Making Lectures More Engaging

In an article for *Faculty Focus*, Davie Davis reviews five points in which recent research into the workings of the brain can help improve pedagogy in the higher education classroom.

1. **"The upper limit of the human brain's capacity to pay focused attention to a lecture is about 20 minutes."** To address this wandering attention, vary your methods of content delivery, alternating between lectures, discussion, and activities, allowing students time to assimilate what they've learned.
2. **"The most effective learning is based on prior knowledge."** Build on students' past experience and coursework to help connect new material to old. Help them relate the material by relating it to something they already know.
3. **"Thought and feeling are inseparable brain processes.** This means that information associated with values and feelings will be more readily learned. So even in science disciplines students should be encouraged to develop passionate stances on issues such as cold fusion or stem cell research so that they will retain information more efficiently."
4. **"Perceived dangers cause the brain to downshift to its most rudimentary processing mode and bring learning to a halt."** Negative emotions such as stress or fear impede the brain's ability to retain or retrieve information. In the classroom, this effect can be seen in panic attacks during presentations or classroom incivility. Instructors can "mitigate some of these effects…by creating less-threatening learning scenarios, such as small groups or talking partners."
5. "**The search for meaning is innate.** The human brain constantly seeks meaning and pattern in a rich milieu of emotions, facts, associations, memories, and other inputs.... we can capitalize on the brain's hunger for meaning by providing information in relevant contexts that yield both intuitive and logical meaning" (Davis, 2008).

Taking these points into account, instructors can redesign their lectures to be more engaging. In her book, *Tools for Teaching*, Barbara Gross Davis has presented alternative lecture formats that integrate the principles of active learning:

- **Interactive lectures** evolve around brainstorming sessions instigated by a question or prompts from the instructor at key points in the lecture. After gathering the responses, the instructor and the class then work together to "sort the responses into categories. The flow of examples and counterexamples, generalizations and specifics, or rules and exceptions encourages students to grapple actively with the topic."
- **Problem solving, proofs, and stories** begin "with the instructor posing a question, paradox, or enigma – some provocative problem that whets students' interest… The suspenseful answer unfolds during the class period, with students actively or passively anticipating or pointing toward solutions."
- **The case study method** "follows a realistic situation step by step to illustrate a general principle or problem-solving strategy. Depending on the level of the students, either the instructor takes the lead or the students themselves generate the questions and principles." See our Teaching Tips on Case Method for more information: http://www.ryerson.ca/content/dam/lt/resources/handouts/CaseMethodBestPractices.pdf
- **Short lectures framing discussion periods**. In this method, the instructor sets the stage for discussion with a twenty-minute lecture on a particular issue, and then allows for a fifteen-minute discussion of that issue's implications and effects. The instructor then "closes with another short

lecture that pulls together the major themes or issues. In large classes, the discussion segment may be turned over to students working in trios or small groups" (Davis, 1993). Besides engaging students, using this method gives the instructor a break by shifting the energy of the class to students.

Encouraging Discussion

There are many different methods for encouraging discussion in the classroom. This can range from activities that encourage student participation (case method, debate) to the seating arrangement of the classroom.

When leading group discussions, it's important to ask the right questions. To help lead students to a deeper understanding of the material, consider these questioning strategies from Indiana University:

- **Shift points of view**: "Now that we've seen it from [W's] standpoint, what's happening here from [Y's] standpoint?" "What evidence would support Y's position?"
- **Shift levels of abstraction**: "When [Y] says "_____," what are her assumptions?" Or seek more concrete explanations: "Why does she hold this point of view?"
- **Ask for benefits/disadvantages of each position**
- **Shift time frame**: "How could this situation have been different?" "What could have been done earlier to head off this conflict and turn it into a productive conversation?"
- **Shift to another context**: "We see how a person who thinks X would see the situation. How would a person who thinks Y see it?" "How might [insert person, organization] address this problem?"
- **Follow-up questions**: "What do you mean by ___?" Or, "Could you clarify what you said about ___?" "How would you square that observation with what [name of person] pointed out?"
- **Point out and acknowledge differences in discussion**—"that's an interesting difference from what [Y] just said. Let's look at where the differences lie"

Other ways of encouraging student participation:

- **Gather class opinion**. Prepare students for the day's topic by polling them before the discussion. This can be done before class using D2L or Google Forms, or at the beginning of class using clickers or another classroom response technology. Display results to the entire class to show consensus or areas of contention. A vote requires students to publically commit to their positions, engaging them with the discussion (Garvin, 2004). This will help give you a better idea where the class stands, as well as allowing students to see they are not alone in their opinions, thus making them more comfortable with sharing their views (CTE). D2L, Google Forms, Twitter, and some classroom response technologies will also allow students to provide text responses from a couple of words to a few sentences – these features can be used to capture the comments and questions of students who are too shy to speak up (CTE). When considering any of these tools, think about your learning objectives, and whether it makes sense to display aggregate answers, anonymous answers, or responses under student names or avatars.
- **Discussion leaders.** Ask two or three students to serve as discussion leaders. Meet with them to review their questions and the format for the discussion. Allow them to take control of your class and facilitate the discussion. If you plan on leading the discussion, "assign one or two students per session to be observers responsible for commenting on the discussion. Other student roles include

periodic summarizer (to summarize the main substantive points two or three times during the session), recorder (to serve as the group's memory), timekeeper (to keep the class on schedule), and designated first speaker" (Davis, 1993).

- **Have students debate the material via role-play**. Ask students to volunteer to take on a role in a debate. When picking students to role-play, consider whether you want them to argue for the position they currently hold, or if you want them to argue against their current beliefs. Try to pick students across the room from each other so that their dialogue will bring the students sitting in between into it, rather than shutting them out (Garvin, 2004).
- **Use a token system.** Distribute three tokens (poker chips, pennies, etc.) to each student at the beginning of class. "Each time a student speaks, a chip is turned over to the instructor. Students must spend all their chips by the end of the period… This strategy limits students who dominate the discussion and encourages quiet students to speak up" (Davis, 1993)

See our Teaching Tips for more active learning techniques:
http://www.ryerson.ca/content/dam/lt/resources/handouts/activelearning.pdf

See our Teaching Tips on Facilitating Discussion for more on how to use discussion in the classroom:
http://ryerson.ca/content/dam/lt/resources/handouts/FacilitatingDiscussion.pdf

Interactive Lecture Demonstrations

Demonstrations during lectures can be used to break up long chunks of dry information, as well as engage students with the material. "The visual impact of a good in-class demonstration that illustrates a scientific concept can help to make a concept clearer and more 'real' in the mind of a student. Years after taking a class, the 'lecture demos' are often what a student remembers with the greatest clarity" (Science Centre for Learning and Teaching).

For interactive lecture demonstrations to be most successful, students must be involved throughout the entire process. Students should discuss the purpose of the demonstration, predict what will happen, discuss the theories behind the concepts being demonstrated, and compare their observations to predictions (Morgan, 2007).

Demonstrations can be placed at three stages in a given class – as an introduction to the course topic, at the end to bring the topic to a close, or as an aid used throughout to clarify points or stimulate discussion (Morgan, 2007). When developing an interactive lecture demonstration:

- Identify a core concept for students to learn
- Choose a demonstration that will illustrate this concept, preferably with an outcome different from student expectations
- Prepare accompanying materials to help students follow along and achieve the desired learning outcomes (SERC)

Learning outcomes are achieved by leading students through three steps:

1. *Prediction.* Have students predict the outcome of the demonstration. This can be done individually or in groups, even potentially as a Think-Pair-Share activity.

2. *Experience.* Run the demonstration for the class, or have students conduct small experiments in groups. Give students time to determine whether their predictions were confirmed.
3. *Reflection.* Have students reflect on the outcome of the demonstration, why they made their initial prediction and the ways in which the demonstration confirmed or contradicted this theory. This can be done in a class discussion, small group work, or in individually prepared written reports (SERC).

Benefits of Interactive Lecture Demonstrations

- Provides concrete examples for abstract principles
- Helps students connect their previous knowledge to what they've learned
- Promotes critical thinking

The key to creating an engaging classroom is to make learning more student-centered—involve students in discussion, provide them with relatable and relevant material, and present content in multiple formats. Most importantly, "make students active participants in learning. Students learn by doing, making, writing, designing, creating, solving. Passivity dampens students' motivation and curiosity. Pose questions. Don't tell students something when you can ask them. Encourage students to suggest approaches to a problem or to guess the results of an experiment. Use small group work" (Davis, 1999).

Work Cited

Centre for Teaching Excellence (CTE). *Motivating Students: Creating an Inspiring Environment*. University of Waterloo. http://cte.uwaterloo.ca/teaching_resources/tips/motivating_students.html

Centre for Teaching Excellence (CTE). *Promoting Effective Classroom Participation*. University of Waterloo. http://cte.uwaterloo.ca/teaching_resources/tips/promoting_effective_classroom_participation.html

Davis B. G. (1999). *Tools for Teaching*. Jossey-Bass, San Francisco.

Davis, D. (2008). A Brain-Friendly Environment for Learning. *Faculty Focus*. http://www.facultyfocus.com/articles/instructional-design/a-brain-friendly-environment-for-learning/

Garvin, D. (2004). Participant-centered learning and the case method: A Case study teacher in action. *Harvard Business School*. http://hbsp.harvard.edu/multimedia/pcl/pcl_1/start.html

Morgan, J., Barroso, L.R., Simpson, N. (2007). Active Demonstrations for Enhancing Learning. *Frontiers In Education Conference - Global Engineering: Knowledge Without Borders, Opportunities Without Passports*. http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4418057

Science Centre for Learning and Teaching. *Using Lecture Demonstrations to Promote Conceptual Learning*. University of British Columbia. http://www.skylight.science.ubc.ca/lecturedemos

Science Education Resource Center, Carleton College. http://serc.carleton.edu/

Teaching With Case Method. *Indiana University Teaching Handbook*. Indiana University at Bloomington. http://www.teaching.iub.edu/wrapper_big.php?section_id=case