iClicker
Active learning simplified

Dr. Brandon Tenn
How to Create an Active Learning Environment

Active learning is a big professional interest for Dr. Brandon Tenn, who teaches chemistry and mathematics at Merced College. Not only has he hosted an ative learning conference, and is currently planning another for 2019, but he infuses student engagement into every aspect of each of his courses.

STARTING WITH ACTIVE LEARNING

In order to ensure his classroom environment is conducive to learning, Brandon starts infusing active learning characteristics right from the start, before he even begins teaching. Setting the stage with his students helps him adequately prepare them to come to class ready to participate and learn. Once class begins, Brandon utilizes a specific course structure to promote continual engagement by his students.

Here, Brandon breaks down his strategies for preparing his course and his students to engage in learning and then shares how his course structure keeps things going in each class session.

PREPARATION

Preparing to teach a course which focuses on active learning is all about developing the right environment according to Brandon, who has established five key strategies to get things started in his courses.

1. Verbalizing Expectations

Brandon wants to have a classroom where there are no assumptions. He likes full transparency, so makes sure expectations are discussed for what students expect of each other, what they expect of Brandon as their instructor, and what they expect of themselves. This is all in addition to Brandon sharing his own expectations. This can help alleviate any stress and make students feel equipped to succeed in the course. After the conversation around expectations occurs, Brandon takes all the comments and compiles them into a list which he shares with the class. They then review the list, elaborate on some items, remove others, and work to create a consensus on course expectations.

2. Setting the Right Tone

This begins in the step above, since full transparency can help create the comfortable environment Brandon aims for having in his course. At the start of a new semester, Brandon will typically invite everyone to engage in a discussion around their hobbies or their majors in order to get students used to talking with each other. He continues to set this tone with the help of iClicker. Giving every student a voice in the course, regardless of how large the class is, is highly important for Brandon because it adds to the comfort level in the class. If every student feels they're heard, they'll all speak up. With iClicker, each student is empowered to ask questions and actively participate in class discussion. "iClicker Reef gives every student a voice so you're hearing from more than just those students comfortable with being vocal, those who typically sit in the front row," says Brandon.

3. Making Course Tools Available

Having course tools that promote active learning, such as iClicker, is just one piece of making course tools available so students have access to the resources they need to succeed. Brandon also has a robust class website which not only houses the syllabus and general course information, but also handouts, lecture videos he's made, and more.

4. Teaching Students Beneficial Habits

Ensuring students are able to interact with the course's content in the best way to glean information is not always thought about at the start of a class. One of the things Brandon goes over early on in the semester is reading strategies to ensure students are able to digest the content they're preparing prior to coming to class. He takes them through exercises, during the lab component of his course, that teach annotation and thinking aloud to promote metacognition.

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5. Promoting a Growth Mindset
Tying into the tone of comfort he likes to have in his course includes getting his students comfortable with chemistry. He works on dispelling chemistry fears by establishing a growth mindset with this students. This challenges students to not think negatively about chemistry, giving up before they've even begun the course, but rather to approach chemistry with an open mind to learning.

Implementation
Developing a very specific course structure helps Brandon keep discussion going for an entire class period. He does not lecture at all during class. He may, if students are struggling with a particular concept, take some time to elaborate on a topic, but the design of his course revolves around discussion and not presentation.

Prework: Everything starts even before class begins. Students are expected to read a selection in the text or watch lecture videos in order to prepare for class discussion.

Opening: The first 10-20 minutes of class, students submit questions, through iClicker Reef, that they have from their pre-work. Brandon answers each question, but does not respond to statements. A student submitting, "I just don't get any of this," as a question won't get a response, but a content-based question will be addressed. If similar questions come up repeatedly, Brandon will work some additional examples related to that topic into the course discussion.

Practice: The rest of class is full of content-based questions, posted via iClicker Reef related to readings. There is a heavy focus on conceptual questions. If a particular question comes back with a low correct answer rate, Brandon puts the question up again, encouraging students to talk about the topic a little more with each other before making a second attempt at answering. He usually sees an increase in the answer rate at this point, but if students continue to struggle, he'll either eliminate an answer choice, provide them with a hint, or engage in an active discussion with his class. On average 5-10 questions are asked each class, and while he has a set list of questions for each topic, he selects his questions based on student need rather than going in a particular order.

After class: Students are assigned online homework and the next class' reading or lecture video assignment.

This course structure revolves around the importance of communication which builds out course time into truly productive time. Such a deep integration of iClicker Reef not only gives every student a voice, it helps create better, more valuable discussion while helping the students develop good classroom habits as they engage with the content and each other.

"The cool thing about iClicker is it does give us instant feedback about what students need the most, what topics they need the most help with, and I do focus on those," says Brandon who not only uses iClicker to ask questions and receive student feedback, but also to share information with students which they can then refer to outside of the class. "I annotate right on the side of a question as students are solving problems and send it right back to them through Reef."

Keeping the goal of active student engagement at the heart of his planning and implementation strategies for his courses allows Brandon to share the tools and resources necessary to create a classroom focused on active learning.

DR. BRANDON TENN is a physical chemist who earned his Bachelor's of Science degree in Math and Chemistry from the University of Hawaii at Manoa in 2001 and a Ph.D. in Chemistry from UC Davis in 2009. Between 2006 and 2010 he taught at both Sierra College and the California Maritime Academy. Since 2011 he has taught math and chemistry at Merced College. He is very interested in teaching developmental and introductory science and math courses utilizing an active learning approach. He has flipped every math and chemistry course he taught since Spring 2015 and continues to research best practices for the technique based on his target student populations.