

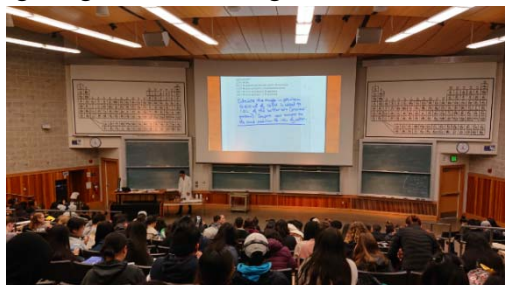
## Report on Kyoto University Laboratory for Teaching Improvement Program at UC Davis (May 11 to May 26, 2019)

The course was designed to (a) learn new concepts in higher education and (b) improve the teaching skills in the classroom including English pronunciation. Just before leaving Japan, we, six faculty members of Kyoto University (Kentaro Teramura, Naoya Nishi, Takashi Taniguchi, Jun-ichi Horinaka, Tamotsu Kanai, and Masayuki Gon), received three e-mails from the teacher Dr. Mikaela Huntzinger (Mika) about pre-course preparation. The first one provided recommendations on bringing materials with a short statement that we would have a busy schedule in Davis. The second mail said that the course would be a lot of work and then required us to do assignments by the day before the course began. The last one was about the weather in Davis, predicting that it would probably be in the high 20's and low 30's Celsius and very sunny. What she wrote in the e-mails turned out to be true, except for the weather.

### (a) New concepts in higher education

Thanks to modern technology, most course content can be moved outside of the classroom. For example, you can borrow videos, podcasts, and written material from the web. Alternatively, you can record yourself discussing lecture content and upload the video to YouTube or other video sites. Research shows that lecturing doesn't help students learn as well as other methods do. It is pointed out that teaching as we were taught is actually unscientific; we could also call it anti-scientific. Decades of scientific evidence shows that other methods of teaching help students learn more than lecturing does. One effective method is to "flip the classroom." Traditional classrooms and flipped classrooms allocate time inside and outside of the classroom differently.

The course used "backward design" as its core model. The motivation for this model of backward design comes from observations academics have made in both the US and Japan: We want to help our students to become better scientists and engineers. We want them to think critically and creatively to solve problems and improve the world. Backward design and the teaching techniques that go with it have been shown in many studies to help students become better at learning and doing science and engineering. Using "backward design" means that instructors plan their classes "backwards" from the traditional way. Backward design is goal focused – it focuses on what we want our students to be able to do, and it requires us to be explicit in our plans for getting them to those goals. In the research literature, backward design is normally stated in jargon terms, like this: 1. What are my learning objectives for my students? 2. How do I assess whether they've reached my objectives? 3. What teaching and learning activities should I use to prepare them for the assessment?



One way to motivate our students is to give them a challenge. The challenge should be difficult enough to keep their interest but not so difficult that they give up. Bloom's Taxonomy will help us plan questions for our students that will motivate them. Bloom's Taxonomy finds that we can do the following cognitive activities, from simplest to most difficult: remembering, understanding, applying, analyzing, evaluating, and creating. Remembering is recalling a previously learned piece of information, such as a formula, definition, or date. Understanding is comprehending an idea, which means being able to organize it, translate it, put it in context, or explain it in different words. Applying is using previously learned information to a new situation, formula, or context. Analyzing is breaking down a piece of information into its component parts, or identifying the causes or consequences of something. Evaluating is assessing and judging an idea and giving the reasons for the judgment. Creating is making something (a concept, a model, an experiment, a paper) that is both original and useful. Students can usually find the answers to the lower-order thinking skills online. For this reason, these questions are often not very motivating. Students know they have to memorize them for the exam, but they don't care about them much. In contrast, students usually can't find high-order answers online. These questions provide a challenge, and many students prefer them. They have to do more thinking to answer higher-order questions.

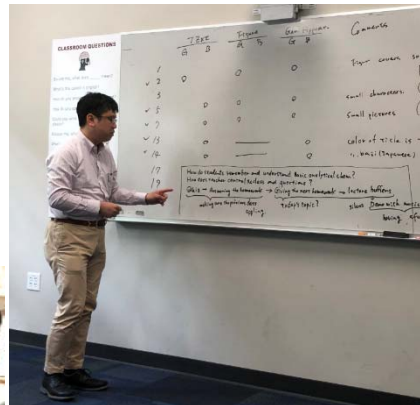


Assessing learning is one of the three central components of backward design. With traditional college teaching, assessment often means just one thing: exams. But with backward design-style teaching, assessments should be designed to determine whether our students are reaching our learning objectives. There are two main types of assessment: "formative" assessment and "summative" assessment. We probably all use summative assessment (such as exams or final projects). Formative assessment, while less commonly used, has the power to transform the way we teach for the better. The purpose of formative assessments is to provide feedback to the teacher and the students while there is still time to improve. They are done during the learning process to help both the teacher and the students figure out what they have learned so far (and what they haven't). Formative assessments are meant to happen frequently to help everyone keep on track. They include rapid feedback during class time to keep the student moving forward. Formative assessment is one of the most powerful tools we have to make sure our students are learning what we are trying to teach. It allows the teacher and the students to adjust in real time, and it gives them the immediate feedback they need to be motivated to improve.



(b) Improving the teaching skills

During the course, we experienced three short teaching demonstrations. The three demonstrations were on a single topic of each one's choice. According to the backward design, which we learned during the first several days, we needed to first decide what we wanted our students to be able to do by the end of the course. Once we knew where the finish line of the race was, we started to plan how to get there. Therefore, we should have planned our demos in reverse order, starting with our conclusion. We "flipped" our classroom by giving our "five students" a homework assignment to prepare before our lesson demonstration. We planned for enough time for students to do the assessment remembering that student work can be slow, but also that it can be the most meaningful way they can learn from us. Of course, we practiced beforehand out loud, not just in our head, in our hotel room to be able to speak smoothly and use our time more effectively. On demo days, we also participated as if we were students in the teaching demo instructor's class, using a teaching demo rubric. The teaching demos were designed to help us learn a lot about our teaching in a safe and fun atmosphere. For each demo, Mika gave us oral and written feedback so we can improve our next demo or our upcoming class. In addition, she drilled us on English pronunciations, especially on "differences between r and l", "th", "b and v", "n", and "schwa". We enjoyed the English exercises very much!



L and R practice phrases

Really weird rear wheels.  
Roy left the rice in the red trolley.  
...  
Lauren likes the low lights.  
Little Lily lit a little lamp.  
...

