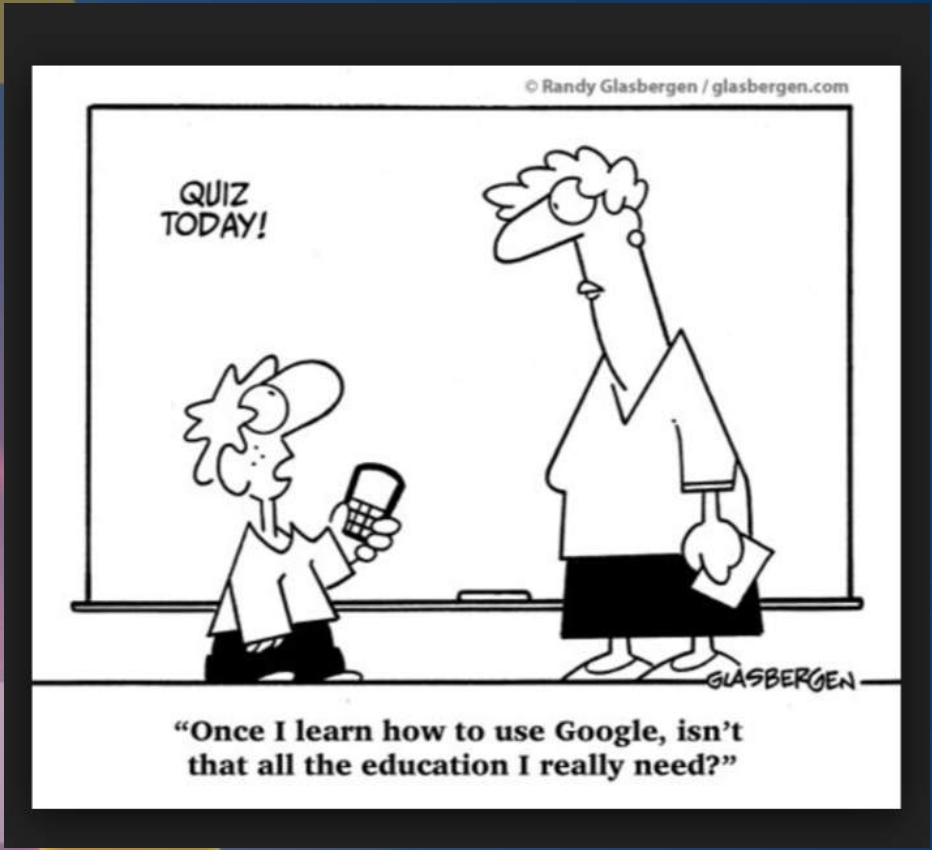
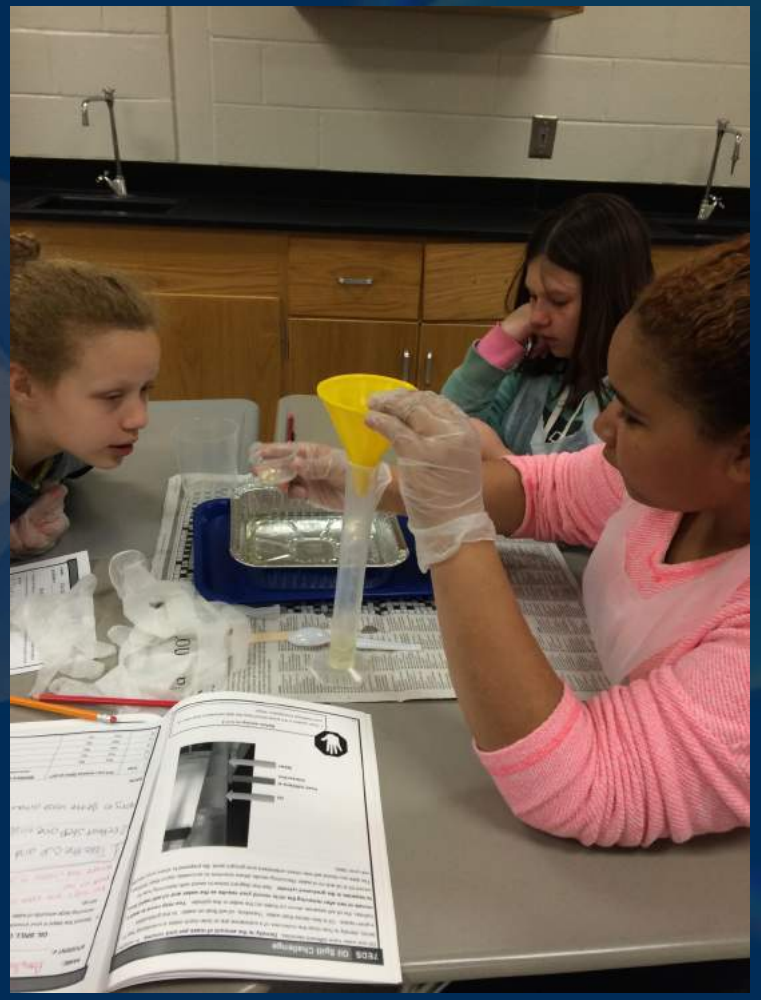


Middle School Math- Science Curriculum

- Integrated STEM
- Problem Based Learning
- Inquiry Driven
- Aligned with NGSS Practices
- Connections to Georgia Tech Research



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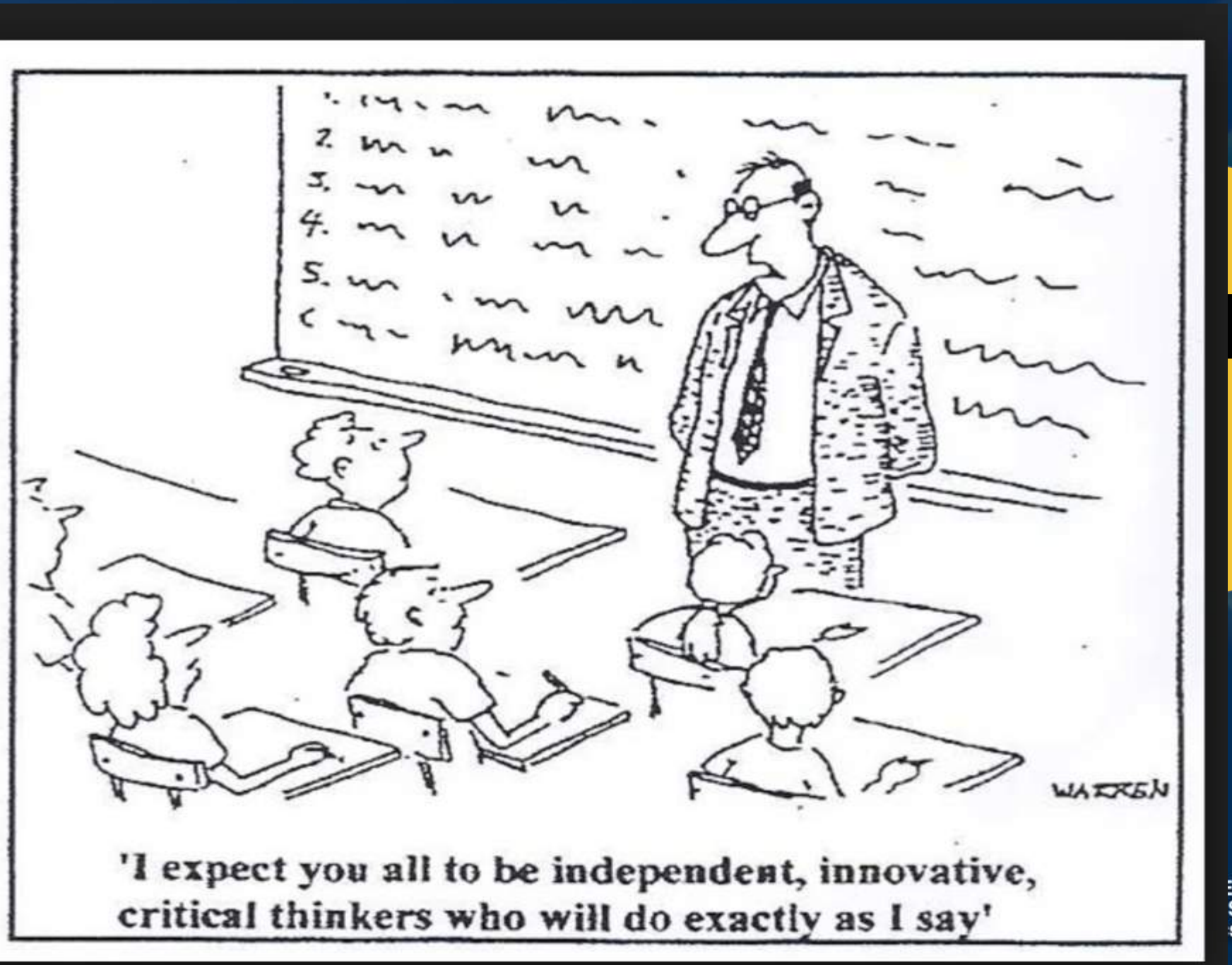

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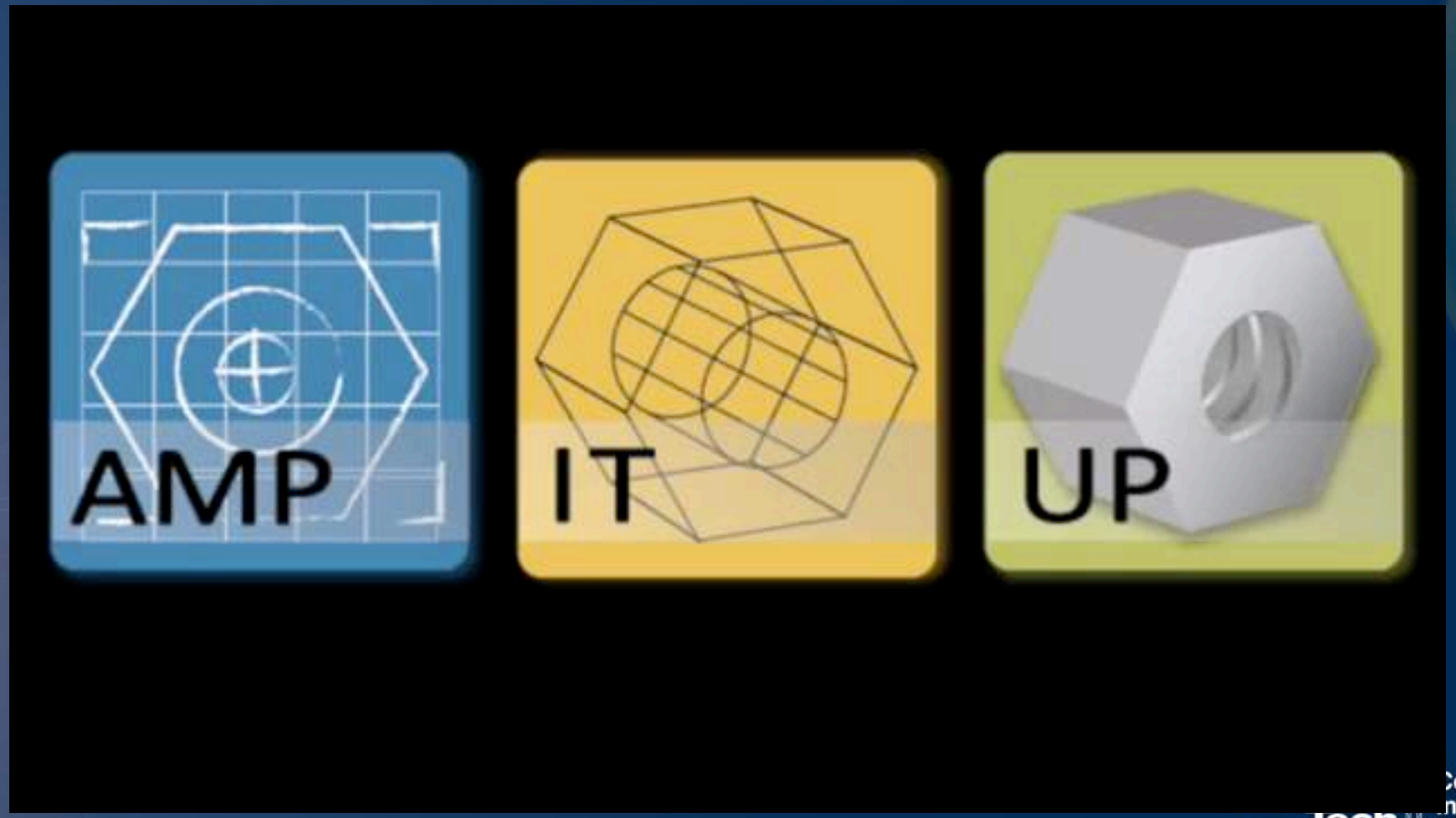
Crab Aquarium Challenge



Crab Aquarium Challenge

Your Challenge

Your team has been asked to help an aquarium select the predators for a blue crab display so that there is an ecological balance of crabs and predators.

Crab Aquarium Challenge

Directions:

1. Record the Pheromone Percentage on your data sheet.
2. Count the blue plastic chips, record on on Data sheet under Crab Mating Event
3. Assign each member of your group a predator:
    1. Sea Turtle: Yellow Plastic Chips
    2. Red Drum: Red Plastic Chips
    3. Croaker: Green Plastic Chips
4. Count your predator chips and record your number on your data sheet

Crab Aquarium Challenge

Crab Pheromone Concentration (%)	20	30	40	50	60	70	80	90	100
Number of Mating Events	4	6	8	10	12	14	16	18	20
Number of Croaker Predatory Events	2	5	8	11	14	17	20	23	26
Number of Red Drum Predatory Events	2	4	6	8	10	12	14	16	18
Number of Sea Turtle Predatory Events	1	3	5	6	7	8	9	10	11

Trends

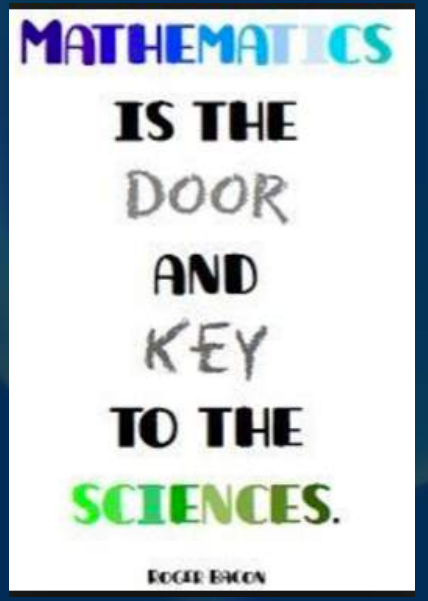
- What trends do you observe about the number of the blue crab mating events as the pheromone concentration increases?

- What trends do you observe about the number of events with each Blue Crab Predator?

- Are the differences between trends of the different predators?

STEM Integration

- Think about this act… how does this teach science content?
- What types of math con…ctions can be made?
- How could this be an exa…le of STEM integration?



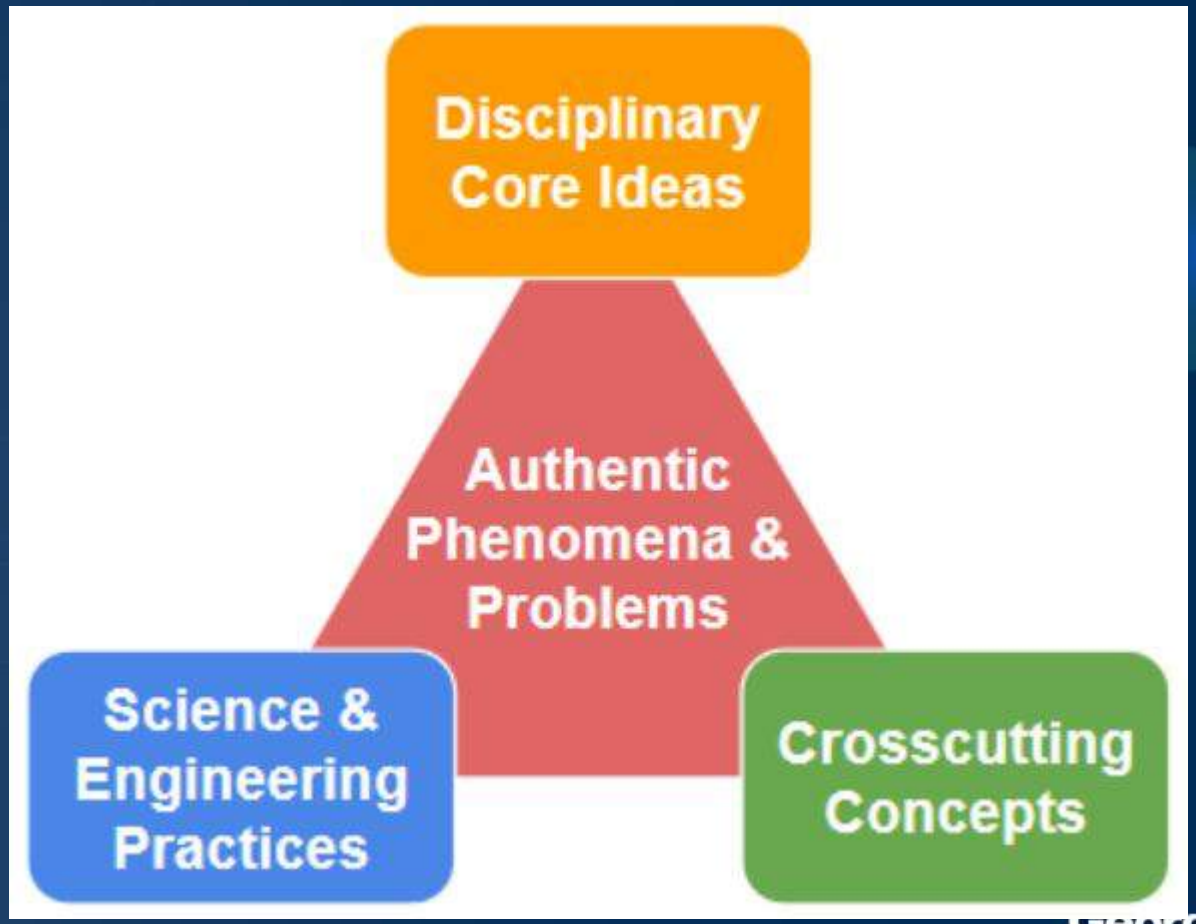
This activity is part of a 7th Grade Math Module that covers basic GSE concepts in proportional relationships and rate of change.

How does this change your thoughts about the activity in terms of STEM Integration?

STEM Integration in AMP

- Nine Math Modules and Nine Science Modules
- Each grade level has three modules in each content area aligned to specific NGSS practices
- Each module presents a challenge that requires math/science content development to develop solutions
- Math modules use science/engineering context and data to teach specific math standards
  - Ocean Zones
  - Solar Energy
  - Manufacturing Challenge
- Science modules use data analysis to reinforce math standards

3D Learning In AMP-IT-UP



Phenomena and Problems

Examples:

- Students engage as earth scientists to help a small town that is adjacent to a volcano develop evacuation plans in the event of an eruption
- Students play the role of school officials and have to decide whether to close school or keep it open based on weather forecasts
- Students engage as earth scientists to help a company decide where to build its new cell phone and tablet manufacturing plant in northern California
- Students engage as environmental engineers to develop a procedure that would remove the most amount of oil from the ocean in the shortest time possible in the event of a large scale oil spill

Deep Dive into NGSS Practices

Each module focuses on one of these themes:

- ***Experimen***
  - Planning
- ***Data Visu***
  - Analyzing
- ***Data-Drive***
  - Construct
  - Engaging in Argument from Evidence (Practice 7)

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as procedures become standardized.

Students analyze data and situations that are intentionally murky, and to make decisions based on data, but where there isn't a simple solution and instead they need to address various trade-offs and then communicate and defend their decisions.

Crosscutting Concepts and Core Content

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Crosscutting Concepts

1 Patterns
2 Cause and effect
3 Scale, proportion, and quantity
4 Systems and system models
5 Energy and matter
6 Structure and function
7 Stability and change

Science Modules

Experimental Design

- Molten Madness(6)
- Oil Spill Drill (7)
- Ocean Blizzard (8)

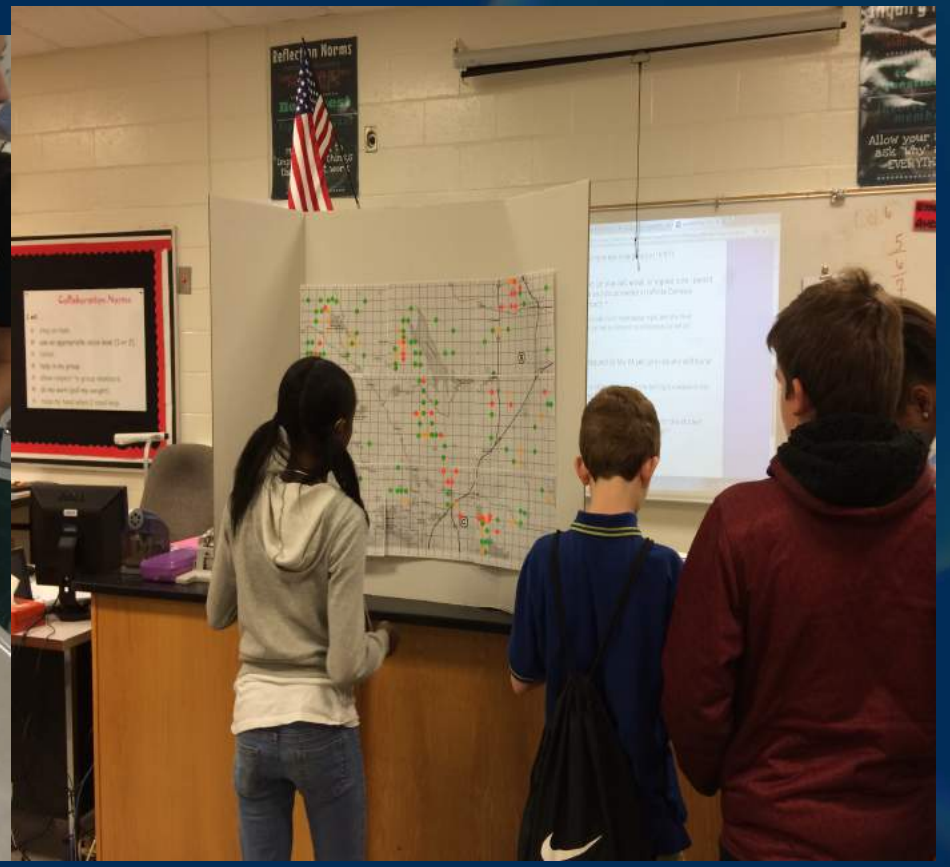
Data Visualization

- Shake and Brake (6)
- Under the Sea (7)
- Riding the Concrete Wave- Part 1 (8)

Evidence Based

- Snow Day (6)
- Don’t Wreck the Reef (7)
- Riding the Concrete Wave – Part 2 (8)

Modules in the Classroom



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Griffin Spalding Community Schools and Georgia Tech : A Partnership

GRIFFIN-SPALDING COUNTY SCHOOL SYSTEM

GSCS is transfoming our students into future-ready learners and contributing members of society.

Georgia Tech Center for Education Integrating Science, Mathematics & Computing

Want to learn more? Visit ampitup.gatech.edu

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AMP-IT-UP Module Request Form

Start — Module Selection — Complete

Selected Modules *
(check all that apply)

- [ ] .6th-12th Grade - Engineering/Technology - Electronic Engineering Design Process Log
- [ ] 6th Grade - Engineering/Technology - Carnival Tycoon Challenge
- [x] 6th Grade - Math - Data Visualization: "Data Saves the Whales!" - Whale Challenge
- [ ] 6th Grade - Math - Experimental Design: "Some Assembly Required" - Packaging Challenge
- [ ] 6th Grade - Science - Data Visualization: "Molten Madness" - Lava Challenge
- [ ] 6th Grade - Science - Experimental Design: "Shake and Break" - Earthquake Challenge
- [x] 7th Grade - Engineering/Technology - Flight of Fancy Challenge
- [ ] 7th Grade - Math - Data Visualization: "Crab Friend or Foe?" - Crab Ac...e
- [ ] 7th Grade - Math - Experimental Design: - Board Game Piece Challenge
- [ ] 7th Grade - Science - Data Visualization: "Don't Wreck the Reef" - Coral Reef Challenge
- [x] 7th Grade - Science - Experimental Design: "Oil Spill Drill" - Oil Spill Challenge
- [ ] 8th Grade - Engineering/Technology - Robot Rescue Challenge
- [ ] 8th Grade - Math - Data Visualization: "Extract the Hot Shots!" - Hot Shot Challenge
- [ ] 8th Grade - Science - Data Visualization: "Riding the Concrete Wave" - Helmet Challenge
- [ ] 8th Grade - Science - Experimental Design: Cookie Challenge
- [ ] 9th Grade - Engineering - Foundations of Engineering and Technology

Go back to Module Request Form **Submit Module Request**

Fill out the information on Module Request Form and then select the module(s) that you would like copies and click submit. You will then receive an email with the links for downloads of the modules requested.

GSTA AMP SESSIONS

- 6th Grade Curriculum
  Thursday at 2pm Rhododendron A
- 7th Grade Curriculum
  Thursday at 4pm Rhododendron A
- 8th Grade Curriculum
  Saturday at 8am Gardenia

Contact Information

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