Adapting sequence of questions in your classroom

Sequence of questions is useful for even the most apt students as a way to explicitly model a process of approaching increasingly challenging material. Questions provide scaffolding to meet various levels of skill and preparation.

How do you begin?

Think about your goals for student learning. Answer the question: What do you want your students to be able to know, to do, or feel after completing this exercise?

What kinds of questions are effective in engaging student diversity?

Questions that:

- move from the concrete to theoretical can engage students who have different levels of familiarity with the subject.
- encourage students to make connections with the material based on their own personal experiences and interpretations of data/information. Connecting to personal experience sets up broader discussion and makes discussion more memorable.
- engage students in decoding specific elements of the data, figure or image can model the analytical processes you want them to learn. (That is, show them how to think like a…. [person in your field].)

How do you facilitate a class discussion with sequence of questions?

- Provide students with a graph, figure, or image and ask them to write their responses to some reflection prompts. Such prompts might include "What patterns do you see?", What stands out?", "What is one conclusion you draw from looking at this graph?", "How do you think this figure supports or refutes the theory you read about for today?"
- Ask students to discuss their written responses with a partner as a way to learn from and appreciate the insights of others in the class.
- Discuss, with the large group, the details of the exercise and make connections between the theory and/or principles students are currently studying with the image/graph provided.

(See next pages for examples)

Sequence of Questions—Engineering Example[1]

Table 25.1. A comparison of the properties of fuels	Gasoline	Ethanol	No. 2 diesel	Biodiesel
Energy content (kW-h/l)[a]	8.99	5.91	9.94	9.25
Autoignition temperature (°C)	257	423	$\sim$300	177
Air/fuel ratio	14.7	9.0	14.7	13.8
Vapor pressure (Pascal at 38 °C)	0.55 to 10.3×10^6	1.6×10^5	$<1.4\times10^3$	$<1.4\times10^3$
Water solubility in fuel at 21 °C	Negligible	Miscible	Negligible	Negligible
Freezing point (°C)	−40	−114	−40 to −34	−3 to 19

Ginley, D. S., & Cahen, D. (Eds.). (2011). *Fundamentals of materials for energy and environmental sustainability*. Cambridge university press.

1. What do you see here? What stands out?

2. What questions do you have? What is least clear or most confusing to you?

3. What is one conclusion you draw from looking at this table?

4. How do you think this graph supports or refutes some of the issues associated with the use of biofuels in engines?

Sequence of Questions—Earth and Environmental Science Example[2]

1. What do you see here? What stands out?

2. What questions do you have? What is least clear or most confusing to you?

3. What is one conclusion you draw from looking at this figure?

[2] Data provided by Rose Cory for Earth 284,Introduction to Environmental Geology and adapted for this workshop by Gina Shereda, CRLT. Graphic source: *Geology and the Environment* (7th Ed.) by Bernard W. Pipkin (University of Southern California), Dee D. Trent (Citrus College), Richard Hazlett (Pomona College), Paul Bierman (University of Vermont). Publisher: Cengage/Brooks-Cole.