EER 2023 Round Table 7/11: Sharing Resources to Promote Teaching Socio-Scientific Issues

What are socioscientific issues?

https://serc.carleton.edu/sp/library/issues/what.html

“Socioscientific issues are controversial, socially relevant, real-world problems that are informed by science and often include an ethical component (Sadler, Barab, and Scott, 2007)”

Less emphasis on…	More emphasis on…
Discussing science in isolation	Discussing science concepts and understanding in the context of personal and societal issues
Working alone	Collaborating with a group that simulates the work of a scientific community or represents authentic groups found in society
Acquiring scientific information	Acquiring conceptual understanding and applying information and conceptual understanding in making and evaluating personal, societal, and global decisions
Closed questions with one correct answer	Open-ended questions that require students to explain phenomena or take positions backed by evidence
Multiple-choice assessments	Authentic assessments

Interesting resources

1. GEOCONTEXT https://geo-context.github.io/ This source has powerpoint slides and accompanying documents that help contextualize geoscience knowledge in timely topics such as topics on racism, colonialism, imperialism, environmental damage, and exploitation of natural resources into subjects commonly taught within geoscience departments
2. CARBON, CLIMATE and ENERGY RESOURCES https://serc.carleton.edu/integrate/teaching_materials/change_inthe_air/index.html This source has a great lesson on logical fallacies around climate change that is useful in other contexts as well!
3. EIA: https://www.eia.gov/ This source has lots of visuals and graphs on energy resource useage. I have used this in the classroom to help students recognize that the decrease in coal usage is due primarily to an increase in natural gas production and usage, rather than green energy shutting down coal useage
4. National Academy of Sciences lines of evidence: https://www.youtube.com/watch?app=desktop&v=gIUN5ziSfNc

5. Climate Fiction to engage students: https://serc.carleton.edu/integrate/teaching_materials/climate_fact/index.html
6. New york times article: Climate Catastrophe – a good way to engage students in hard conversations: https://www.nytimes.com/interactive/2022/10/26/magazine/climate-change-warming-world.html
7. Start the conversation with "What are you passionate about?" and then link to your subject area
8. Teach Geoethics: https://serc.carleton.edu/geoethics/index.html
    a. Normative vs. descriptive ethics (**Adam Papendieck**)
        i. Describe the ethics without a value assigned
        ii. Empirical ethics analysis (bioethics)
        iii. Frith 2012: https://pubmed.ncbi.nlm.nih.gov/21039690/
9. Eos ENGAGE: https://eos.org/engage Using articles to connect geoscience classes to students
10. InTeGrate Teaching Materials: http://serc.carleton.edu/integrate/teaching_materials/connections.html
11. List of culturally responsive and sustaining lesson ideas for the STEM classroom
12. **Ginny Isava**– "WTF Happened to Nuclear Energy?" - why people are afraid of nuclear energy, and what the data says in response (33-minute video on YouTube, pro-nuclear)
13. Nuclear Option documentary: https://www.pbs.org/wgbh/nova/video/the-nuclear-option/
14. MINING– https://serc.carleton.edu/integrate/teaching_materials/mineral_resources/unit6.html (women in mining- https://www.womeninmining.us/)
15. Flooding mitigation
    a. Miami Beach is raising roads for sea rise. Lawsuits say they're causing flooding too
16. Agriculture
    a. https://serc.carleton.edu/integrate/teaching_materials/water_sustainability/index.html

    b. https://serc.carleton.edu/integrate/teaching_materials/sustain_agriculture/index.html

17. Flooding and run-off with agriculture and other pollutants
18. Soil documentary– kiss the ground…https://kisstheground movie.com/ *problematic white savior-ism…* An opportunity to talk about that (not on purpose)
19. Earth Science has a whiteness problem (**MAYA PINCUS**): https://www.nytimes.com/2019/12/23/science/earth-science-diversity-education.html#:~:text=Barely%2010%20percent%20of%20doctoral,of%20research%2C%20many%20scientists%20say.&text=Sign%20up%20for%20Science%20Times,cosmos%20and%20the%20human%20body.
20. Deep South Center for Environmental Justice: https://www.dscej.org/
21. **SHARON BYWATER-REYES**– discussion prompts for documentary films

Assignment: Respond to the Following

1. What new information did you learn? Be specific and list at least five things you learned. Be sure to include a claim supported by evidence from the film. You can use quotes and time marks for your evidence.
2. Of the five things you learned what was the most surprising and why? Did you have any preconceptions or assumptions about Colorado Water that were not true? What were they and where did they develop?NOTE: Make sure you explain thoroughly what the new information was, and what you may have thought about the subject previously to help explain why the new information was surprising to you. For this question, I want you to delve into the assumptions you may have had about water in the western US or Colorado. Personal experience, media exposure, peer and family influence are all common ways that we obtain information about the world around us - but please be specific as you delve into why you may have had certain preconceptions.
3. Who and whose perceptions/values/beliefs/cultures/voices are highlighted in the film? Make a few comments on how this makes you feel and some

conjecture about how this might make people with different identities than yours feel.

22. **MEGAN PLENGE**- writing a paper on socioscientific issues
23. Systematic Moral Analysis (elliot) creating a shared language
24. Students describe and frame issues in their own terms. ADAM PAPIENDIECK 3 general prompts for discussion….
    a. They say….
    b. I say…
    c. Frame it for a debate!
25. More discussion prompts (MEGAN PLENGE):
    a. What was the author's goal?
    b. Did the author achieve their goal?
    c. What else could the author have included to each their goal
26. How to make students more comfortable with the "wrong answer" protocol—- MAYA PINCUS– New visions Rumors protocol https://curriculum.newvisions.org/middle-school
    a. Help people come up with ideas nad have their voices heard
27. "Speed dating" discussion as a mechanism for getting students to have one-on-one discussions
28. Creating places for people to have discussions and engage in intellectual risk-taking… really important for these issues
29. LYNDSEY LEMAY– primary literature article interpreted in both Time magazine, and scientific american
30. Comparison of primary literature vs. media articles– authors perspective
31. Including points of connection for introductory classes— how do you reign them in so that these points of connection, if based on incorrection information, can be resolved
    a. E.g., question about fracking in class…. Tell the student to "research on their own", write a one-sentence summary of what they found, write down source.

Whole-class reflection afterwards on different perspectives and opinions, how to validate sources, which of these perspectives/opinions are based on science vs other topics

32. Teaching scientific literacy
    a. Sense of what science can and cannot do- what questions it can answer
    b. Graph reading/interpretation/evaluation - how to read graph, how to interpret data, is this data answering the question I'm asking
    c. Science is a process, changeable and tentative, but also self-correction
33. Talking about contention in the field: "Here is a set of papers…. Who is right? Why did they come to different conclusions?" – explaining this to novices, e.g., "climate debate"
    a. Students get uncomfortable because there is not a "right answer"
34. Water related issues: Students are not aware that it is a issue
    a. Discussion prompt for beginning a water resources unit:
        i. Where does your water come from?
        ii. Where did your grandparents get their water (at your age)
        iii. Where do you think your grandchildren will get water)
35. Case studies for natural hazards
    a. Risk/ vulnerability
    b. https://serc.carleton.edu/NAGTWorkshops/hazards/index.html
36. LOTS of cool modules featuring quantitative skills related to natural hazards and other socioscientific issues https://serc.carleton.edu/getsi/teaching_materials/index.html
    a.