Virtual Science Best Practices

Karen McDonald
McDonaldK@si.edu

Smithsonian
Environmental Research Center

Chesapeake Bay Otter Alliance

MAEOE
Goal for today: You will all walk away with techniques and practices to help with virtual and hybrid instructions.
We Need to "Dissolve the Screen"

- Heighten student's awareness of back and forth interactions
- "I see the work you're doing"
- "I value the work you're doing"
- We're here together

Teaching in the Online Classroom: Surviving and Thriving in the New Normal by Doug Lemov
What do you do to "Dissolve the Screen?"
IDEA: Set the Scene: Immerse Students in Your Lab or Classroom (even at home): change for changing topics

- Act as if the students are in your science classroom or lab, be excited but not over the top

- Lift as much physical stuff as you can from your classroom and use during online class (props, white boards, pads of paper, posters, etc.) If hybrid-use classroom as backdrop
You can use Bitmojis for fun
More Ideas for Dissolving the Screen

In your science/watershed class use hand written instructions or notes, offer handwriting live

You can't take the "temperature of the room" but you can....

- Have Cameras on, faces visible (as possible)
- Chat privately/public
- Use Polls
- "Show Call"
- Take Turns reading
- Put student work on screen
When you're doing a lesson live, get interaction by:

- Thumbs up, down, middle for understanding
- Show fingers for how many minutes students need for a question/online project
- Chat word "ready"
- Show call (drawings, lap boards, writing, etc.)
- Take turns reading live
- Use Zoom white board
- Have students read something and then summarize in shared document
Asynchronous learning relies on "artifacts" choose how those artifacts are submitted and make them fun

- Shared project documents for MWEES/homework
- Student records a reading a passage out loud for homework
- Have students show you concrete writing
- Create Podcast or video tour of your watershed site or student's study area, have them describe what they see.
- Digital Science notebook (Google Slides)
- Students evaluate and give feedback on each other's work
Pause Point, Breathers
- Be strategic
- Stop and Jot cues
- Journal then show
- Turn n' talk
- Encourage writing, not just typing

IN BREAKOUT ROOMS
- Do drop-ins
- Assign roles
- Use the "broadcast to all" to give prompts
- Set concrete time
Science lends itself to natural "antidotes" of too much screen time, meaning offline time.

"Antidotes of Science"

- Reading books and articles
- Collecting
- Observing
- Taking data
- Science notebook
- Journaling
- Drawing
- Measuring
- Collaborating
Watershed Science is a Good Example of the Zoom "Antidote"

Watersheds are big and hard to understand (like a lot of Earth Sciences). This gives you the opportunity to learn through modeling and field studies.

- Mapping: What is your watershed address (online)
- Google Earth and topography (online)
- Map making of your home and local green spaces (outside)
- Tracking how water flows (outside)
- Water cycle art and diagrams (art)
- Weather Tree/tracking weather (observe)
- Water footprint (collecting data)
- Erosion picture scavenger hunt (multimedia)
Focusing on the Practices of Science (NGSS)

The eight practices of science and engineering that the Framework identifies as essential for all students to learn.
1. Asking questions (for science) and defining problems (STEM)
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 (for science) and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information
You can't do it all, but you can take it one thing at a time

ASKING QUESTIONS

A practice of science is to ask and refine questions that lead to descriptions and explanations of how the natural and designed world works and which can be empirically tested.
Teaching science remotely/in-person is most effective when the teacher asks fewer questions, but more in-depth questions needing higher responses.

- Use wait time to demonstrate you have high expectations
- Go deeper with student explanations

https://www.middleweb.com/44050/effective-questioning-during-remote-learning/
"F.I.R.E" Questioning

► **Factual Thinking Questions** – gathering factual information and applying it to a given problem in a way that is clear and relevant.

► **Insightful Thinking Questions** – which ask students to look at the big picture or assumptions, interpret information or give different perspectives, focus on depth, and look for solutions to situations or problems.

► **Rational Questions** – which ask students to analyze connections among both facts and implicit assumptions or focus on breadth.

► **Evaluative Questions** – in which students focus on feelings and values that affect decisions, interpretations, or analyses.

http://blog.tesol.org/questioning-techniques-to-engage-students-in-critical-thinking/
Question Starters for Synchronous Science Sessions

- What do you see...
- What might happen if....
- Why do you think.....
- What evidence is there.....
- How does this apply....
- Who did....
- How would it be different if...
- I know this because....
- Another way to solve this is....
CUBING

Prompts based on numbers:
1. Describe....
2. Compare...
3. Link/relate...
4. Analyze....
5. Argue for/against...
6. Predict..

Others: Generalize, imagine, speculate, judge, evaluate, forecast

https://www.teacherled.com/iresources/tools/dice/
https://jamboard.google.com/d/1OdMb2DcF0k30hNSebLdtj1zw5b8tbdHUt3NpYwF0Zmo/edit?usp=sharing
Questioning

- Two truths and a lie (ice breaker)
- Drawing and sharing an outcome or flow chart of thought (visual)
- Doing Math together
- Think-pair-share (collaborative)
- Show n' tell projects/drawings in a gallery
- Spiderweb discussion--use Google meet for students to meet before/after to solve questions/brainstorm or jumping off spot
Everybody Writes

Before starting a discussion or argument from evidence, everyone takes a moment to reflect and write.
Visual Questioning
Visual Questioning
Asking and Answering

Try to avoid student answers of "I just know" or "I found out" or "I Googled it"; get students to provide supporting evidence. Graphic organization helps.

<table>
<thead>
<tr>
<th>My Question</th>
<th>Information from my Peers</th>
<th>Information from my Teacher</th>
<th>Information I found (list source)</th>
<th>Answer(s) to my question</th>
</tr>
</thead>
<tbody>
<tr>
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Use Jamboard, Google Docs, or other document sharing
TOOLS & TIPS

https://www.youtube.com/watch?v=iWE5ea7dB4&t=46s

Prezi (integrated teaching and slides)
Use document cameras

- Read and write along with students
- Use camera for dissection, flower anatomy, water filtration demo etc.
- Have students tell you what to do based on hypothesis
- Magnify math manipulatives
- Demonstrate by drawing
Screencastify
Window's Snip and Sketch
There are lots more platforms and tools these are just a few

What questions do you have?