

Supplementary Material: Questions and Prompts from Semi-structured Interviews, Homework, and In-class Prompts Used for Analysis

Semi-Structured Interview Questions

Explanation:

The numbered questions are structured questions asked of all participants. Below these questions are examples of semi-structured follow up questions that are intended to elicit more information. These examples do not fully encompass all semi-structured follow-up questions as each participant interview is unique.

Introduction: *[Read to the students]*

We are conducting research to explore the ways in which students think about energy concepts in engineering. While we had originally planned to focus on classroom observations and some interviews for context, when the class moved to an online format this made meaningful observation more difficult. Therefore, we are focusing more on student feedback through interviews. We want to know about your impressions of the class, the content, and how it connects to engineering. We are hoping that this research will help engineering educators reach a better understanding of how students learn about energy concepts in our current context.

Questions:

1. Why did you choose to major in engineering?
 - For example, how did you eventually decide on your major? Did you consider any other majors? Did anyone or anything influence your decision?
2. How do you define engineering?
 - How would you personally define engineering? OR What does engineering mean to you?
 - i. Asking to define engineering in their own words
 - ii. Asking what the personal significance of engineering is to their lives
 - What kind of problems do you think engineers might solve?
3. What differentiates engineers versus non-engineers?
 - What differentiates expert engineers versus novice engineers?
4. Imagine you are designing a new power installation. What information would you want to gather to inform your design?
 - Potential answers we might get:
 - i. Technical: Local resources available, costs, reliability, size
 - ii. Economic: Cost, efficiency
 - iii. Environmental: how the power installation affects local wildlife
 - iv. Social: Who is the user? What does the user need? Whose land is this? Who does this affect? Who benefits and who pays from this installation?
 - What is important to consider in engineering problem solving?
 - Where would you get this information?
5. What has been the most interesting thing about the GENG 294 course? Why?

6. What has been the least interesting thing about the GENG 294 course? Why?
7. What was the most important thing you learned from the class? Why?
8. Please describe a moment in class where the content 'clicked' or resonated with you.
 - How was it taught? Why did it resonate with you?
9. How would you compare this class to the other engineering classes you have taken at USD?
 - Examples: Thermodynamics, circuits
10. How do you think the current global pandemic relates or connects to what you learned in GENG 294?
11. Do you have anything else to add?
12. Do you have questions for me?

Homework Reflective Questions

1. Identify two key topics you think will still impact the way you see the world in five years. (HW#1)
2. Identify one topic you found particularly interesting and one you found particularly boring or challenging. Explain these topics in your own words and why you think they are or are not relevant to your life. (HW#2)
3. What is the most interesting thing you learned about energy this past week (could be from class, homework, or somewhere else)? Explain this concept and what you found interesting about it? (HW#3)
4. Do you think wind energy will be an important part of the energy landscape in your lifetime? (HW#4)
5. Consider the material we have explored in class this week. How has it changed your perspectives on wind energy? Do you think wind energy will be an important part of the energy landscape in your lifetime? (HW#5)
6. What is your personal view on nuclear? (HW#7)

In-class Prompts

1. What is efficiency?
2. What trade-offs should engineers consider when choosing the source of energy for a new power station?
3. What do you think the primary role of engineers in terms of policy considerations should be?