Teaching Statement

Kevin Zhou

If I had to summarize my highest aim in my teaching in a single sentence, it would be to equip and inspire my students to reach their full intellectual potential. Towards realizing this aim, I have identified three primary goals in my teaching:

1. Make instruction student-centered
2. Focus on deep conceptual understanding
3. Encourage student ownership of learning

These goals are all quite complex and nuanced, so I will expand upon why I believe they are important, how I have already addressed them in my teaching, and how I plan to continue working towards them in the future.

Making instruction student-centered. For students to reach their full intellectual potential, instructional decisions must be made keeping the students' needs as the top priority. Additionally, as every student and classroom is different, proper instruction must be constantly adapating to best take into account student background, interests, and perparedness. This is most easily accomplished on the individual student level when helping students in one-on-one or small group settings. In such settings, I try to have students work through as much of a problem as they can in order to get a sense of the frontier of their understanding. This often reveals that the student's confusion originates in a more fundamental concept or skill rather than what they originally came with. Addressing the more fundamental issue then leads to better outcomes than simply fixing surface-level problems.

On a broader level, I aim for student-centered instruction through strategic and adaptive design of course materials. An example of this arose when I was a TA for an introductory computer science course at the University of Illinois Chicago, for which I had to create materials for weekly lab sessions. As an undergraduate at Carnegie Mellon University, I had taken and taught computer science courses that were designed with a certain student profile in mind. In particular, most students were traditional-aged and specifically focused on studying computer science; as a result, the courses assumed a large amount of background knowledge, were very fast-paced, and generally focused on core CS topics over broader applications. However, the student profile at UIC was significantly different, with students having a far wider range of backgrounds and goals, such as a student in her 30s who wanted to learn how programming could be utilized in her Environmental Science degree. As a result, I had to adjust the content of our weekly labs to both reinforce background knowledge and also provide a wider range of applications in the examples. As a result, the content was better able to serve the students and I saw improved outcomes compared to what would have happened if I tried to copy-paste approaches that were designed for different students.

Focusing on deep conceptual understanding. Mathematical instruction often falls into the trap of being overly focused on imparting specific skills and procedures at the expense of the concepts underlying those skills. It is not hard to see why this happens: rote memorization of skills is easier for instructors to assess and requires less intensive study on the part of the student as well. However, achieving full intellectual potential requires mastery of core concepts in addition to applicable skills. I have witnessed a lack of such mastery leading to less transferable knowledge

and impaired recall while teaching remedial algebra courses. Many students struggled with basic prerequisite skills such as adding fractions, and it was often the case that these students had previously memorized procedures for certain problems without understanding why those procedures worked. However, due to disuse, they forgot or misremembered the procedure, a problem that could have been mitigated had they originally been taught the reasoning behind the procedures.

Developing deep conceptual understanding in students is not a simple task, but there are concrete steps that can be taken. One approach that I use is to bring the underlying concepts into clear view when teaching skills. For example, assessment in calculus courses often centers around the ability to carry out certain tasks, such as computing derivatives. However, when guiding students through such skills, I place a lot of emphasis on deriving the relevant formulas and procedures and describing what each of the terms and steps represent, coupled with graphs and illustrations to help students develop a clearer mental picture. In doing so, I hope that the students do not treat it as an exercise in rote memorization of a formula, but instead have a strong grasp of the underlying idea and can re-derive the formula even if they can't perfectly recall it from memory. On a broader scale, such emphasis can be incorporated into course design by ensuring adequate assessment of fundamental concepts, such as by asking students to explain or re-derive certain procedures.

Encouraging student ownership of learning. It has been my experience that students only thrive when they are fully bought into the learning process and are able to take the lead on their learning. Furthermore, buy-in tends to arise when two conditions are met: first, students believe that what they are learning is worthwhile, and second, students feel that they are in a supportive but flexible learning environment. To help students see content as worthwhile, I focus on why material is interesting in its own right, as well as how it is relevant to the broader intellectual landscape. This can take the form of highlighting interesting applications during lectures, or can be more systematic in the form of strategically choosing interesting topics when designing curricula. For example, when teaching a supplementary workshop for an introductory proofs and discrete math course, I chose to spend one class exploring combinatorial games. Though this is not typically taught in such a course, the session was extremely enjoyable for the students and also gave them a somewhat different perspective on proofs compared to what they had seen previously. Another way I strive to encourage student ownership of learning is by creating an environment in which students feel that they are well-supported. When this happens, students become more confident in engaging with the material on their own, since they have the assurance that there are resources available to them to assist them when they encounter difficulties. On an individual basis, I accomplish this by inviting any and all questions and responding to each question with the same level of care and thought. On a broader level, I strive to provide as much supplementary content as possible, such as recording pre-lecture videos that briefly reviewed previous content when I was giving online lectures for a remedial algebra course during the COVID-19 pandemic.

There are many more strategies and techniques that can go into effective teaching, but at the end of the day, all such efforts must be in service of seeing students thrive. This is the benchmark by which I assess my own teaching effectiveness, and I hope that what students take away from all my efforts is that I care about their success just as much as they do.