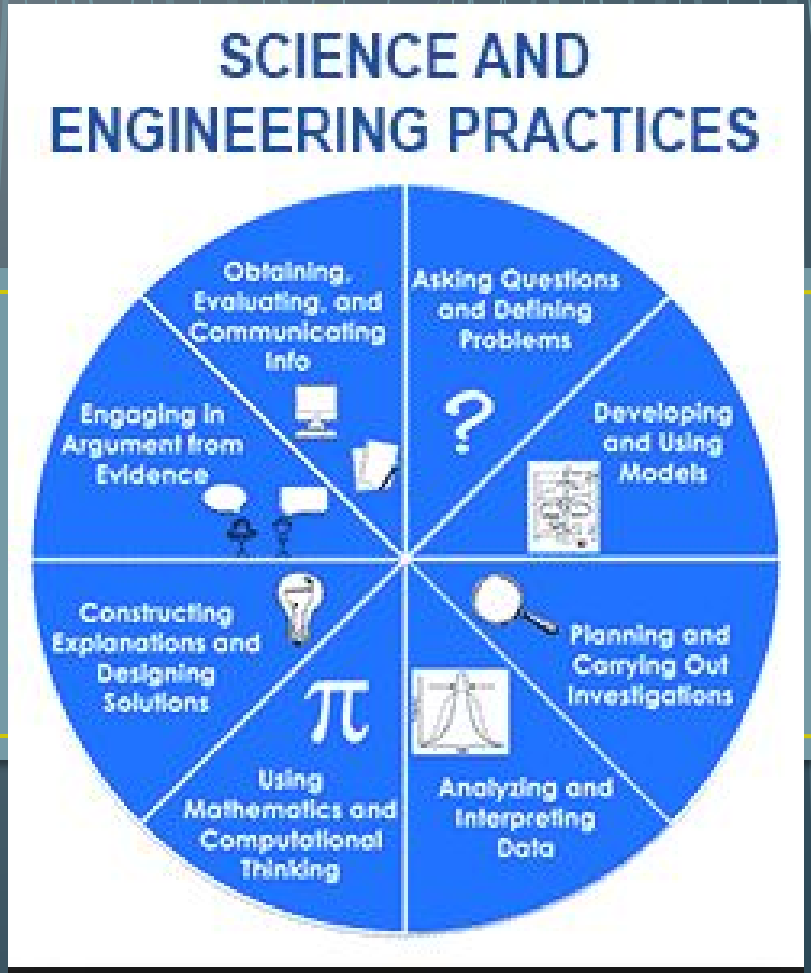


Science & Engineering Practices

Day 3 Biology Boot Camp

Introductions:
Jen Gutierrez, ADE

NSTA

Science and Children

Learning About Plants With STEAM

In a yearlong unit on plants, students use art to make models of their subjects.

By Rebecca Kurson

Who is Susan Rodriguez?

Where it all started….

One-Room Schoolhouse

Grades Kinder-5th

19 students that year

Problem-based learning

Self-directed learners

Special Education, Self-Contained

Taught 3 years

Ages 3-5

VERY familiar with IEPs!

Learned the importance of real-world connections

The big move to Arizona!

2 years in 2nd grade

5 years in 4th grade:

- Embed, embed, embed!
- Cooperative groups

STEM Curriculum

Wrote STEM Curriculum for grades Kinder-5th

- Integrated existing curriculum (ELA and Math)
- Embedded technology
- Modeled for and coached teachers (Gradual Release of Responsibility)
- Incorporated entire school (ancillaries, custodians, ria)

Education Specialist

Navajo County Education Service Agency

- Work under the County Supt. of Schools (Jalyn Gerlich)
- Partner with schools to help meet their needs
- Fun Projects:
  - Regional Science and Engineering Fair
  - STEM Festival
  - Spelling Bee
  - Read Across America
  - Pi Day
  - Square Root Day
- Provide quality professional development

My family

Kahoot!

- On your phone or device, go to kahoot.it

Kids learn best when they:

- engage in activities that are fun, exciting, and connect to the world in which they live
- choose their path through open-ended challenges that have multiple solutions (AzCCRS)
- have the opportunity to succeed

We learn best when we:

- have fun!
  - releases endorphins
  - improve brain function
  - boosts creativity
  - improves relationships
  - http://www.helpguide.org/articles/emotional-health/benefits-of-play-for-adults.htm

Just for fun……
what would you name this pic?

Feedback from Observations

- Quality resources (county website)
- It’s ok to say, “I don’t know, so why don’t we explore that!” (Wonder Wall example)
- Know how the math and science is used in everyday life! (integrated units, ties to real-world local problems)

I have 3 goals for you for the next 3 hours:

- I want you to know the Science & Engineering Practices.
- I want you to know more about the shift to Practices.
- I want you to know more about Depth of Knowledge.

Please write ***your*** goals in your notebook.

All decked out! A student-grouping method

- Take the top card off the deck as it comes around.
- NO looking at the card before you take it.
- Find the other people in the room who have the same NUMBER as you
  - (example, 2s go with 2s, regardless of suit)
- Sit somewhere together where you can read and talk.

Jigsaw: Student Engagement Strategy

- Find your section of the article and read it. (ex., Aces are reading the 1 section)
- When everyone finishes, discuss the main idea of your section. What is the most important information in that section?
- Make sure everyone knows what is important. (Feel free to use highlighters, etc.)

Jigsaw: Student Engagement Strategy

- Shuffle! Find all the people with the same suit as you. (ex., all the spades come together)

- Sit (or stand) somewhere together where you can talk.

- Share out within your group.
  - (ex.) The 5 in your group shares the important parts of that section, etc.
  - Continue until everyone has shared.

"And, as amoebas, you'll have no problems recruiting other sales reps … just keep dividing and selling, dividing and selling."

Non-linguistic Representations

"Knowledge is stored in two forms- a linguistic form and an imagery form. The linguistic mode is semantic in nature...The imagery mode, in contrast, is expressed as mental pictures or even physical sensations, such as smell, taste, touch, kinesthetic association, and sound" (*Classroom Instruction that Works*, 2001)

Numbered Heads Together: Cooperative Learning Strategy

Number off, 1-8

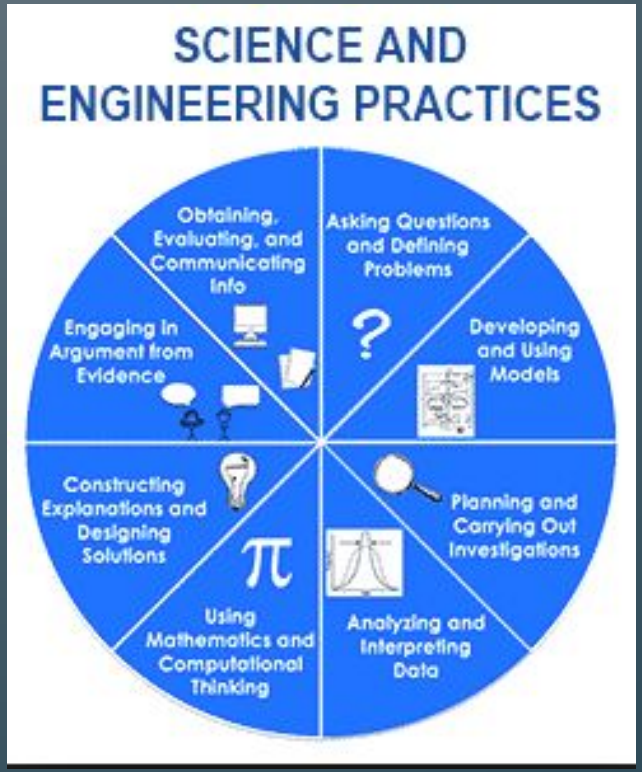
Find the poster with your number on it (example, all the 3s together)

- Each group will get one Practice (handout)
- No letters and/or numbers
- Does not have to be word-for-word
- More important to have one strong visual
- Be ready to share out in 20 minutes

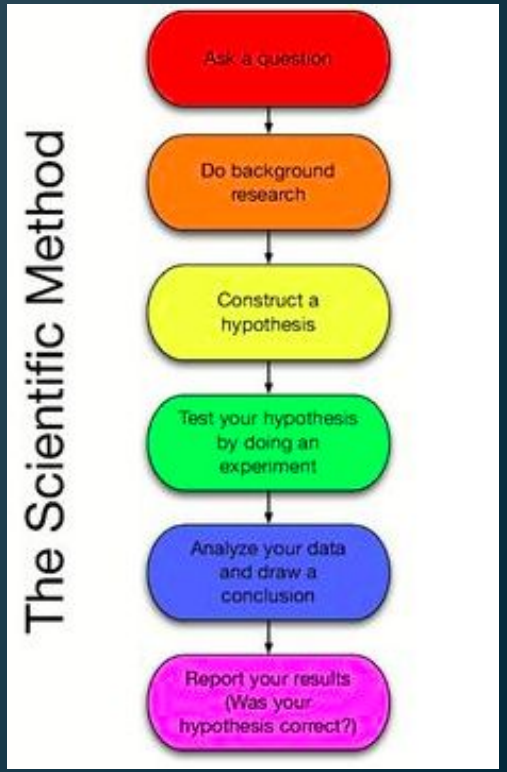
Share Out:

- Tell us the name of your Science/Engineering Practice.
- Explain what that means for Science and Engineering.
- Let’s start with Asking Questions and Defining Problems.
- How did our cell activity today relate to your poster?

How do the Science Practices Compare?



Jigsaw 5s and 6s, why are we shifting towards Science (and Engineering) Practices versus the Scientific Method/Process?



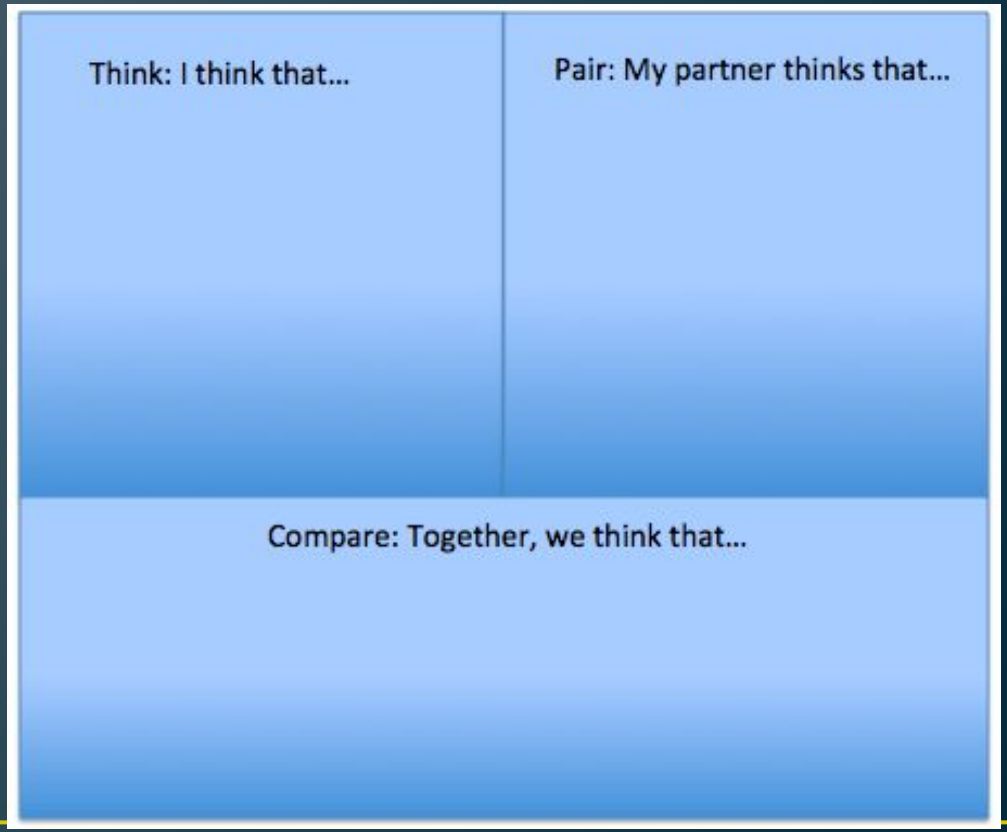
How do the Science Practices Compare?

"Students cannot comprehend scientific practices, nor fully appreciate the nature of scientific knowledge itself, without directly experiencing those practices for themselves." (*A Framework for K-12 Science Education*, 2012)

Think, Pair, Compare: Student Engagement

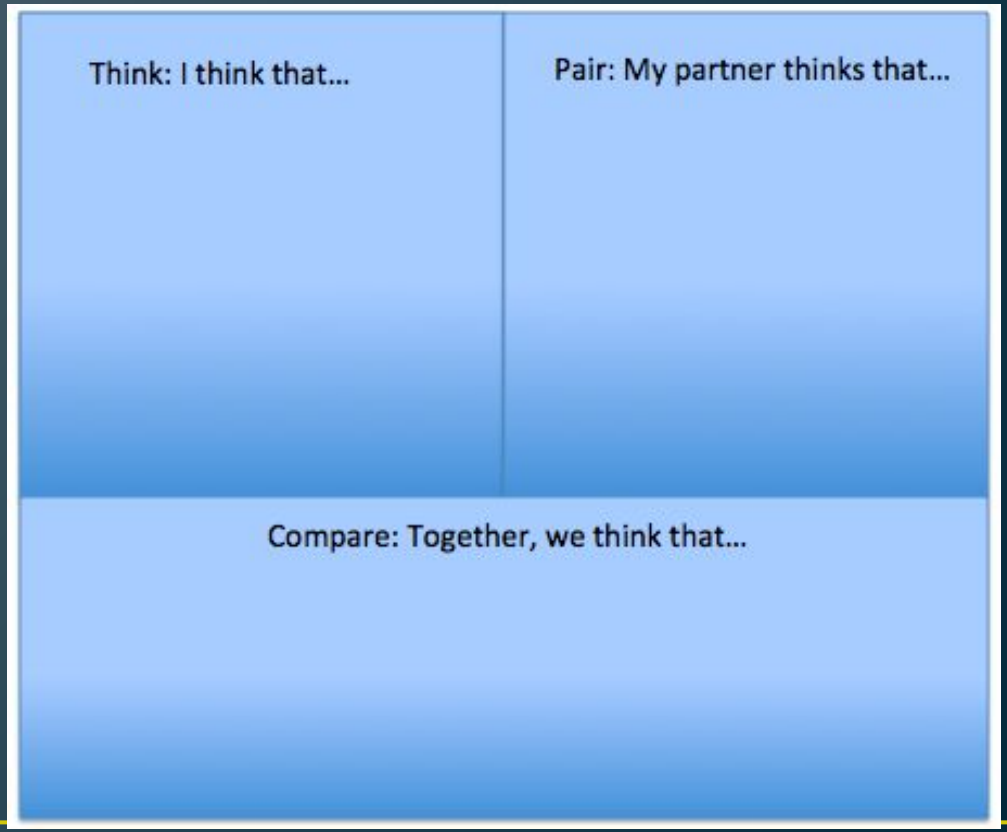
- In your notebook, draw this graphic organizer to fit the entire page

- **Think**: What are the differences and similarities of the Science Practices and the Scientific Method/Process.



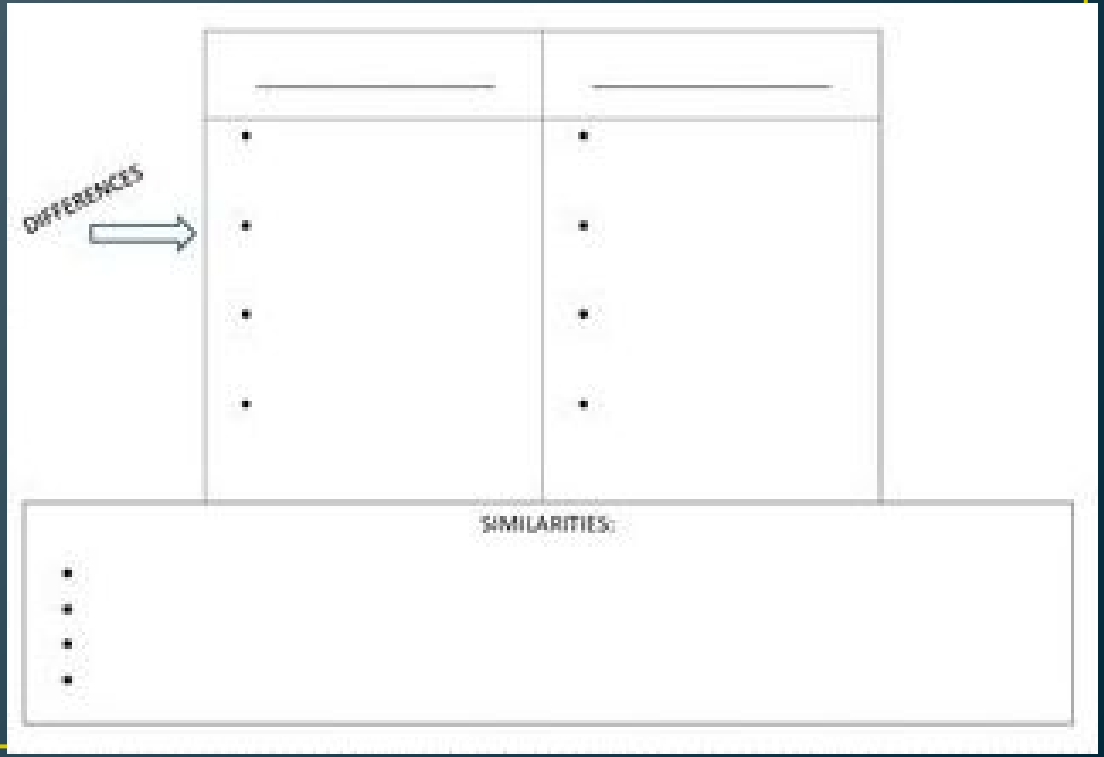
Think, Pair, Compare: Student Engagement

- **Pair**: Talk with your Elbow Buddy about what you wrote in the Think box. Write down what your partner said in the Pair box.
- **Compare**: With your buddy, come to a consensus and write your differences/similarities in the Compare box.



Top Hat Organizer: Informal Assessment

In your notebook, draw this graphic organizer to fit the entire page

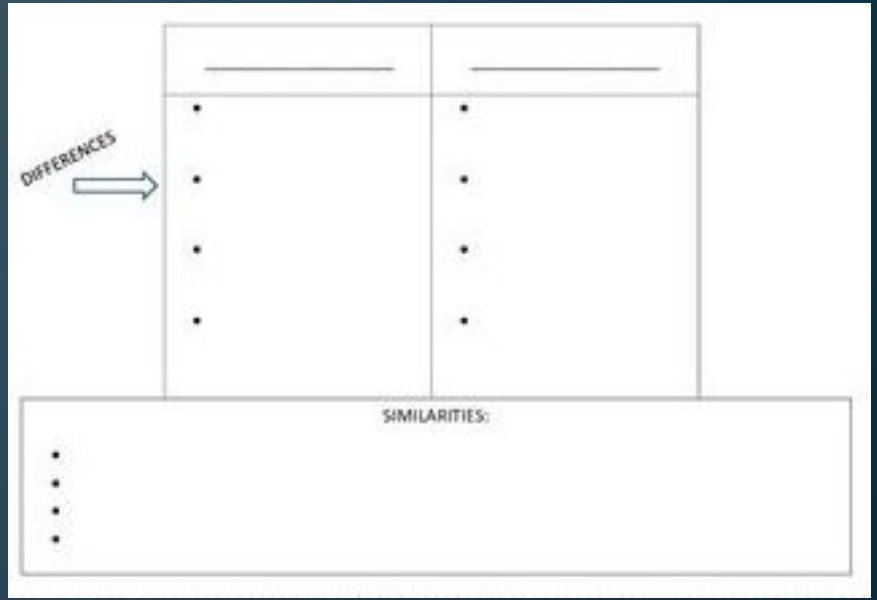


Top Hat Organizer: Informal Assessment

On the top of the left side of the hat, write “Scientific Method”.

On the top of the right side of the hat, write “Science Practices”.

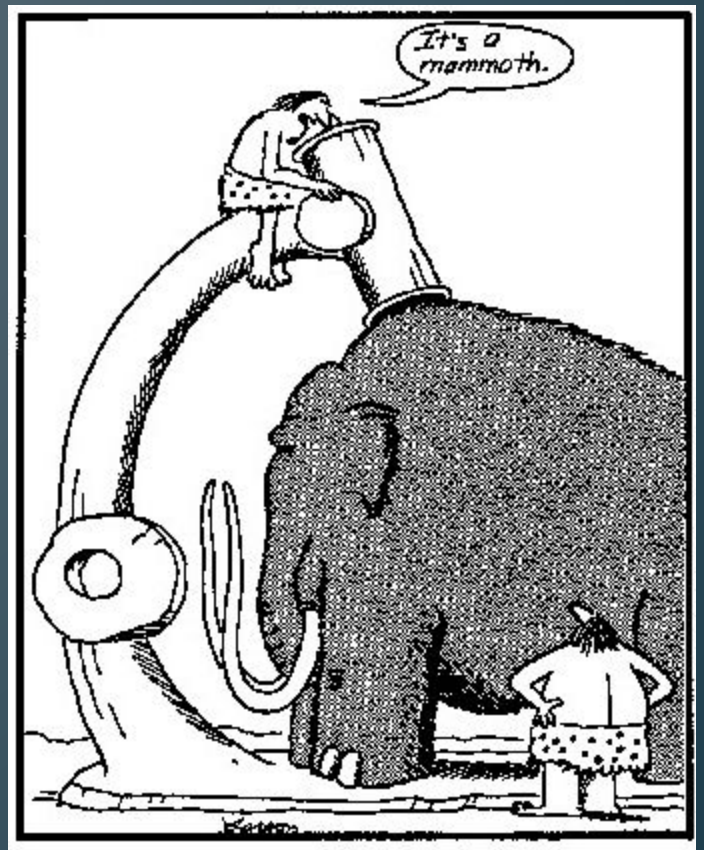
Complete the graphic organizer on your own. This is your Informal Assessment for today.



Top Hat Organizer: Informal Assessment

On the next page, answer these questions:

- What is the most important difference?
- Based on your comparison, what conclusions can you draw?

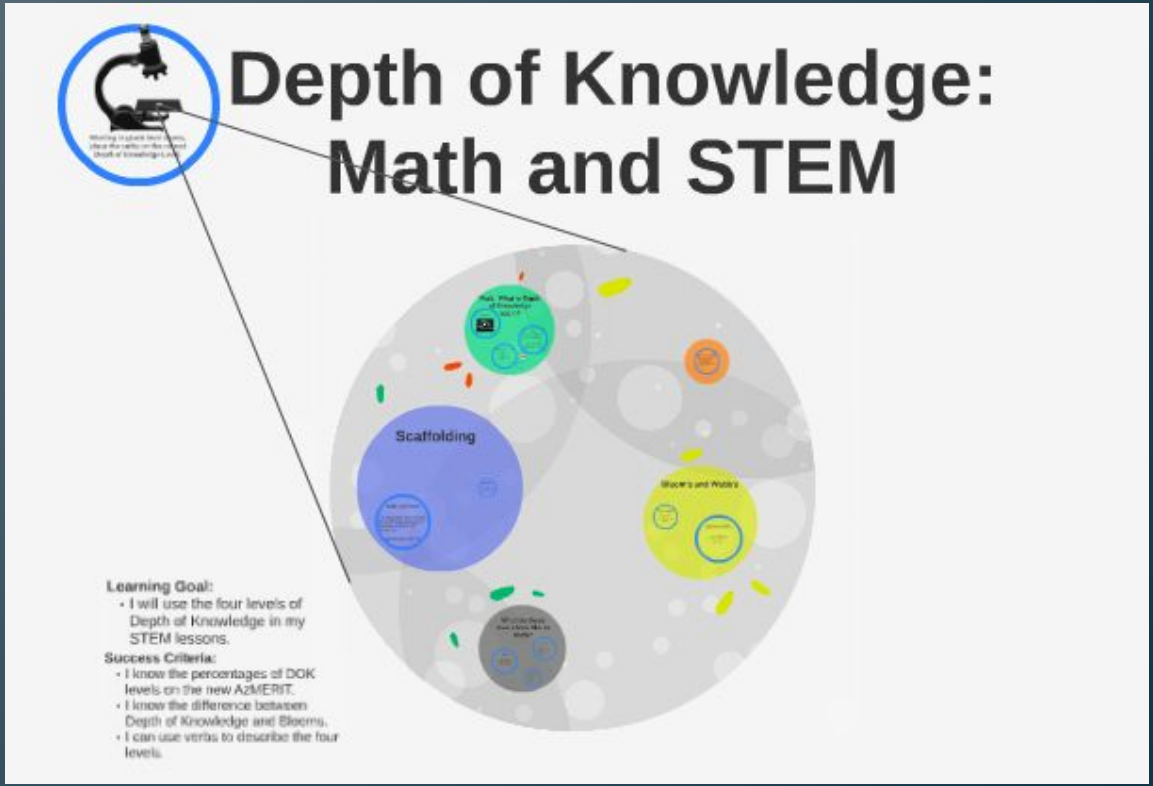


Early microscope

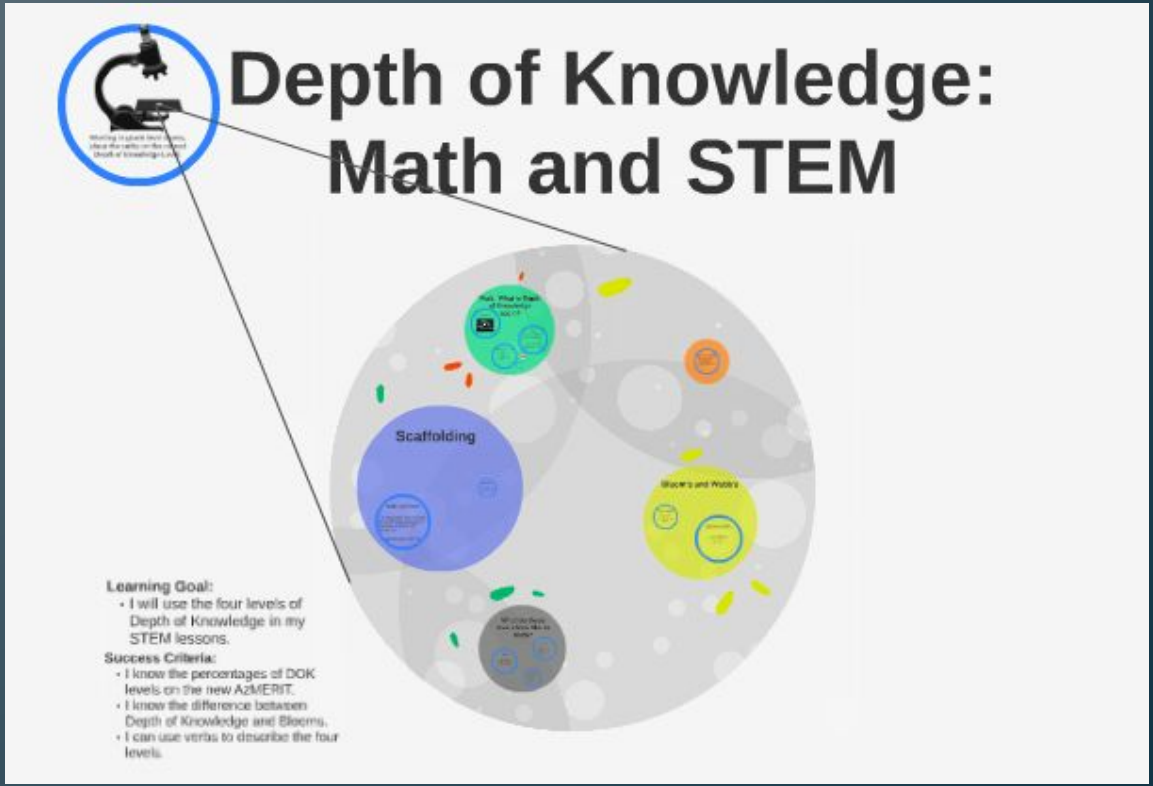
Break into your GRADE LEVEL teams:

	K: A. Kimberly B. Margaret C. Laura D. Mary	**1st:** A. Alexandra B. Katy C. Brandie	
2nd: A. Rachel B. Clarissa C. Danielle	**2nd:** D. Karen A. Sheri B. Kelli	**2nd:** C. Valerie D. Monica A. Angela	**3rd:** A. Lynnda B. Mayme C. Carlynn
4th: A. Tanya B. Jennifer C. Holly D. Deena	**5th:** A. Cathleen B. Cynthia C. Rachel D. Amy	**5th:** A. Aaron B. Kimberly C. Wendy D. Amy	**Jr. High:** B. Eric C. Carol D. Marie

Fist to Five: Confidence level with DOK



Fist to Five: Confidence level *now* with DOK



Let's revisit our goals:

- I wanted you to know the Science & Engineering Practices.
- I wanted you to know more about the shift to Practices.
- I wanted you to know more about Depth of Knowledge.

In your notebook, reflect on your goals. Did you meet your goals today?