

Lunch Summary

October 5, 2015

Topic: Authenticity in teaching

During the lunch, Dr. Ben Rottman and Dr. Tim Nokes-Malach discussed authenticity in teaching. They also had various faculty members share with the group ways in which the learning activities in their courses are (or are not) authentic.

Nancy Pfenning (statistics) – Dr. Pfenning described a situation in which a student in an honors statistics course was having trouble creating a simple 2 way table given a set of data. She noted that in the textbook homework problems, however, students are usually given the 2 way table and are asked to analyze it (“crunch the numbers”). In actual practice, statisticians are rarely given a two way table, but rather, they are asked to generate one given a set of data. Dr. Pfenning suggested that students should be given more opportunities to “crunch the words,” i.e., given the description of a situation, analyze the “words” to determine what types of statistical analyses to perform.

Sam Donovan (biological sciences) – Dr. Donovan follows a learning process of problem posing, problem solving, and peer persuasion, which is more authentic than traditional “cook book” laboratory activities. Besides spending a lot of time on problem solving, students are encouraged to think about the questions underpinning the laboratory activity and ways in which they would convince others of the validity of their results. In this process, there is a focus on undefined questions with large data sets in which students have to determine which data to analyze. Problem posing, problem solving, and peer persuasion are activities that are aligned with what actual biologists do in the laboratory.

Brian D’Urso (physics) – Dr. D’Urso is attempting to make modern physics lab activities more authentic. One way he makes labs more authentic is to have students learn techniques that they will actually use in a research laboratory (as opposed to “dumbing down” the experiment). In addition, students use equipment in the laboratory that physicists use in research laboratories. As opposed to giving students a step-by-step process, students are given definite goals but not told how to reach the goals. Students are also encouraged to explore other questions after the lab activity is completed. Dr. D’Urso also mentioned that he hopes to give students lab equipment to take home and “play with.” After this, they come to the lab course and discuss what they learned from “playing with” the lab equipment. The “playing with” lab equipment activity is authentic because most physicists learn how to use equipment by “playing” with it. All of these activities will contribute to more authentic modern physics laboratories.

Sean Garrett-Roe (chemistry) – Dr. Garrett-Roe teaches a thermodynamics and statistics course to juniors and seniors majoring in chemistry. As opposed to simply accepting the laws of thermodynamics, students are guided to prove the thermodynamic laws for themselves. Questions are set up so that students can derive the laws. As students explore, they ask further questions and develop new knowledge derived from what they have already learned. Dr. Garrett-Roe notes that this type of questioning is the essence of science and is highly authentic.

Nancy Kaufmann (biological sciences) – The authentic laboratories in biology are dealt with real research problems. The labs are tied with faculty members’ research questions. Thus, students in the biology labs are doing real research in a structured environment. Students feel like what they are working on matters, and sometimes the work can be published. Although the “big question” is already determined, students use real tools and repeat experiments many times, which is realistic in an actual biology research lab. Students also deal with “messy” data, and sometimes the experiments fail. At the end of the semester, students participate in a poster presentation, which mimics a real scientific meeting. Students have to present on their own research and learn from other students’ posters as well, which fosters authentic scientific communication.

Chris Schunn (psychology) – Dr. Schunn uses authentic learning experiences to help students engage with reading research articles. He removes the introduction and abstract from a research article. Students are given methods and results section and are asked to write the introduction and abstract themselves. They are also asked to “spin” the introduction based on different audiences (narrow audience of a research journal vs. broad audience of a journal, e.g., Nature). The quality of the conversation about the research articles is improved after students have thought about questions such as “what did I learn from this research article? Which results are the most important? How does this inform other research? etc.

During the lunch, the attendees also discussed why authenticity in the classroom is so important? Some of the responses include:

1. Motivation – students feel more invested in what they are doing and can see why it is important in the “real world.” In turn, students may engage more deeply with the course content.
2. Learning often equals doing. In many cases, it is impossible to learn something without “doing” it yourself.
3. Authentic learning hits on the major goals of a university degree (good problem solving, communicating with others, getting a job, contributing to society, being an informed citizen, etc.)

Chris Schunn noted that very little “real” science involves cookie cutter procedures. It is necessary to see the bigger picture of the entire research process. Even putting cars together requires adjustments – car technicians often follow one car along the assembly line (as opposed to doing one thing over and over, e.g., putting the wheel on). Similarly, analysis of data involves knowledge of the research question. Doing one or two of the steps from Carl Wieman’s article (e.g., collect data, analyze data) without knowledge of the other steps is like trying to put a puzzle together without seeing the picture first. This results in rote learning that is very fragile.

Another question which arose during the discussion was whether authentic learning experiences can result in transfer of learning across different courses. Can having an authentic learning experience in chemistry, e.g., result in a transfer of learning (e.g., critical thinking skills) to physics? Or is it the authentic learning experiences cause students to be more motivated and have deeper engage in the course, resulting in possible transfer of learning to different contexts?

Carol Washburn noted that teaching is a craft. How are authentic learning activities presented? She gave an experience in which she was listening to a talk about vaccines and fish (a topic which she knows nothing about and doesn’t necessarily care about), but the speaker was engaging in a way such that all audience members were intrigued and wanted to learn more. Framing authentic learning is very important. It is like telling an engaging story which motivates the students to engage and ask more questions.

Chris Schunn also noted that one fear of instructors is that authentic learning can turn out to be “nonproductive.” It is very important when using authentic learning experiences to make sure the students are supported while they are learning. Scaffolding is key. Dr. Singh also noted that, due to the time constraints of courses, it is important that the instructor ensures that students can complete authentic learning activities in a timely manner. This requires thoughtful planning on the part of the instructor (which steps of the authentic learning experience do they feel are the most important for their students?)