ACTIVE LEARNING FOR THE COLLEGE CLASSROOM ONLINE

Note: This document is based on an excellent, if slightly dated, resource compiled by Donald R. Paulson and Jennifer L. Faust of Cal State. The original article (citations preserved) contains a number of basic, easy-to-implement ideas for the "traditional" classroom. The authors' original suggestions have been reproduced here (black text), with slight editing to here and there to clarify and/or "update" them for current technologies. Below each method, you will find a bulleted list (blue text) of concrete suggestions for modifying the technique for incorporation into online classes, frequently in both synchronous and asynchronous modes of delivery. The use of such straightforward techniques for invoking students' short- and longer-term responses to online lectures, pre-recorded content delivery, peers' submissions, etc. can improve retention of and engagement with online content, just as they do in the face-to-face classroom.

For suggestions or guidance in adapting techniques like these to your content area and particular class, contact Chris Skrable (cskrable@uchicago.edu), Director of Chicago Studies & Experiential Learning in the College. To make an appointment for a virtual consultation via Zoom, visit https://calendly.com/cskrable.

BACKGROUND & DEFINITIONS (Paulson & Faust)

The past decade has seen an explosion of interest among college faculty in the teaching methods variously grouped under the terms 'active learning' and 'cooperative learning'. However, even with this interest, there remains much misunderstanding of and mistrust of the pedagogical "movement" behind the words. The majority of all college faculty still teach their classes in the traditional lecture mode. Some of the criticism and hesitation seems to originate in the idea that techniques of active and cooperative learning are genuine <u>alternatives</u> to, rather than enhancements of, professors' lectures. We provide below a survey of a wide variety of active learning techniques which can be used to supplement rather than replace lectures. We are not advocating complete abandonment of lecturing, as both of us still lecture about half of the class period. The lecture is a very efficient way to present information but use of the lecture as the only mode of instruction presents problems for both the instructor and the students. There is a large amount of research attesting to the benefits of active learning.

"Active Learning" is, in short, anything that students do in a classroom other than merely passively listening to an instructor's lecture. This includes everything from listening practices which help the students to absorb what they hear, to short writing exercises in which students react to lecture material, to complex group exercises in which students apply course material to "real life" situations and/or to new problems. The term "cooperative learning" covers the subset of active learning activities which students do as groups of three or more, rather than alone or in pairs; generally, cooperative learning techniques employ more formally structured groups of students assigned complex tasks, such as multiple-step exercises, research projects, or presentations. Cooperative learning is to be distinguished from another now well-defined term of art, "collaborative learning", which refers to those classroom strategies which have the instructor and the students placed on an equal footing working together in, for example,

designing assignments, choosing texts, and presenting material to the class. Clearly, collaborative learning is a more radical departure from tradition than merely utilizing techniques aimed at enhancing student retention of material presented by the instructor; we will limit our examples to the "less radical" active and cooperative learning techniques. "Techniques of active learning", then, are those activities which an instructor incorporates into the classroom to foster active learning.

TECHNIQUES OF ACTIVE LEARNING

Exercises for Individual Students

Because these techniques are aimed at individual students, they can very easily be used without interrupting the flow of the class. These exercises are particularly useful in providing the instructor with feedback concerning student understanding and retention of material. Some (numbers 3 and 4, in particular) are especially designed to encourage students' exploration of their own attitudes and values. Many (especially numbers 4 - 6) are designed to increase retention of material presented in lectures and texts.

1. **The "One Minute Paper"** - This is a highly effective technique for checking student progress, both in understanding the material and in reacting to course material. After presenting a "chunk" (i.e. a discrete unit) of content, ask students to take out a blank sheet of paper or hand out an index card. Pose a question (either specific or open-ended) about the material just presented, giving them <u>one</u> (or perhaps two - but not many more) minute(s) to respond. Another good use of the one minute paper is to ask questions like "What was the main point of today's class material?" This tells you whether or not the students are viewing the material in the way you envisioned.

   - Synchronous/online version (Zoom): In Zoom, use the "Chat" feature to post your discussion prompt. Ask each student to use "Chat" to *privately* message you/a TA their responses to the question you've asked. Limit their response time, as above.
   - Synchronous OR asynchronous version (Twitter): Designate a hashtag for your class' discussions and/or share your Twitter handle with students. Post the discussion prompt on Zoom "Chat" and/or Twitter, and ask students to respond to your prompt in a single Twitter post, @you and/or using the class hashtag.
   - Asynchronous version (Canvas): Create a timed Canvas quiz with the prompt as its only question; give students one or two minutes to write their responses.

2. **Muddiest (or Clearest) Point** - This is a variation on the one-minute paper, though you may wish to give students a slightly longer time period to answer the question. Here you ask (at the end of a class period, or at a natural break in the presentation), "What was the "muddiest point" in today's lecture?" or, perhaps, you might be more specific, asking, for example: "What (if anything) do you find unclear about the concept of 'personal identity' ('inertia', 'natural selection', etc.)?".

- See previous item for online versions.
- For a collaborative learning version of this exercise, have students share their "Muddiest points" with a partner or small group, and attempt to collaboratively clarify their points of confusion.
    - In Zoom, use the "Breakout Groups" feature to generate these discussions.
    - In Twitter, encourage students to "Reply" to one another's posts, perhaps for a defined period of time – e.g., "Reply to as many posts as you can in 5 minutes."
    - In Canvas, use the "Threaded Discussions" feature to create distinct conversations based on student's individual "Muddiest Points."

3. **Affective Response** - Again, this is similar to the above exercises, but here you are asking students to report their reactions to some facet of the course material - i.e., to provide an emotional or valuative response to the material. Obviously, this approach is limited to those subject areas in which such questions are appropriate (one should not, for instance, inquire into students' affective responses to vertebrate taxonomy). However, it can be quite a useful starting point for courses such as applied ethics, particularly as a precursor to theoretical analysis. For example, you might ask students what they think of Dr. Jack Kevorkian's activities, before presenting what various moral theorists would make of them. By having several views "on the table" before theory is presented, you can help students to see the material in context and to explore their own beliefs. It is also a good way to begin a discussion of evolutionary theory or any other scientific area where the general public often has views contrary to current scientific thinking, such as paper vs. plastic packaging or nuclear power generation.

    - These kinds of prompts favor slightly longer, more thought-out responses. As such, it's probably preferable to use these in asynchronous lessons – e.g., as a response to a recorded lecture, a video, an article, a case study, or other "text" – where students have a little more time for formulate their replies.
    - These kinds of prompts may be especially helpful to "break up" longer lessons. For example, use an asynchronous lecture/reading to present an idea; invite students to write a brief (5-10 minute) affective response using a timed Canvas assignment; then present the second part of the lesson, e.g. a theoretical analysis or literature review on the question posed.
    - To use this kind of prompt in a synchronous session, use the Zoom "Breakout Groups" feature to break the class into small groups (2-4 persons), and invite the group members to discuss their reactions for a specific amount of time, then bring the groups back together for the second part of the lesson.

4. **Daily Journal** - This combines the advantages of the above three techniques, and allows for more in-depth discussion of or reaction to course material. You may set aside class time for students to complete their journal entries, or assign this as homework. The only disadvantage to this approach is that the feedback will not be as "instant" as with the

one-minute paper (and other assignments which you collect the day of the relevant lecture). But with this approach (particularly if entries are assigned for homework), you may ask more complex questions, such as, "Do you think that determinism is correct, or that humans have free will? Explain your answer.", or "Do you think that Dr. Kevorkian's actions are morally right? What would John Stuart Mill say?" and so on. Or you might have students find and discuss reports of scientific studies in popular media on topics relevant to course material, such as global warming, the ozone layer, and so forth.

- This activity is inherently asynchronous. It can easily be implemented using the Canvas Assignments feature, and assigned to be completed after reviewing an asynchronous lecture or after a synchronous class session.
- For a collaborative learning version of this activity, use a graded Canvas Discussion. This will make all students' responses available to the larger group.
- Alternatively, structure students' responses as Peer Reviewed Assignments in Canvas. This will require students to review and reply to one or more of their peers' responses.
- For assignments where students are finding and discussing external reference materials related to a class topic or article, use a Google Doc or wiki page or other collaboration space. Students must post a new reference (with a "signed" short descriptive citation) on the common space and may not repeat citations; this encourages speedy responses! Bonus: the final document -- a collaboratively-assembled annotated bibliography – can be used as a resource for future activities.

5. **Reading Quiz** - Clearly, this is one way to coerce students to read assigned material! Active learning depends upon students coming to class prepared. The reading quiz can also be used as an effective measure of student comprehension of the readings (so that you may gauge their level of sophistication as readers). Further, by asking the same <u>sorts</u> of questions on several reading quizzes, you will give students guidance as to what to look for when reading assigned text. If you ask questions like "What color were Esmerelda's eyes?" (as my high school literature teacher liked to do), you are telling the student that it is the details that count, whereas questions like "What <u>reason</u> did Esmerelda give, for murdering Sebastian?" highlight issues of justification. If your goal is to instruct (and not merely to coerce), carefully choose questions which will both identify who has read the material (for your sake) and identify what is important in the reading (for their sake).

- Reading quizzes can be easily implemented using a Canvas Quiz.
- For asynchronous quizzes, assign students to complete the quiz after completing a particular reading/before a particular due date; use an expiration date on the Quiz to enforce timely completion.
- For synchronous ("pop") quizzes, publish the quiz right at the beginning of a synchronous session and require students to all log into Canvas and complete it at the same time.

- For a non-graded synchronous quiz, use live polling to have students answer multiple choice questions at the same time. Although this will not yield individual grades, it will give you an overview of how many of your students completed/understood a reading assignment as of the time of a lecture.

6. **Clarification Pauses** - This is a simple technique aimed at fostering "active listening". Throughout a lecture, particularly after stating an important point or defining a key concept, stop, let it sink in, and then (after waiting a bit!) ask if anyone needs to have it clarified. You can also circulate around the room during these pauses to look at student notes, answer questions, etc. Students who would never ask a question in front of the whole class will ask questions during a clarification pause as you move about the room.

   - This is a good technique to practice during synchronous lectures, especially since reading students' nonverbal feedback is often more difficult in online settings. The "Chat" feature in Zoom is especially well-suited for this kind of back-and-forth/clarification.
   - Alternatively, you can ask students to direct questions to a TA (again using the "Chat" feature). This bit of indirection can help manage larger classes, and also provides shy students with a bit of additional anonymity/cover.

7. **Response to a demonstration or other teacher-centered activity** - The students are asked to write a paragraph that begins with: I was surprised that ... I learned that ... I wonder about ... This allows the students to reflect on what they actually got out of the teachers' presentation. It also helps students realize that the activity was designed for more than just entertainment.

   - An alternative version of this prompt is to ask students to come up with a "Top 5 Takeaways…" or similar list.
   - For a collaborative, synchronous version of this activity, use the Zoom "Breakout Groups" feature and have small groups come up with a collective list of takeaways/responses.
   - For an asynchronous version of this (e.g. after a prerecorded lecture), use the prompt in either a Canvas Discussion (allows students to see and react to one another's responses) or a Canvas Assignment (for individual responses).

Questions and Answers

While most of us use questions as a way of prodding students and instantly testing comprehension, there are simple ways of tweaking our questioning techniques which increase student involvement and comprehension. Though some of the techniques listed here are "obvious", we will proceed on the principle that the obvious sometimes bears repeating (a useful pedagogical principle, to be sure!).

The "Socratic Method"

Taking its namesake from the most famous gadfly in history, this technique in its original format involved instructors "testing" student knowledge (of reading assignments, lectures, or perhaps applications of course material to a wider context) by asking questions during the course of a lecture. Typically, the instructor chooses a particular student, presents her with a question, and expects an answer forthwith; if the "chosen" student cannot answer the question presented, the instructor chooses another (and another) until the desired answer is received. This method has come under criticism, based on claims that it singles out students (potentially embarrassing them), and/or that it favors only a small segment of the class (i.e., that small percentage of the class who can answer any question thrown at them). In addition, once a student has answered a question they may not pay much attention as it will be a long time before the teacher returns to them for a second question.

This approach may be particularly problematic in synchronous, online classes, where technical difficulties can interfere with individuals' ability to hear or respond quickly, where students can more easily tune out or "leave the (virtual) room" to avoid being singled out, etc.

In spite of these criticisms, we feel that the Socratic method is an important and useful one; the following techniques suggest variations which enhance this method, avoiding some of its pitfalls.

8. **Wait Time** - Rather than choosing the student who will answer the question presented, this variation has the instructor <u>WAITING</u> before calling on someone to answer it. The wait time will generally be short (15 seconds or so) - but it may seem interminable in the classroom. It is important to insist that no one raise his hand (or shout out the answer) before you give the OK, in order to discourage the typical scenario in which the five students in the front row all immediately volunteer to answer the question, and everyone else sighs in relief. Waiting forces every student to think about the question, rather than passively relying on those students who are fastest out of the gate to answer every question. When the wait time is up, the instructor asks for volunteers or randomly picks a student to answer the question. Once students are in the habit of waiting after questions are asked, more will get involved in the process.

   - In a synchronous session, Zoom's "Raise hand" feature enables an interesting variant on this. Pose a question verbally, and tell students to use the "Raise hand" feature when they have an answer. This allows you to see how quickly (and how many) participants are ready to reply. You can also follow up using the private "Chat" feature to inquire with students who were NOT ready, or have a TA do this.
   - In teaching larger online classes, it may be helpful to have a paper or digital list of your students available (outside of your synchronous/Zoom window). This allows you to keep track of who has responded/whom you've asked to respond throughout a class discussion.

9. **Student Summary of Another Student's Answer** - In order to promote active <u>listening</u>, after one student has volunteered an answer to your question, ask another student to summarize the first student's response. Many students hear little of what their classmates have to say, waiting instead for the instructor to either correct or repeat the answer. Having students summarize or repeat each others' contributions to the course both fosters active participation by all students and promotes the idea that learning is a shared enterprise. Given the possibility of being asked to repeat a classmates' comments, most students will listen more attentively to each other.

   - In a synchronous, online session, this approach can quickly come to feel like a waste of time – remember that attention spans tend to be shortened in online settings, and students more tempted to "change the channel" if they aren't constantly getting "new" content.
   - However, this approach can be combined with a "threaded replies" Canvas Discussion to create an interesting form of asynchronous collaborative learning. After a pre-recorded lecture, reading, or other form of asynchronous instruction, designate a small number of students as "first responders," responsible for offering replies to a prompt in a Discussion. With the "threaded replies" option active, each of these will generate a separate discussion. After a suitable period, require the rest of your students to participate by responding to one (or more) of their peers' responses.
   - For a more structured version of this activity, you can require responding students to begin their reply in one of three ways: "I agree with [a specific quote], AND…" "I disagree with [a specific quote], BECAUSE" or "I understand [a specific quote] to be saying [rephrase], and that makes me wonder…" This forces them to robustly engage the details of their peers' replies.

10. **The Fish Bowl** - Students are given index cards, and asked to write down one question concerning the course material. They should be directed to ask a question of clarification regarding some aspect of the material which they do not fully understand; or, perhaps you may allow questions concerning the application of course material to practical contexts. At the end of the class period (or, at the beginning of the next class meeting if the question is assigned for homework), students deposit their questions in a fish bowl. The instructor then draws several questions out of the bowl and answers them for the class or asks the class to answer them. This technique can be combined with others (e.g., #8-9 above, and #2).

   - For an online version of this, require students to submit questions via Canvas (Assignment or Discussion) after reading/reviewing a piece of asynchronous content or at the end of a synchronous Zoom presentation (via private Chat to the instructor or TA – be sure to save this before closing the session!). Use these questions to structure subsequent assignments or discussion.
   - This can also be a charming way to make lectured content more interesting. Require students to submit questions after they have completed a reading, but

before you prepare your lecture (synchronous or asynchronous) on the topic. Then structure your remarks around students' questions, being sure to name the students as you're replying to their inquiries.
- For an even more dramatic version of this, have a TA (or someone who lives with you, or "Zoomed-in" interlocutors) pose questions to you while you're recording – this will give your lecture a "Town Hall" feeling. Alternatively, record an audio-only version of the conversation, and brand it a Podcast.

11. **Quiz/Test Questions** - Here students are asked to become actively involved in creating quizzes and tests by constructing some (or all) of the questions for the exams. This exercise may be assigned for homework and itself evaluated (perhaps for extra credit points). In asking students to think up exam questions, we encourage them to think more deeply about the course material and to explore major themes, comparison of views presented, applications, and other higher-order thinking skills. Once suggested questions are collected, the instructor may use them as the basis of review sessions, and/or to model the most effective questions. Further, you may ask students to discuss the merits of a sample of questions submitted; in discussing questions, they will significantly increase their engagement of the material to supply answers. Students might be asked to discuss several aspects of two different questions on the same material including degree of difficulty, effectiveness in assessing their learning, proper scope of questions, and so forth.

- This activity is particularly well-suited to online instruction. Consider using this as a simple, recurring Canvas Assignment after ALL class readings/lectures. The generated pool of questions can then be used according to the excellent suggestions above, using Canvas Discussions to "discuss," etc.
- For a still-more interactive version of this, collect some of your favorite student-generated questions into a single mock exam, and then invite your students to collaboratively analyze the resulting document (again, see the excellent suggestions above) using a collaborative text markup platform such as Hypothesis (http://hypothes.is).
- In some classes, it may be appropriate to have students submit, evaluate, and collaboratively decide upon a set of particularly good questions, and then use those same questions on their actual midterm/final exam.

Immediate Feedback

These techniques are designed to give the instructor some indication of student understanding of the material presented during the lecture itself. These activities provide formative assessment rather than summative assessment of student understanding. Formative assessment is evaluation of the class as a whole in order to provide information for the benefit of the students and the instructor, but the information is not used as part of the course grade; summative assessment is any evaluation of student performance which becomes part of the course grade. For each

feedback method, the instructor stops at appropriate points to give quick tests of the material; in this way, she can adjust the lecture mid-course, slowing down to spend more time on the concepts students are having difficulty with or moving more quickly to applications of concepts of which students have a good understanding.

12. **Finger Signals** – This method provides instructors with a means of testing student comprehension without the waiting period or the grading time required for written quizzes. Students are asked questions and instructed to signal their answers by holding up the appropriate number of fingers immediately in front of their torsos (this makes it impossible for students to "copy", thus committing them to answer each question on their own). For example, the instructor might say "one finger for 'yes', two for 'no'", and then ask questions such as "Do all organic compounds contain carbon [hydrogen, etc.]?". Or, the instructor might have multiple choice questions prepared for the overhead projector and have the answers numbered (1) through (5), asking students to answer with finger signals. In very large classes the students can use a set of large cardboard signs with numbers written on them. This method allows instructors to assess student knowledge literally at a glance.

- Any form of online/simultaneous polling (e.g. within a Zoom meeting) allows instructors to do this in synchronous settings.
- In addition to asking simple multiple choice questions, you can also ask students Likert-style questions, e.g. "Do you strongly agree, agree, disagree, or strongly disagree with this statement?"
- As a variant of the above, you use this method to assess students' interest in or self-perception of understanding of a just-presented topic or key content point, e.g. "5 = 'I GOT IT,' 4 = 'Okay, that makes sense,' 3 = 'Uhhhhhh…I think so?' etc.
- Sharing the results of such spontaneous/in-the-moment polls with your students can improve the confidence of struggling students, especially if they recognize that they aren't the only ones with questions about content.
- For a collaborative learning follow-up, create Zoom breakout groups that mix students who answered the poll very differently (e.g. strong agreement vs. strong disagreement; clear understanding vs. confusion), and invite them to either discuss or collectively work to improve their understanding of the answers.
- For an asynchronous version of this, use students' different replies to divide them among different threaded Discussions or to work collaboratively on a group Assignment.

13. **Flash Cards** - A variation of the Finger Signals approach, this method tests students' comprehension through their response to flash cards held by the instructor. This is particularly useful in disciplines which utilize models or other visual stimuli, such as chemistry, physics or biology. For example, the instructor might flash the diagram of a chemical compound and ask "Does this compound react with H_2O?". This can be combined with finger signals.

- This activity can be a lot of fun in a synchronous Zoom session, if your class is not too large. Be sure students can see your card (a PowerPoint slide can work well too), and that you are using "Gallery View" to see all participants at once.
- Canvas Quizzes permit image-based questions, and therefore allow you to create a similar experience asynchronously.

14. **Quotations** - This is a particularly useful method of testing student understanding when they are learning to read texts and identify an author's viewpoint and arguments. After students have read a representative advocate of each of several opposing theories or schools of thought, and the relevant concepts have been defined and discussed in class, put on the overhead projector a quotation by an author whom they have not read in the assigned materials, and ask them to figure out what position that person advocates. In addition to testing comprehension of the material presented in lecture, this exercise develops critical thinking and analysis skills.

- In additions to quotations, this activity works well with data visualizations, article abstracts, short case studies, images, etc.
- This method is an excellent way to transition students from an asynchronous learning experience (reading an article, watching a pre-recorded lecture) to a synchronous discussion. The object can be presented either prior to the synchronous session (and the students invited to prepare responses) or at the beginning of the session (to "kick off" a conversation).
- This method can also be used *after* a synchronous presentation, either to break up a longer lesson or as an asynchronous follow-up to test students' comprehension of material presented synchronously. In the former, the object can be presented before implementing Zoom breakout groups; in the latter, embed the prompt in a Canvas Assignment or Quiz, then make it available at the end of the synchronous session. (If using a Quiz, you can also put a time limit on students' responses.)

Critical Thinking Motivators

Sometimes it is helpful to get students involved in discussion of or thinking about course material either <u>before</u> any theory is presented in lecture or after several conflicting theories have been presented. The idea in the first case is to generate data or questions prior to mapping out the theoretical landscape; in the second case, the students learn to assess the relative merits of several approaches.

15. **The Pre-Theoretic Intuitions Quiz** - Students often dutifully record everything the instructor says during a lecture and then ask at the end of the day or the course "what <u>use</u> is any of this?" or "what good will philosophy [organic chemistry, etc.] <u>do</u> for us?" To avoid such questions, and to get students interested in a topic before lectures begin, an instructor can give a quiz aimed at getting students to both identify and to assess their own views. An example of this is a long "True or False" questionnaire

designed to start students thinking about moral theory (to be administered on the first or second day of an introductory ethics course), which includes statements such as "There are really no correct answers to moral questions" and "Whatever a society holds to be morally right is in fact morally right." After students have responded to the questions individually, have them compare answers in pairs or small groups and discuss the ones on which they disagree. This technique may also be used to assess student knowledge of the subject matter in a pre-/post-lecture comparison.

- Pre-assessments can really help engage students (and direct instructors' subsequent efforts) in online classes. Canvas Quizzes (ungraded) can be used to implement surveys of the sort described, either before a class or at the start of a unit or project.
- As a variant of this, you can ask students to articulate their pre-thematic beliefs or opinions in a personal statement or similar document. If posted as part of an "Introduction to our class" Canvas Discussion, this can be a nice way to combine some online "getting to know you" activities with some substantive content.
- Controverted questions that surface in the replies to such assessments can be used to start subsequent (graded or ungraded) Canvas Discussions; in a variant of this, the instructor can post multiple controverted items to start multiple threaded Discussion forums.

16. **Puzzles/Paradoxes** - One of the most useful means of ferreting out students' intuitions on a given topic is to present them with a paradox or a puzzle involving the concept(s) at issue, and to have them struggle towards a solution. By forcing the students to "work it out" without some authority's solution, you increase the likelihood that they will be able to critically assess theories when they are presented later. For example, students in a course on theories of truth might be asked to assess the infamous "Liar Paradox" (with instances such as 'This sentence is false'), and to suggest ways in which such paradoxes can be avoided. Introductory logic students might be presented with complex logic puzzles as a way of motivating truth tables, and so forth. In scientific fields you can present experimental data which seems to contradict parts of the theory just presented or use examples which seem to have features which support two opposing theories.

- Puzzle- or problem-based learning tends to work better in smaller groups (2-4 students).
- In synchronous settings, you can pose a puzzle or problem and then break students into Zoom breakout groups for small-group discussion.
- In asynchronous settings, you can use Canvas group Assignments to assign small groups of students to work on common puzzles/problems.
- To allow students to see/work on multiple puzzles/problems, create a threaded Discussion in Canvas. Post the assignment overview as the discussion prompt/description, and create a separate thread for each puzzle/problem. This will let students read all the puzzles/problems and reply to the ones they choose.

Pair/Share

Grouping students in pairs allows many of the advantages of group work. Students have the opportunity to state their own views, to hear from others, to hone their argumentative skills, and so forth without the administrative "costs" of group work (time spent assigning people to groups, class time used just for "getting in groups", and so on). Further, pairs make it virtually impossible for students to avoid participating thus making each person accountable.

Both Canvas and Zoom make dividing students into groups of any size very easy. In Zoom (synchronous), use the Breakout Groups feature (with a group size of 2) to quickly divide a class' participants into pairs for private conversation. In Canvas (asynchronous), you can divide a class into stable groups using the "Groups" feature, or create task-based groups by creating a group Assignment.

17. **Discussion** - Students are asked to pair off and to respond to a question either in turn or as a pair. This can easily be combined with other techniques such as those under "Questions and Answers" or "Critical Thinking Motivators" above. For example, after students have responded to statements, such as "Whatever a society holds to be morally right is in fact morally right" with 'true' or 'false', they can be asked to compare answers to a limited number of questions and to discuss the statements on which they differed. In science classes students can be asked to explain some experimental data that supports a theory just discussed by the lecturer. Generally, this works best when students are given explicit directions, such as "Tell each other <u>why</u> you chose the answer you did."

   - When posing discussion questions to pairs of students in a synchronous session, consider imposing a time limit for discussions and notifying students at the halfway point to ensure that both members of the pair have the opportunity to listen and to talk.
   - For asynchronous paired discussions, consider asking students to produce a collaborative summary statement or other document analyzing their responses' similarities and differences. This will deepen their learning from the interaction.

18. **Note Comparison/Sharing** - One reason that some students perform poorly in classes is that they do not have good note-taking skills. (This can be a particular challenge in online courses, where students who are unaccustomed to handwriting notes may be watching/participating in session on their phone or laptop, and thus be unable to take typed notes.) One way to avoid some of these pitfalls and to have students model good note-taking is to have them occasionally compare notes. The instructor might stop lecturing immediately after covering a crucial concept and have students read each others' notes, filling in the gaps in their own note-taking. Once students see the value of supplementing their own note-taking with others', they are likely to continue the practice outside of class time.

- Note comparison/sharing is not recommended as a synchronous session practice. However, it can be especially helpful to students as an asynchronous practice.
- In light of the extra strain on students in the Spring 2020 term, and given the probability that many students' participation in synchronous sessions will be negatively impacted by health considerations (either their own or others') and/or technical difficulties, instructors should consider complementing recorded synchronous sessions (for subsequent asynchronous review) with supplementary note-sharing and/or having a TA take and share notes with students after each class.

19. **Evaluation of Another Student's Work** - Students are asked to complete an individual homework assignment or short paper. On the day the assignment is due, students submit one copy to the instructor to be graded and one copy to their partner. These may be assigned that day, or students may be assigned partners to work with throughout the term. Each student then takes their partner's work and depending on the nature of the assignment gives critical feedback, standardizes or assesses the arguments, corrects mistakes in problem-solving or grammar, and so forth. This is a particularly effective way to improve student writing.

    - Canvas (asynchronous) makes this particularly easy, allowing instructors to assign one or more peer reviewers to any Assignment.
    - To improve student-to-student feedback, consider embedding a rubric in any peer reviewed Assignment.

Cooperative Learning Exercises

For more complex projects, where many heads are better than one or two, you may want to have students work in groups of three or more. As the term "cooperative learning" suggests, students working in groups will help each other to learn. Generally, it is better to form heterogeneous groups (with regard to gender, ethnicity, and academic performance), particularly when the groups will be working together over time or on complex projects; however, some of these techniques work well with spontaneously formed groups. Cooperative groups encourage discussion of problem-solving techniques ("Should we try this?", etc.) and can be especially supportive of students who have not yet mastered all of the skills required.

20. **Cooperative Groups in Class -** Pose a question to be worked on in each cooperative group and then circulate around the room answering questions, asking further questions, keeping the groups on task, and so forth. After an appropriate time for group discussion, students are asked to share their discussion points with the rest of the class. (The ensuing discussion can be guided according to the "Questions and Answers" techniques outlined above.)

- This technique can be implemented during a Zoom synchronous session with the Breakout Rooms feature. Instructors/meeting hosts can "visit" each group in turn during such discussions, as noted above.

21. **Active Review Sessions** - In the traditional class review session the students ask questions and the instructor answers them. Students spend their time copying down answers rather than thinking about the material. In an active review session the instructor poses questions and the students work on them in groups. Then students are asked to show their solutions to the whole group and discuss any differences among solutions proposed.

    - This technique can be implemented synchronously by assigning review questions to groups in separate Breakout Rooms in Zoom.
    - To implement this technique asynchronously, group Assignments or a threaded Discussion can be used in Canvas (the latter allows all students to more easily access all the groups' work).
    - For a "flipped classroom" approach to this exercise, combine it with #11, and let the students first generate, then solve the review questions.

22. **Work "at the Blackboard"** - In many problem-solving courses (e.g., logic or critical thinking), instructors review homework or teach problem-solving techniques by solving the problems themselves. Because students learn more by doing, rather than watching, this is usually not the optimal scenario. Rather than illustrating problem solutions, coach students as they work out the problems themselves.

    - In most classes, it will not be practicable to have students solving complex problems or working on projects during whole-class synchronous sessions.
    - However, this technique may lend itself to transitions into and out of large-group synchronous learning, in the manner described in #14.

23. **Concept Mapping** - A concept map is a way of illustrating the connections that exist between terms or concepts covered in course material; students construct concept maps by connecting individual terms by lines which indicate the relationship between each set of connected terms. Most of the terms in a concept map have multiple connections. Developing a concept map requires the students to identify and organize information and to establish meaningful relationships between the pieces of information.

    - Concept mapping doesn't lend itself to synchronous work via Zoom, unfortunately. But preparing one for students, or better, asking students to generate one after a reading or listening to a lecture is a great way to deepen learning.
    - There are a number of online tools that allow students to build concept maps; many of these are free, and some allow online collaboration. (Need help

identifying a tool? Check out educational technologist Kathy Schrock's resources list, available at https://www.schrockguide.net/concept-mapping.html.)

24. **Visual Lists** - Here students are asked to make a list; by working in groups, students typically can generate more comprehensive lists than they might if working alone. This method is particularly effective when students are asked to <u>compare</u> views or to list pros and cons of a position. One technique which works well with such comparisons is to have students draw a "T" and to label the left- and right-hand sides of the cross bar with the opposing positions (or 'Pro' and 'Con'). They then list everything they can think of which supports these positions on the relevant side of the vertical line. Once they have generated as thorough a list as they can, ask them to analyze the lists with questions appropriate to the exercise.

- This technique can be used synchronously in Zoom in a number of different ways:
  o Use Breakout Groups to have smaller groups of students come up with the list items for opposing positions, then synthesize these on a PowerPoint slide or Word document you share via Screen Share.
  o Ask the large group to send you pro and con elements using the Chat feature in Zoom.
  o Have students verbally call out pros and cons (make sure everyone is unmuted!), and you or a TA log and share them.
  o If you are broadcasting your lecture in front of a whiteboard or easel paper, you can even write ideas down as students share ideas.
- To execute this method asynchronously, use either a Wiki page divided into two sections or a Canvas threaded discussion, broken into two separate threads and invite students to contribute.
- To add an element of "Family Feud" gamesmanship to the generation of pro's and con's, solicit students' ideas privately before the class via a Canvas Assignment or ungraded Quiz, and then invite students to guess (or better, explain) the most popular answers during a subsequent synchronous session or asynchronous discussion.

25. **Jigsaw Group Projects** - In jigsaw projects, each member of a group is asked to complete some discrete part of an assignment; when every member has completed his assigned task, the pieces can be joined together to form a finished project. For example, students in a course in African geography might be grouped and each assigned a country; individual students in the group could then be assigned to research the economy, political structure, ethnic makeup, terrain and climate, or folklore of the assigned country. When each student has completed his research, the group then reforms to complete a comprehensive report. In a chemistry course each student group could research a different form of power generation (nuclear, fossil fuel, hydroelectric, etc.). Then the groups are reformed so that each group has an expert in one form of power generation. They then tackle the difficult problem of how much emphasis should be placed on each method.

- This kind of group project is ideal for online courses, since it permits individualized study and effort. However, as an instructor, you need to take great care to scaffold the project for your students! This means providing clear expectations not only for the deliverable(s), but also regarding students' participation, the mechanisms for collaboration, and how you'll evaluate the both the project and their efforts.
- **Participation:** when explaining the project, be clear with students about how much time you expect *each student* to put in and when you expect the groups' work to take place (e.g. during synchronous class sessions or independently of class sessions. You'll also need to decide in advance whether groups will self-select, be assigned, or be chosen randomly (e.g. by Canvas or Zoom).
- **Mechanisms:** encourage your students to use class-related collaboration channels (e.g. in Canvas or UChicago Google tools) for group work. This permits you, as the instructor, to monitor group interactions and (if necessary) intervene before difficult group dynamics interfere with students' success.
- **Evaluation:** be sure students understand whether they will be graded as a group or individually. (Canvas allows both options when setting up a Group Assignment.) If you'll use a rubric to grade the project, give a copy to your students at the outset, and consider offering consultation along the way to help steer groups to success. If grading students individually, establish clear standards by which each students' *unique contributions* should be documented and assessed, and consider using a rubric or similar mechanism for peer evaluation to get extra insight into who contributed what to the final product.

26. **Role Playing** - Here students are asked to "act out" a part. In doing so, they get a better idea of the concepts and theories being discussed. Role-playing exercises can range from the simple (e.g., "Answer the following questions in the voice and from the perspective of the author of this week's article") to the complex (e.g. students studying ancient philosophy might be asked to recreate the trial of Socrates using a range of primary and secondary sources, presenting arguments of the prosecution and defense, presenting historical/metaphorical witnesses, preparing questions for cross-examination, and so on).

- Insofar as they require significant creativity, role playing exercises can involve some very sophisticated critical thinking, but can also permit the introduction of some much-needed levity into an online environment. This is true whether you undertake them synchronously or asynchronously.
- In a synchronous setting, consider combining role playing with #27 to create virtual panel discussions between thinkers you're considering in the class. (To do this cleanly, make sure each presenter has access to a webcam, and then limit video access to ONLY the presenters, possibly including a moderator. Viewers can suggest questions via Chat/the Raise Hand feature.) This permits real-time debates. After 10-15 minutes, pause and ask first the actors, and then the audience to evaluate their performances' fidelity to the ideas being studied.

- In an asynchronous setting, inflect a Discussion or Assignment by asking students to respond to a prompt "in character." This works for written assignments, but also for multimedia products.
- For a "flipped classroom" approach, let the students generate the pool of figures/concepts/ideologies available as roles, and then let them choose (or be assigned) the role they will play in completing an assignment or project.
- For yet another layer of complexity, assign students to complete group Assignments while playing a role. This will encourage them to think about ways in which different concepts/ideas interact. This may be especially appropriate at the end of an idea-heavy course or sequence.

27. **Panel Discussions** - Panel discussions are especially useful when students are asked to give class presentations or reports as a way of including the entire class in the presentation. Student groups are assigned a topic to research and asked to prepare presentations (note that this may readily be combined with the jigsaw method outlined in #25 above). Each panelist is then expected to make a very short presentation, before the floor is opened to questions from "the audience." The key to success is to choose topics carefully and to give students sufficient direction to ensure that they are well-prepared for their presentations. You might also want to prepare the "audience" by assigning them various roles (see #26). For example, if students are presenting the results of research into recommended forms of energy conservation, you might have some of the other students role play concerned environmentalists, fossil fuel executives, local officials from a range of locales, commuters, and so forth.

- See #26 (above) for a number of related suggestions, including how to execute a panel discussion in a synchronous/Zoom environment.
- To enrich a synchronous panel discussion, consider inviting guest presenters or discussants – remember to relax any class security measures to permit log-in by non-University guests.
- For an asynchronous version, have each presenter record a short presentation (or prepare a written presentation/white paper) and upload it as a Canvas Assignment. Assign the entire class as peer reviewers for the assignment, and have them review the presentations independently. For the discussion, you can either have a (much shorter) synchronous session, or ask your entire class to comment via threaded Discussion (one for each presenter). Such discussions can also be conducted via Slack or Skype chat.
- In situations where not every student has the opportunity to present in the same class session, make sure to specify work for the audience to do. For example, you can require each audience member to submit three questions in advance of the panel (see #10 above), or to research a role to play, or to fill out a rubric giving one or more panelists specific feedback on their work.

28. **Debates** - Actually a variation of #27, formal debates provide an efficient structure for class presentations when the subject matter easily divides into opposing views or 'Pro'/'Con' considerations. Students are assigned to debate teams, given a position to defend, and then asked to present arguments in support of their position on the presentation day. The opposing team should be given an opportunity to rebut the argument(s) and, time permitting, the original presenters asked to respond to the rebuttal. This format is particularly useful in developing argumentation skills (in addition to teaching content).

- See #27 (above) for closely related recommendations for executing debates in an online context. Note that this technique can also be fruitfully combined with role playing (#25), in cases where students are asked to debate from a particular ideological or historical or theoretical perspective, for example.
- In a synchronous session, you can reinforce time limits (and limit interruptions) by carefully managing participants' audio/video settings in Zoom. The chat feature will permit the logging of objections, the tracking of questions from the audience, etc.
- Again, be mindful to have clear tasks for the audience in such a presentation, e.g. peer evaluation, fact-checking, etc.
- For an asynchronous version, a threaded Discussion allows both sides to marshal arguments for their position. These can be synthesized into a presentation of their case (shared in writing or as a pre-recorded presentation), with time allotted after the presentation for submission of and responses to questions. When both teams have had their say, the remainder of the class (and/or external guests invited as observers) can be invited to evaluate the strengths and weaknesses of the arguments presented.

29. **Games** – The valuation of game playing (and game development) as a learning tool has seen a resurgence of interest in recent years. Insofar as they operate according to clearly defined rules, games may be a particularly good way to illustrate some concepts or theories; insofar as they follow highly structured processes, they may also be illustrative of certain methods. For example, a few rounds of the Induction Game (in which playing cards are turned up and either added to or discarded from a running series as observers attempt to discern the underlying logic) is a highly efficient way to introduce concepts such as the derivation of the "laws of nature" or "the scientific method." Likewise, asking students to develop a game (or classroom activity) illustrating a concept such as "natural selection" requires them to engage a number of higher-order critical thinking skills.

- Unfortunately, a Zoom-mediated synchronous online environment can be very limiting for many forms of student-defined, student-led game play among class members (although some game show-type scenarios may play out fairly smoothly, see #24 above for an example).

- In inviting students to play (or develop) a game, instructors should be mindful that few of our students – even those sheltering in place – will be living alone. So long as a game can be executed with relatively few players, students *may* be able to play (or field test) games with family and friends and then report back about their experiences.
- Inviting students to adapt existing game forms (e.g. Scattergories, Cards Against Humanity) or their motifs (e.g. Chess, Go) to attain academic outcomes may also be possible, even for students who are relatively isolated.
- In lessons where game *play* is meant to achieve academic outcomes, create an Assignment or Discussion that requires students to reflect on their experience of playing the game and to articulate the connections they were able to make between the experience and the class' content. (Course credit should be given for learning evidenced, not for gameplay itself.)
- In lessons where game *development* is meant to achieve academic outcomes, create a rubric (either by yourself or collaboratively with your students) that helps students explicitly assess the extent to which the game's design achieves its desired purposes. Embed this in the Canvas Assignment in which you stipulate the goals for the game developer. Assign one or more students (who will play/evaluate the game) as peer reviewers.

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