

## **Nature of STEM**

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Methods of STEM Education

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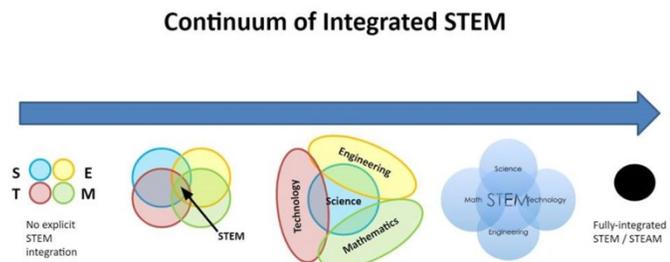
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Science, unfortunately, is not held to as high of importance in my grade level. We have students who cannot read or identify letters, so we tend to put science and social studies on the back burner. I do my best to implement science into reading and writing so that my students still get the education they require and deserve. I also tend to give some of my students who need a challenge, different activities that require a higher level of thinking and problem-solving. Often these activities will have pieces of STEM integrated within them.

We do not have a set science curriculum, which is very challenging for a new teacher. Most of what I use to teach science is online resources, resources that have been suggested to me by veteran teachers, and slide shows and lessons that I have done my best to create on my own. Being a second-year teacher, a lot of my lessons have been based on trial and error.

When looking at the Continuum of Integrated STEM my grade level and I are at the far left of the continuum. I am hoping with more teaching experience and proper training, I will move more towards the right of the continuum.



A) One of my favorite science projects, using the engineering and design process, I do with my students during Halloween time. With this project, students work together in teams of two or three. Not only does this promote teamwork and working together, but students have to practice and learn how to listen to their peer's thoughts and ideas. Often, students will have to compromise and bring all of their different ideas into one collaborative idea, which can be a

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challenge for second graders. (Side note: This lesson is something I got from Teachers Pay Teachers. I did not create this and am not taking credit for it). Students have to help Farmer Joe build the tallest tower possible using only pumpkins (candy corn pumpkins) and wood planks (toothpicks). Students are immediately excited to help Farmer Joe with the short blurb/story that is included in this activity. They then have to come together as a group and decide what the problem is they are trying to solve and ask a question. After students come up with a question, they have to come up with an initial design to help Farmer Joe. After they come up with a design, they begin to create and test their design. At this point in the process, as a teacher, it is important to voice to students that the first design they come up with is most likely not going to be successful. As a second grader, this can be very discouraging when your initial design fails. Luckily, the engineering and design process has a very important step which is to evaluate and improve. Students might ask themselves: What went well? What didn't work? What can we fix? Was there something that worked well in our initial design? Was there something that didn't work well in our initial design? This is when students have to go back to the drawing board and continue to follow the engineering and design process cycle.

Group Member(s)

**P U M P K I N**  
**T O W E R C H A L L E N G E**

**Challenge:**  
Farmer Joe needs your help! He needs to build the tallest tower possible so he can oversee his garden and scare away any animals that want to eat his crops. The only problem is that he only has wood planks and pumpkins to build his structure!

**Criteria:**  
Communicate and collaborate with your group to build the tallest tower possible using only 20 candy pumpkins and toothpicks.

**Materials:**  
20 candy pumpkins per group  
Toothpicks (as many as needed)

**Ask:** What problem are we trying to solve?

**Imagine/Design:** Collaborate with your group to create a design to solve the problem. Draw your **team's design** in the space below.

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Group Member(s)

**P U M P K I N**  
**T O W E R C H A L L E N G E**

**Create/Test:** Collaborate with your team to create your design, then test it out. Draw a picture of your finished product.

**Evaluate/Improve:** Were there any problems you faced in your design? How can you make it better? Communicate with your group and redesign your structure below.

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B) There are a lot of ways that I can enhance my teaching when it comes to science and STEM. When diving into the Nature of Science reading, I found myself thinking of different ways I could, or already do, incorporate some of the eight themes of science into my teaching practices.

Nature of Science understandings most closely associated with Practices:

- **Scientific Investigations Use a Variety of Methods**

- Science investigations begin with a question.
  - Most of our lessons, math, science, reading, social studies, and writing all begin with me asking a question to my students to activate prior knowledge. I would like to begin more lessons with my students posing the questions.
- Scientists use different ways to study the world.

- **Scientific Knowledge is Based on Empirical Evidence**

- Scientists look for patterns and order when making observations about the world.
  - Often before starting a science or math lesson, I will have a picture, an icon, a symbol, or a graphic of some sort that has to do with what the lesson will be about. I then give students quiet think time to make observations and think about the following: What do you wonder? What do you know? What questions do you have? What can you see?

- **Scientific Knowledge is Open to Revision in Light of New Evidence**

- Science knowledge can change when new information is found.

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- This is a very hard concept for young learners to understand because they are used to the answer being the answer and that is the only answer. When it comes to science, that is not the case. I think using the engineering and design process is a great way to address this misconception with young learners. When you find a new or better way to do something, you make the necessary changes, which is what scientists do when they find out new information.
  
- **Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena**
  - Scientists use drawings, sketches, and models as a way to communicate ideas.
    - The science projects and activities that we do in class require students to start out by sketching their designs to help communicate their thought processes to their group member(s).
  - Scientists search for cause and effect relationships to explain natural events.
    - In second grade, cause and effect is something we cover in great detail in reading. Students begin to understand that when \_\_\_\_\_ happens, \_\_\_\_\_ happens. When we bring this concept into science or mathematical thinking, it calls for higher-level thinking and problem-solving. Students will begin to ask questions, think about why \_\_\_\_\_ happened, and how they can fix it or come up with something to solve the problem, which leads directly into the engineering and design process.

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C) When thinking about the Nature of Science, I feel that many of the concepts overlap with those concepts of the Nature of Math. Three of the mathematical practices I found that overlap with the Nature of Science are:

- 1) Make sense of problems and persevere in solving them.
  - i. Science and using the engineering and design process, which we do often in second grade, is full of making sense of problems and solving them. This is a very challenging concept for young learners because they are used to the answers being black and white. That is not always the case, especially when it comes to science and math. There are many different ways to look at and solve problems.
- 2) Construct viable arguments and critique the reasoning of others.
  - i. Something I focus greatly on in second grade is listening to learn. Second graders tend to talk, talk, talk, and not actively listen. Therefore, they are not taking the time to learn from others and listen to others' thoughts, opinions, and ideas. When young learners learn the gift of listening, they can come together with their peers and collaboratively create something impeccable.
- 3) Attend to precision.
  - i. With any subject area, especially math and science, students tend to make silly mistakes because they are not attending to precision and paying attention to what they are doing. Thinking at a higher level and being a problem solver takes time and is not something that can be rushed through. Scientists and mathematicians cannot create something that will benefit civilization if they do not attend to precision when it comes to their work.

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