

Scaffolding Metacognition

To encourage students to practice agency and metacognition in my course, I have incorporated a short 5-minute, game called "What would YOU do?", at the start of our weekly sessions (classes meeting more often could start the week off with this activity).

The model, follows these steps throughout the semester:

1. Individually write down: Describe what you would do in a given situation.
2. Trade papers: Give peer suggestions and constructive feedback- pairs or groups
3. Harvest answers from multiple groups of students
4. Lead/Model discussion with best practices / emphasize good student strategies
5. Give time to revise and reflect their thinking (explicitly incorporate peer feedback)

Overall Strategy:

I. Start of the semester, general scenarios like, "You just remembered that you have an exam coming up in 5 days, what exactly will you do?" to identify *past* habits, and practice openness to others' suggestions to change

II. Middle of semester, start focusing on content specific questions, skills they are practicing *presently* in the classroom, so they get feedback on their thinking strategies and approaches

For classes after exams, revisit strategy scenarios about studying / allocating time.

III. Mid - End of semester, ask higher level 'think like a scientist' contexts, that are more abstract and complex applicable/real-life problems, more expert and *future* focused

In Practice:

- Prompts may be in the form of worksheets, on powerpoint slides, or on Canvas.
- Steps 4 and 5 may be interchangeable, depending on the diversity of speeds in which students complete the task.
- Encourage students to hold onto their sheets during class, so they may reflect and revise before turning in (and you can also use them as a prompt to engage in discussions during other activities).

Examples from an Introductory Biology course:

I. Start of the semester: Skills

- a) Your 6-year old cousin asks you, 'Do you think I am smart?' What would you tell them to foster a growth mindset?
- b) You just remembered that you have a difficult exam coming up in only 5 days, and you have not yet studied for it. Describe in detail below how you will manage your time efficiently, and lay out a study plan for your exam (you need to get an A to pass). Be specific.

Student: Now, trade papers with a classmate. **Classmate's Name:** _____

1. What are the strengths of this person's answers/ strategies?
2. Give them at least **three** helpful suggestions or constructive criticisms for improvement.

Original Student: Which suggestion was most helpful and why?

II. Middle of semester: Content

You are traveling in Costa Rica, and your faithful dog has been vomiting and has diarrhea. You go to a local vet, and they ask you what tests you want done to your traveling companion. What do you ask them to look for? (hint- include aspects of cell biology in your answer)

Student: Now, trade papers with a classmate. **Classmate's Name:** _____

1. What are the strengths of this person's answers/ strategies?
2. Give them at least **three** helpful ideas for their strategy / solution.

Original Student: Which idea was most helpful and why?

III. Mid - End of semester: Expert thinking

You are biologist and have been hired by Boulder County Police Department. They found a body yesterday, and they collected a sample of maggots from the crime scene. They want you to tell them any information you can about these maggots, in hopes that it will give them information related to the crime.

- a) Describe at least three types of information that you can gather/conclude, and explain how each piece of information could be used in relation to the crime.
- b) You squish the salivary glands of some of the maggots, and are able to look at their cells undergoing mitosis under the microscope. Describe how you could use this information to identify these maggots.

Student: Switch worksheets with a neighbor. **Classmates name:** _____

1. Did you have any similar ideas? If so, which one(s)?
2. What idea of theirs seemed most interesting and why?

Original Student: Which strategy seemed the best, and would you attempt first for time-sake?