

Teaching Philosophy and Experience- Arielle Leitner

0.1 Philosophy

Students need to develop the capability to solve problems innovatively, connect concepts, and communicate well. I think students best acquire these skills in an open, flexible learning environment, with room for varying abilities, which allows them to truly *own* mathematical ideas and to interact with mathematics as a creative, evolving body of knowledge. My goal as a teacher is to *facilitate* student learning by providing adaptable classroom activities which promote this internalization of mathematical concepts and give a rich context for engaging with mathematics at different levels.

In my summer calculus classes I engage students with active learning. We start class every day with an ‘instant warmup’ to review an idea from the previous day or introduce a new concept. We have group quizzes twice weekly, and my goal is to never lecture for more than 15 minutes at a time without giving a ‘check in’ question, so students can see if they are following the ideas. It is important not just to create new mathematics, but also to communicate it effectively. Active learning experiences encourage students to clarify their thinking and to take responsibility for the material. For example, I often employ a ‘jig-saw’ activity in which each student in a group is responsible for understanding a problem and communicating it to a new group of her peers. I find that putting an idea in my own words and explaining it to someone else is one of the best ways to crystalize it in my mind. When I have my students do this and listen to their explanations and ideas, it is the best gauge for how well they understand the material. Explaining an idea to a friend helps a student to clarify her thinking- her friend may be confused about something she didn’t realize she hasn’t completely understood herself! I have found that when a student is responsible for explaining an idea to someone else, he takes more responsibility for his own understanding.

In my 10 years of experience working with calculus students at various levels, I have found that rephrasing student ideas and asking them to explain their thinking are among the best ways to help students learn. My goal for my students is that they will accept an answer as correct not because I said so, but rather because they are confident that their arguments lead to the solution. I often ask students to explain their answer, *even when it is correct*, to help them learn this skill. I try to ask questions to get students to connect computations and concepts. For example, in linear algebra: how did you know to use two free variables, s and t ? Why not just one free variable? What geometrical object is your solution space? How does this relate to the system of equations you were solving? Is this like any of the other examples we did today? Can you explain this idea to your friend?

My focus for the students is not on computing the answer, but rather on understanding why it should be the answer and why a piece of mathematics is true. I don’t want to create automatons who use formulas without a hint of what is going on. I aim to create critically thinking individuals who have mathematical reasoning skills to attack a variety of problems and the communication skills to convince others of their reasoning. In the age of technology, where computers can solve problems in milliseconds, we need critically thinking individuals who can formulate problems clearly. I wish my students to excel as innovative, logical, tenacious, and communicative problem solvers.

I facilitate the creation of these mathematically minded individuals by fostering an open

learning environment. I try to help my students focus on the reasoning behind the answer and internalize big concepts. I see in my students the future of our planet (or perhaps future engineers of a bridge I might someday drive over). As such, I aim to foster critical mathematical thinking, open analytical discussions, and self-reflection through active learning.

0.2 Experience

While at UCSB I was a teaching assistant in a wide variety of undergraduate courses ranging from calculus to upper division math. I had the opportunity to instruct my own course four times. I received consistently high student evaluations, and two teaching awards while at UCSB. I was selected to run departmental teaching assistant training, and also campus wide training for summer graduate student instructors. I also experimented with different methodologies such as inquiry based learning. Since moving to Israel, I have been teaching in Hebrew. I ran an undergraduate research project at the Technion in summer 2016, and in spring 2017 I was a teaching assistant for linear algebra (in Hebrew). This fall I am a lecturer at the Technion (in Hebrew).

0.3 Student Evaluations

Here is what my students thought of my teaching:

“What makes Arielle a truly exceptional TA is her commitment to our learning. One of the main purposes of this class is to not only find the answers to math problems, but also to understand why and how something is the correct answer. Arielle pushes us to make connections between various concepts, and expects us to think about math in ways we never have before. She seeks to fully understand our questions during discussions, and knows when to take a step back and let us discuss our ideas with each other. I have never had the opportunity to work with someone so encouraging and helpful before, and look forward to the remainder of my quarter with her.” UCSB Math 100

“Arielle had an eagerness to help us learn more, to expand our horizons. She continued to display this trait in the classroom: often, after finishing a problem assigned to our group by our professor, Arielle would stop by our table and ask a question.... Many of her questions were about topics that were eventually critical to understanding the section, other questions were simply thought provoking. If we were ever stumped by a particular concept, she gave hints that led us in the right direction, and if necessary, clear and concise answers for us.” UCSB Math 4BI

“She always emphasized that I understood the path to the answer and then understood the answer. For me, Arielle’s most distinguishable quality as a T.A. was her approachability: when I was confused and frustrated I always felt comfortable asking her questions. ” UCSB Math 4BI