Teachers, through students, can have positive impacts on the quality of life of future generations. My personal experiences have developed and shaped this philosophy over the course of my career. Purely by chance, in my first academic quarter in college, I ended up in an Introduction to Geology class with over 150 students. The course was taught by an inspirational instructor who continually challenged my thinking. I was fascinated by the material he presented and immediately knew that I had found my passion, my career, and the start of my educational journey. As my career progressed, I came to realize that my experience in that life-altering class was not unique. As the educational literature demonstrates, an inspirational and passionate teacher is important in helping students determine their field of study and career choices (Chambliss & Takacs, 2014).

One of the disheartening facts that I learned in that introductory geology class several decades ago—a discovery that has been reinforced by my research, professional experiences, and personal observations—is that humans have a substantial impact on the Earth, including its atmosphere, water systems, and biological systems, to name a few. All will have long-term consequences for future generations. In my courses, I want to make sure that every student understands and realizes this impact. The everyday choices that students make have significant effects on the long-term future and environmental health of the planet.

Today, with every new semester and every class, I try to bring my passion for teaching, learning, and science into the classroom. I have found that passion—along with real-world examples from my research and professional experiences, integrated with an active in-class learning environment—has promoted student learning and has helped students transition to a path of being a lifelong learner. There have also been a number of students who have been inspired in my classes by a particular subject (e.g., climate change and sustainability), decided to switch majors, and are now working with their degrees in those areas trying to implement change.

How do I try to make this happen? One active-learning strategy that I use in my large introductory classes is student or personal response systems—“clickers.”

Clickers are a popular technological innovation found in many lecture-based college classrooms (Boyle & Nichol, 2003; Mayer et al, 2009; McConnell & Doolittle, 2012). At their most basic level, clickers represent a convenient tool for taking attendance and increasing student involvement in large classes (Kolinkant, Drane, & Calkins, 2010). Clicker fans often claim that they are particularly suited for today’s student body, collectively known as Millennials, digital natives,
or the constantly texting “thumb generation” (Immerwahr, 2009). Generational myths aside (Bennett, Maton, & Kurvin, 2008), the pedagogical power of clickers to improve student learning is still an open question in the literature (Mayer et al., 2009; Martyn, 2007; McConnell & Doolittle, 2012).

For more than eight years, I have been teaching an introductory Resources and the Environment class in a traditional large-lecture format (the average class size is 200 students) and have used clickers since 2011. Clickers have given me the ability to poll student attitudes on different subjects as well as evaluate content-related comprehension using multiple choice and/or true/false questions. I am also aiming to address a range of open questions regarding the use of clickers in my class:

• How well do clickers work to keep students involved?

• Do clickers motivate students?

• Can the use of clickers be used to identify and address student misconceptions?

• Can faculty craft clicker questions that push students to think and ultimately learn more deeply?

Clickers allow for the collection of data in order to help address these questions and others and can also give insights on short- and long-term learning and assessment.

With my dataset, I have observed that students are not “blank slates” when coming to college. In certain areas, personal experiences or education may have allowed them to develop misconceptions (Libarkin et al., 2005; Svinicki, 1998; Thompson & Logue, 2006). I have spent the past few years trying to identify these misconceptions, teach supporting material around these misconceptions, change the misconceptions, and monitor students’ thoughts on these misconceptions throughout the semester.

With the use of clickers, I have started to identify student misconceptions of course material and to document student short- and long-term retention. As an example, I asked one class of 175 students, “Which metal is recycled in the largest quantities in the U.S.?” Approximately 64 percent of students answered aluminum, which is incorrect. After a long discussion of why iron is the correct response, the students were then asked to answer the same question again. Using their clickers, almost all (95 percent) of the students recorded iron as the correct answer. Two days later on their exam, I asked the same question again. More than 50 percent of the students still answered the ques-
tion incorrectly as aluminum. Once I had identified this as a continuing misconception, I revised my teaching of the material to include more depth and the continued revisiting of this and other misconceptions.

Data collected using clickers have identified other examples where there have been challenges in terms of changing students’ original misconceptions. The ability to change misconceptions might challenge students to think more critically and question how they think about information, potentially altering how students approach their lives, especially in relation to areas such as human population growth and resource use, environmental impacts associated with energy extraction and its use, and other areas. In collaboration with Kathryne McConnell in the Office of Assessment and Evaluation, I am evaluating how the findings align with educational research and cognitive psychology vis-à-vis how students learn and what we as educators need to do to help promote the ultimate goal of college teaching: long-term retention and transfer (Halpern & Hakel, 2003).

Although I still have a lot to learn about students and teaching in large classrooms, I feel that, with active-learning techniques like clickers, I am positively impacting and maybe even changing the lives of students. I am hopeful that my classes will inspire students to start their own lifetime pursuit of knowledge and that this educational journey can open for them just as many, if not more, doors as have been opened for me.

References


