Recent Research

- What is Active learning?
  - Any method that engages students in the process of learning as opposed to passively listening to a lecture.
- Future research?
  - The field should focus on what active learning methods are most effective and how they can be implemented.
- What are its benefits?
  - Active learning approaches could improve students retention in science-disciplines.
  - Students who feel more involved and motivated to think are more likely to learn and remember the material
- What are some techniques?
  - Clickers, class groups, in-class worksheets, problem-based learning, team-based learning.
- What is team-based learning?
  - This is designed to be used in larger lectures where the teacher may not be able to interact with each student.
    - Team-Based learning requires the professor to create groups of students with diverse backgrounds and strengths at
      the start of the class.
    - The students then remain in those groups for the duration of the class.
    - For example, students would still be held accountable for their own work outside of the classroom such as reading
      and homework but they are able to work together on exams.
- What is problem based learning?
  - In this format the students work in groups while the teacher functions more as a facilitator.
    - It challenges students to "learn to learn" and requires them to think critically and analytically, as opposed to the
      passive learning of the past.
- What are some benefits of using electronic response (clickers)?
  - It focuses on raising student participation and encouraging active learning.
  - It is also helpful in giving the professor an overview of which material the students understand and what concepts
    they may be struggling with.
  - From a students perspective it allows you to participate in a class without feeling the need to stand up in front of a
    room full of strangers
- What are some of the problems?
  - There are not a lot of empirical data on the comparative benefits of each of these methods.
- Some students appear to be resistant to the idea at the beginning.
- Fourth and fifth year students tended to dislike the interruption of tradition class time and found active learning to be a
  "waste of time"

Personal Experience

- At first I was resistant to working in groups since I did ok by myself even in classes that were in large lecture halls; however, group
  work and clicker questions helped me by showing me what I was understanding and what, although I thought I understood, I
  needed to go back and review more. Classes that involve active learning tend to stick with me and I remember that material far
  past when I need it for a test.
- I have had classes that have used clickers ineffectively and it really interrupted the flow of information. When the professor doesn't
  take the time to discuss the material it tends to leave me more confused than I was to begin with.
- Taking my own notes, as opposed to using those listed online, has really helped me pay attention in class and generally I
  remember more of the material right away.

Active Learning
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Learning Strategies for Students

- Don't sit passively; write notes, ask questions, get involved!
- If the professor has clicker questions take them seriously, think about the question and make a choice based on what you understand
- If you are confused in class and too afraid to speak up go to office hours, email the professor or their
  instructional staff and ask them to clarify
- Make your own notes and put things in your own words so that you understand the concept when you go back to
  review
- Take what was discussed in class and apply it to a new situation
- Self test: 
  - Make a concept map
  - Take a practice test under "test conditions"
  - Try other problems listed in the reading material
- Get a group together and explain the concepts to each other in simple terms
  - For Biochemistry:
    - Try to draw out the protein pathway without using your notes
    - Sit towards the front of the class so that you can interact with the professor
    - Work on understanding what you actually know, and what you need to know
    - Ask a TA or LA if you can explain the concept to them and have them ask questions and correct you

Teaching Practices for Professors

- Avoid simply standing in the front of the room and lecturing
- If you have a large class consider using clickers
  - Make the questions applicable to the material
  - Give the students a chance to vote, have them talk among themselves, and then let them vote again
  - Use the questions to open a discussion about the topic
  - The clickers will give you an understanding of how well the students are handling the material
    and help involve the students in the learning process
- Create small groups and give them worksheets and questions to do together
  - Encourage honest discussion and equal participation among group members
  - Grade their group work for a small amount of points so that students know to take it seriously
- Use an instructional staff!
  - TAs, Las and others can help make a large class feel smaller
- For Biochemistry:
  - Encourage students to take their own notes and not rely on what you may post online
  - Use models to help explain complex ideas

Facilitation Strategies for Instructional Staff

- Encourage students to form groups and work through problems together
- Don’t just give answers, help the students work through it on their own
- Create an environment where students feel able to ask questions on topics that they don’t understand
- Ask students to create a concept map
- For Biochemistry:
  - Have groups draw out pathways on the board and explain their reasoning for the placements
  - Pose questions about how the material might relate in other situations
  - Encourage students to think about real world applications of the concepts

References: