Teaching Statement
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My teaching philosophy with respect to mathematics and mathematics education courses is deeply rooted in what I perceive to be the nature of mathematics as a subject and how I believe one may learn a subject of this nature.

Teaching Mathematics Courses

Mathematics is concerned with the study of structures and relationships among structures. These relationships are explored through the means of a collection of inference tools. Thus, from a collection of statements that are taken to be true, one can prove the veracity, falsity, or independence of new statements. It is this view of mathematics as a complex web of logically-connected concepts that I want my mathematics students to explore. To this end, I strive to introduce new concepts through a problem-solving approach: using already-introduced concepts, I challenge the students to work on a problem (individually or in groups) whose solution highlights the need for or usefulness of a new concept and suggests a natural definition which can then be formalized. However, as student explorations of a problem of a novel type take time, I recognize that time restrictions do not allow for this approach to be used for introducing every single new concept. For this reason, throughout a course I mix this approach with a more traditional one, where I directly present the rationale of the need for the new concept. Whether using the former or latter approach, once a concept is defined I like to challenge the students to find examples or non-examples for it, which can bring a sense of tangibility to the more abstract concepts.

Another goal I have for my students in mathematics courses is to develop a sense of ownership for the mathematics they learn. I consistently challenge students to explain how they know a statement used in an argument is true, or what inference rule allows them to claim a certain statement follows from the preceding ones, or how they decided to use a certain proof technique for a problem of a type that had not been encountered before; answers of the type “It says so in the book” or “You told us that 3 days ago!” are not considered acceptable. I believe that creating a learning environment where one needs to provide justification for all aspects of an argument helps students in developing what Richard Skemp calls relational understanding (which requires that one understands how a procedure was derived, what the necessary conditions for applying it are, and how to apply it or adapt it to a variety of problems). Without this type of understanding, a student cannot produce a solution to a problem whose type has not been already discussed by the instructor, not to mention that learning (if it can be called that) would be reduced to memorizing concepts and procedures as disconnected entities, which is much harder to do than anchoring each new concept to existing ones.

Teaching Mathematics Education Courses

When I teach mathematics education courses, I regard my students first and foremost as students of mathematics, and secondarily as students interested in the teaching and learning of mathematics. For this reason I often assign mathematics problems in math education courses, either to be solved individually for extra credit or to use them as a springboard for future discussions regarding ways to introduce new concepts. These problems are usually formulated using K-8 concepts (especially if the students are training to be elementary school teachers), but
are of types that the students are not likely to have encountered before. Apart from sharpening my students’ own problem-solving skills, I believe these problems help them develop a view of mathematics as a subject in which imagination, creativity, and discovery are not only treasured but often necessary to progress on a task. As an instructor of “Teaching Mathematics in the Elementary School”, I started each class with a problem of the type described above, which the students had about half an hour to solve while working in groups. I would then lead a whole-class discussion of the solutions found by the various groups, highlighting the many types of representations employed or the various types of reasoning used in tackling the problem. The task often contained concepts pertinent to the topic scheduled to be discussed that day, thus allowing me to smoothly transition into the main topic for that class.

Informal Assessment

Activities such as the one discussed above allowed me to assess my students’ mathematical and pedagogical knowledge in an informal manner. For example, when I planned to discuss the teaching of fractions at elementary school level, I started the class with a not-that-trivial fraction problem that required good conceptual understanding of what a fraction is. After discussing the solutions proposed by the students, I challenged them to formulate what they thought were typical 5th grade solutions to this problem, and thus launched into a discussion of typical misconceptions about fractions that elementary school students might have, and ways to address them. Another way in which I assessed my students’ prior knowledge was to ask them to summarize the elementary school topics discussed up to that day, and then ask for suggestions on how to introduce a new topic assuming that an elementary school student had a good understanding of all the topics we had already covered. One other way I conducted informal assessment involved letting the students express opinions on the validity of a peer’s answer, before offering my own comments on what the first student proposed.

Formal Assessment

Regarding formal assessment (in the form of papers, midterms, or final projects), I believe it is extremely important to design a syllabus where one’s expectations for the course are clearly outlined and how the grade is computed is detailed. While I try to be flexible and understanding with respect to each student’s individual circumstances, I also need to ensure all students are subject to the same expectations for the course. With mathematics education, where there is no universal agreement on what constitutes good teaching and a statement may not have an objective truth value, I feel students are more likely to feel wronged by a grade than in a mathematics course. I was faced with such situations in the past and learned that talking in detail about my expectations for the course and for each assignment at the beginning of the semester greatly reduced the number of such complaints.

One More Thing

Last but not least, I believe that one essential ingredient to good teaching is caring about your students’ learning and well-being and more importantly, finding a way to let your students know that. There is no silver bullet for the latter part, as how to accomplish this depends greatly on one’s personality and teaching style, but I have no doubt that a student who sees the instructor as someone who is “there to help” as opposed to “there to punish” is much more likely to develop a positive attitude towards the course and consequently, towards the subject taught.