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Title: Using Authentic Active Learning Exercises into Your Science Classroom
Class: SCED 545 STEM Leadership Seminar

Why did you choose this topic: My endeavor classes gave me so many wonderful tools to use in my classroom, and my Adams State classes showed me how I could most effectively integrate these tools into my class. I wanted to incorporate what I learned in my integrated instruction and assessment class about planning backward in my class so I can most effectively teach my students so they can efficiently recall information. My entrepreneurial/innovative learning class made me think differently about the how and why we challenge our students in meaningful ways. It made me really investigate how to create independent learners and how to empower them. I would like to show how my Endeavor tools can promote active learning and help more students reach their learning goals.

How does your PD integrate NASA or Endeavor classes: My endeavor classes gave the inspiration for many of the active learning exercises I will use. For example, in my physical science in motion class, we used many of the PHet simulations I will be using these to show how simulations can be used in active learning. I will also be using WhiteboardFX and Tinkercad, which I used in my coding and robotics class to show how illustration can be used to promote active learning in the classroom. Finally, we will use NASA/NOAA to show how authentic data can be used to encourage active learning for the whole classroom.

Audience for the PD: My PD is intended for teachers that want to implement their science lessons to active learners vs. passive learners. Therefore, I would prefer that the PD be delivered to 5th -9th-grade teachers. Although, due to my schools' small teaching population, I will need to open up the PD to 4th-9th Grade teachers. These teachers will typically have 15-21 students in their classroom at a time. The 4th and 5th-grade teachers will teach all subjects, and the middle school teachers will range from biology, earth/space, life, and physical science.

STEM concepts, learning goals, and replacement of old practices: This PD will set out to change passive learning practices. This change will challenge teachers to find a way to engage every student to create more significant neural links that will lead to long-term information storage. Teachers will be introduced to activities that engage and empower students to take charge of their own education.

Concepts:
CCSS.ELA-LITERACY.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).
CCSS.ELA-LITERACY.RST.6-8.9
Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

[CCSS.ELA-LITERACY.RST.6-8.1](#)
Cite specific textual evidence to support analysis of science and technical texts.
[CCSS.ELA-LITERACY.RST.6-8.2](#)
Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
[CCSS.ELA-LITERACY.RST.6-8.3](#)
Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
MS-ETS1-2.
Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
[MS-ETS1-3 Engineering Design](#)
Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
[MS-ETS1-4 Engineering Design](#)
Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

How Long will your session be: One hour

How will you recruit: I will use other teachers at my school and possibly my sister school.

Pre and Post Survey: I will probably use survey monkey and ask if they know what active learning is? If they understand what passive learning is? Do they currently use active learning techniques in their classroom, and if they do please list some examples? Would they consider switching up their everyday classroom routines? The post-survey will focus on what they learned, if they would apply it, and what teachers think they would use. I would ask if they knew what active and passive learning is again. Also, what active learning techniques they liked and which ones were new to them. Finally, I would ask how likely they would be to incorporate any of these practices into their classrooms. I would also like to randomly choose some attendee teachers to do an exit interview with about a month after the training. These interviews will help me gather data from more flexible responses. I want to observe some of the teachers that are at my school, but unfortunately my administration is not keen on the idea.

What outcomes do you expect: I will assume not all teachers fully understand active learning and how to facilitate active learning in their class. I do think some of my activities will be new to them. The activities they may already know, I will provide a clearer and more engaging version of the activities. I am hoping these ideas make their classes fun for the students and fun for them to teach.

Follow-up: 2 weeks after the PD teachers will receive another survey to see what lasting impact the survey had if any. One Month after I would like to complete short exit surveys with select teachers.

Data Collection: I will collect survey monkey pre, post, and follow-up survey data. I would also like to interview 2-3 teachers to give me personal feedback on the PD.

Skeleton Outline:
What is active vs passive learning?
Lets go beyond think/pair/share and KWL
Do's and Don'ts
- Activities time frame should be proportionally appropriate
  (Example: 3 days to create a papier-mâché light bulb because you are learning electricity)
- Do group work
- Do have students take notes for later retrieval
- Do Teachers must always oversee activities to correct misconceptions and scaffold
- Do Pause
- ...

-The Science Behind Active learning-
1. Drawing:
   -With teacher, with table, alone for speed/accuracy
   -With Tinkercad and whiteboard, whiteboard FX
   "Show example and have teachers try"

2. Simulations:
   -timing?
   -PHET or Gizmo
   -Take teachers through one simulation (Air pressure and weather?)

3. Singing/Song/Dance:
   - Example plate boundaries sone
   - Go Noodle (Little Ones)
   - Bio teacher Tik Tok

4. Using NASA's Data
   - Ocean heat and connection to photo plankton/food web.

5. Quick note jot:
   - Compare with table and highlight in one color points nobody else had and the other key points in a color is someone else at the table had that key point. Cross out misconception and correct.
   - Can be done with note taking/lectures, watching a video, or reading
   - Can be spontaneous or after a specific time

6. Learning Station
   -Incorporate different delivery styles for all leaning levels

7. Project-based learning or Place based learning
   - Example: Broward County and beach weathering

8. Mind Map???? Virtual Field trip? Flipgrid? EDpuzzel

-Model Time frame slide
 Lecture 10 minutes
Activity 4 minutes
Lecture 10 minutes
Activity 4 minutes
Lecture 10 Minutes
Activity 4 minutes
Summary lecture 5 minutes
        Activity 8 minutes
   Rule of thumb student age plus one

-Why do all educators not use active learning?

1. It can eat up class time, so less material is covered
2. Some educators are not properly supported by their current institution
3. Class sizes can make it hard to oversee all students and identify misconceptions
4. Extra planning will be needed and most educators do not have that time.
5. Most educator do not want to overhaul their current tried and true curriculum and teaching methods for something new.