Active Learning and Responsible Conduct of Research (RCR)

Pedagogical Approaches

Scholarship on teaching and learning makes it clear that effective pedagogy challenges learners to generate their own learning[1].

Choosing Active Learning Activities

Higher levels of engagement and interaction are promoted by appropriate learner activities. This goal is recognized by RCR educators who frequently call for the use of case studies. However, while cases can be useful, it should be remembered that many other strategies might also be used to engage learners in reflection and interactive discussion.

- ***No one best strategy:*** It should not be assumed that there is one "best" strategy or activity that should be used routinely.
- ***Use multiple methods:*** To ensure that a course is memorable, useful, and enjoyable, it is worth considering use of multiple methods such as those suggested below.
- ***Learner-led activities:*** Assign or allow self-selection of learners to small groups responsible for presenting and leading discussion about assigned or self-selected topics at least one week later. Each one hour presentation should have minimal lecture to lay a foundation for a creative, engaging approach to discussion involving the rest of the class.

Examples of activities and exercises that can be used in an online classroom:

1.	***Question-based lecture:*** Identify key points to be covered, frame as questions, and deliver "lecture" by asking learners the questions. When answers are correct, re-affirm and clarify if needed. If answers are not given or not correct, then fill in and/or correct as needed.
2.	***Ask everyone:*** To elicit pros or cons about a particular course of action, or brainstorming items on a list, each learner is asked to come up with possibility not already covered. React and clarify as appropriate. Continue until all learners have participated, or ideas have run out.
3.	***Game show:*** Use PowerPoint templates[2] with a game show format (e.g., "Who wants to be a millionaire?") to get learners to answer questions covering information of interest.
4.	***SOP 4 GRP:*** Assign groups of students to develop Standard Operating Procedures (SOPs) for Good Research Practice (e.g., a policy for authorship, requirements for recordkeeping)
5.	***Code of conduct:*** Either provide or have learners find relevant professional code of conduct and use as a starting point for discussion (e.g., Why are these elements included? What's missing?)
6.	***Video clips:*** Identify relevant video clips (e.g., from episodes of *House*, *Big Bang Theory*, or *Star Trek*) to use as starting points for discussion about issues in science.
7.	***Current events:*** For almost any RCR topic, learners can be challenged to find and use as starting point for discussion, a recent news story, blog entry, journal article, etc.

[1] Bransford et al. (2000): How people learn: brain, mind, experience, and school. National Academies Press, Washington, DC; Brown et al. (2014): Make it Stick: The Science of Successful Learning. Belknap Press; Freeman et al. (2014): Active learning increases student performance in science, engineering, and mathematics. PNAS 111(23):8410-8415.

[2] e.g., https://www.thoughtco.com/free-game-show-powerpoint-templates-1396866

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8.	***Scenes from a hat***[3]***:*** Write characteristics of different types of individuals involved in a research dispute, have pairs of learners draw from the hat to select roles, have them discuss a challenging issue (e.g., authorship, sharing of data), and reflect on what did and did not work with the class.
9.	***Reflections:*** Give students 2-3 minutes to reflect on a question, write down their answer, share (either in pairs or with the class), and discuss.
10.	***Questions:*** Give students 2-3 minutes to write down key question(s) they have (or still have…), and then address their questions in class.
11.	***Look it up:*** Have learners use their computers to look up answers to instructor's questions.
12.	***Assigned discussion report:*** Assign learners to discuss a key question with a mentor or other senior person (e.g., "Under what circumstances is it OK for a PI to show a manuscript received for journal review to a trainee?"), and then report and discuss answers at next class.
13.	***Advance Survey:*** In advance of class, distribute electronic survey to elicit agreement (strongly disagree to strongly agree) with statements about topic. Analyze results and use as a basis for discussion with learners at next meeting.
14.	***In class poll:*** Use online tool (e.g., kahoot.it) or embedded poll option in Zoom to poll learners on multiple choice questions, and discuss results received in real time.
15.	***Role play:*** Divide class into groups of three[4], with instructed to discuss challenging issue in character (e.g., grad student and PI); third group member observes and reports back on successes, weaknesses, and results of discussion.
16.	***Debate:*** Divide class into pairs of small groups (4-5 people), with half the groups responsible for pro and the other half con on a defined issue. After sufficient time to develop arguments, groups are called on successively to raise arguments and counterarguments to each other.[5]
17.	***Suggestions from UC San Diego Keep Teaching:*** Engage Your Students
18.	***Something else:*** Come up with your own ideas!

[3] From Dr. Lisa Eyler, UC San Diego, based on "Scenes from a hat" as used in game show "Whose line is it anyway?"

[4] Brummel BJ, Gunsalus CK Anderson KL, Loui MC (2010): Development of role-play scenarios for teaching responsible conduct of research. Science and Engineering Ethics 16(3):573-589.

[5] e.g., http://www.csun.edu/~dgw61315/debformats.html