Teaching Statement: Chung Yin Amy Pang*

When I step into a mathematics classroom, I have two goals for my undergraduate students: to develop a conceptual understanding beyond the computations, and to be able to express their ideas precisely in the mathematical language. I believe the most effective way to achieve these dual objectives is through collaborative problem solving. My favourite recitation sessions are those where students clarify their confusions through group discussions, with minimal nudging from me. I once began a discussion on dimension by asking whether vectors in a four-dimensional subspace are usually expressed in the form (x, y, z, w). A show of hands indicated that half the class thought this was true, and half thought it false. After both sides explained their reasons, the entire group correctly concluded that my statement was false, since the ambient space may be of dimension higher than four; furthermore, they had discovered during their conversation that four basis coefficients are sufficient to specify such a vector.

Active participation is equally important for my second goal of writing rigorous statements. In my experience, students rarely catch the subtle differences between an "if" here and a "then" there solely from watching my demonstration. So, to train good proof-writing, I ask a volunteer to present his or her solution at the board. Then I invite the rest of the class to point out any parts that they find confusing, and suggest ways to improve the language linking the mathematical expressions. This process forces the student presenting to think hard about what he or she is trying to say, and how to best convey it. In lower level classes such as introductory calculus, I use the same method to discipline the correct usage of equals signs.

No two groups of students are the same, and part of the teacher's job is to gauge the reaction of the class and adapt during the term to help them learn best. A personal experience that best illustrates this is a mid-quarter evaluation where half of my recitation group demanded harder problems, whilst the other half complained that the level was already too difficult. Thereafter, we spent less time discussing solutions as a single class. Rather, they worked in pairs on questions of their choice from three difficulty levels, occassionally asking me for pointers. This change of approach proved popular with the group, with one member commending that I "provided problems to help us figure out what we should improve on".

Besides an effective use of class time, the success of a mathematics course depends on well-constructed assessments and smooth logistics. To gain experience in these areas, I voluntarily wrote exam questions on top of my role as "administrative teaching assistant" in my last quarter at Stanford. One of my questions asked if a linear transformation which permutes a set of basis vectors is invertible. This tested whether students understood the notion of invertibility beyond testing for a non-zero determinant. In more straightforward, computational, questions, I made sure the arithmetic was easy, so students are rewarded for applying the correct procedure, and accuracy is less important. On the administrative side, I came away with a list of decisions to make before the start of term, such as a policy regarding schedule conflicts with exams, and the distribution of grading and administrative tasks across the teaching team.

Sharing mathematics always brings me immense pleasure, whether it's introducing my research topic in a graduate class, or helping a math-anxious freshman conquer a volume-of-revolution integral. I look forward to teaching in these and many more settings in my career.

*My teaching evaluations are available at `http://thales.math.uqam.ca/~amypang/PANG_teachingevaluations.pdf` or `http://amypang.github.io/PANG_teachingevaluations.pdf`