Teaching Statement

JASON SAIED

As a teacher of mathematics, I believe that my highest priority is to help students learn problem-solving skills and gain a conceptual understanding of the main definitions and results. In my opinion, the most effective strategy for achieving these interrelated goals is to engage the students using active learning techniques. I believe I have been successful so far, with consistently positive teaching evaluations.

Problem-solving skills. I believe that the most important goal of mathematics education is to teach critical thinking and problem-solving skills. Every student, regardless of whether they ever use the particular theorems from my course, will need the ability to consider a problem, generate strategies for solving it, evaluate each one’s success and using what they have learned in order to decide what to try next. In Rutgers calculus courses, these skills are directly practiced during the “workshops” for which I have been a teaching assistant, in which students work on challenging problems in small groups. When speaking with students who are having trouble on a given problem, rather than giving them a hint or explaining how I would solve the problem, I ask them to walk me through their problem-solving process step by step. When they decide to use a particular technique, I might say, “Good idea: what about this problem made you decide to use that method?” When they are unsure what to try next, I ask them what other techniques they have learned and why each one would or wouldn’t be helpful in their situation. If students feel overwhelmed by a question and do not know where to begin, I try to help them take a step back and think about the meaning of the terms being used so that they can better understand what is being asked. I believe I have successfully implemented these techniques, as demonstrated by these quotations from my Math 151 and Math 152 teaching evaluations:

“It was very helpful when he made students go over problems they were stuck on step by step so they could see what they were supposed to do.”

“Jason Saied has helped me gain more confidence when it comes to problem solving. He taught me to approach problems in a way where I do not have to fear them even when I am initially confused.”

“I learned how to think critically and problem solve more effectively.”

Further, in all my classes, I make sure to model these problem-solving skills while doing examples at the board. Rather than simply using the ratio test to show that a given infinite series converges, for example, I will explain (and write down, so the students know it is important) why I am using the ratio test and what features of the problem make it appear to be a promising choice.

Conceptual understanding. I believe that the most effective way for students to learn mathematics and solve problems is for them to gain a conceptual understanding of the main ideas, rather than memorizing facts and algorithms. For example, I am much more interested in whether a student knows what the inverse of a matrix is and how to use it than whether they can successfully calculate such an inverse by hand. This is particularly important in linear algebra courses, in which there are only a few main algorithms but a large number of important new ideas. Therefore, when I teach linear algebra, I begin nearly every class meeting with a “vocab quiz.” in which the students are asked to give the definitions of important concepts or solve very simple problems that require them to apply a definition (with little to no calculation involved). These quizzes, which are designed to be low-stakes and are graded generously, are intended to encourage students to think about what the concepts mean and how they can be applied.
Further, in my lectures and review sessions, I try to emphasize the connections between the various ideas in the course and how one can derive important formulas from a conceptual understanding instead of memorizing them. For example, if I need to calculate the derivative of an inverse function in a calculus class, rather than stating the typical formula, I will first ask a student for the definition of the inverse, then take its derivative to review how the formula arises. The following are relevant comments from my Math 250 (linear algebra) courses:

“Vocab quizzes reinforce the concepts of what I learn.”

“I liked how Jason was able to break down the concepts in a simpler manner. All of the theorems that we have to learn for this course can be overwhelming, but Jason was able to properly teach us how to apply these concepts computationally and theoretically.”

“I liked how the instructor went into depth about concepts with proofs instead of simply doing computations. However, I also really appreciated how he considered all student’s needs and found a middle ground for both me and the other students who don’t enjoy proofs.”

Active learning. In order for a student to effectively learn problem-solving skills or gain a conceptual understanding of mathematical ideas, I believe they must be actively involved in the learning process and get a great deal of hands-on practice. As mentioned above, this is already built into the structure of Calculus I and II at Rutgers, where I have worked as a teaching assistant for “workshops” in which students solve challenging problems in small groups. Further, during my linear algebra courses, I chose to integrate a workshop period into the middle of each class meeting, so that the students had time to work on problems during class with me and other students present. The problems would be related either to the material we had just covered, giving practice with new ideas and types of problems, or to the material we were about to cover, helping them understand the motivation for the main concepts. I encouraged students to talk to me and to one another about these problems, and I went from student to student in order to check in, clarify definitions, and ask guiding questions as necessary in order to help them progress in their understanding.

“Workshops were very helpful to practice and apply what was learned in class. Group discussions helped to tease out answers and improve learning.”

I am interested in taking these ideas further and employing inquiry-based learning (IBL) in the classroom, which I see as an ideal synthesis of problem-solving, conceptual understanding, and active learning. I have practiced inquiry-based learning during two summer mathematics programs for high school students, MathILy and the Rutgers Young Scholars Program, and each required a different balance of investigation and direct instruction. In particular, at the Young Scholars Program, I integrated more direct instruction because of the shorter timeframe (only one week). I believe that these two experiences gave me useful experience in implementing IBL techniques, and that having experienced both will aid me in applying these techniques in a university setting, where courses tend to have a fixed curriculum that must be covered in a given amount of time.

Conclusion. My goal as an instructor is to teach problem-solving skills and encourage a conceptual understanding of the course material using active learning techniques. In the future, I hope to grow as an instructor by teaching both upper- and lower-level courses, improving my use of active learning techniques, and implementing inquiry-based learning in a classroom setting.