

Teaching Statement

Wei Guo Foo

Institute of Mathematics
Academia Sinica, Taipei, Taiwan.

An educator who decides how to teach mathematics to students will have to grapple with the epistemological question of how should one understand knowledge. Is knowledge a priori, being independent of experience, or is it a posteriori, being necessarily bounded by experience? This will determine whether the educator, at one end of the spectrum, chooses to develop abstract theories from a fixed set of axioms, or whether at the other end of the spectrum, he computes only examples without making much references to theoretical understanding.

My preferred approach would be to find a balance between these two extremes, but if I were forced to choose only one of them, I would choose the latter. This is more assuring in equipping students with tangible skills that will allow them solve real-life problems, than to merely cultivate in them deep understanding of certain theories which may not have any application. It is my personal belief that a university graduate on the job market must be able to convince recruiters with his/ her technical competencies.

The goals of university education for the students are to develop critical thinking skills and to find learning approaches that will suit them best, but on the basis that their fundamentals are strong and solid. Hence I feel that the most basic duty as an educator is to make sure that they build their foundations during the students' formative years of their undergraduate education, before encouraging them to venture into creative works. In addition, although I wish to show the beauty of mathematics to the students, it should not be done at the expense of making students master useful mathematical techniques.

During the last year of my Ph.D., I took up 192 hours of teaching duties, and I noticed differences between hands-on and hands-off approaches to teaching. During the first semester when I was a tutor of calculus class, I was advised to let students think through the questions on their own, and to guide them only when necessary. I observed that this method works for highly motivated students and there were only a handful of them in the classroom. Hence, it was difficult for me to tell if the rest of the class had understood the lessons, or they were simply uninterested. I decided to switch to hands-on approach when I was a tutor for linear algebra courses in the second semester. During each lesson, I did every single question on the board as if I would do them myself on the piece of paper, while verbalising my working calculations. Students at the end of the semester would see that there is a certain repetitiveness in the methods, and that was when I knew that they had learned something, a goal that I had set to achieve at the beginning.

I had also undertaken one semester of lecturing duties for a mathematics bridging module catering to arts and humanities high school graduates who are keen to do sciences in the university. At the end of the semester, I have learned that the interactive roles between

the students and the instructors have to be made clear. Students have to be reminded that it would be in the best of their interests to do their readings before each class and to revise their materials afterwards. They are encouraged to take responsibility for own learning by asking questions whenever they have doubts. The duty of the instructors on the other hand is to present the lesson materials in a way that is clear and understandable to everyone. While I do not expect all students to be born genius, but I do require them to put in considerable amount of effort, and to work well with the instructors, as well as with each other.

In the light of increasing digitalisation of every aspect of life, especially in Singapore, I would be expecting to adapt my teaching styles to this trend. Indeed in my current research on the equivalence problems, many computations were done with the help of computer algebra systems such as MAPLE. The use of computing softwares might be incorporated into classroom pedagogy some time in the future, and when that happens I will be prepared to do so. Moreover, I am receptive to the idea of teaching mathematical aspects of Artificial Intelligence and Machine Learning to the students whenever given the opportunity.

In conclusion, a student has every right to expect the best out of his university life, given the fact that he has chosen to invest his time and resources on obtaining a university degree in lieu of having a work experience. It is therefore natural of him to hope that the opportunity costs he incurs by committing himself to a four-year bachelors degree programme would eventually serve him well on the job market at the end of his training. It is for this reason that I will strive my best to deliver the best teaching quality to the students by constantly learning new skills and techniques, and adapting my teaching styles to new trends, for the benefit of the students.