Teaching Philosophy
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Mathematics is an important tool in our expanding world, and yet, we still often hear from our students that “math is boring” or that they are just “not math people”; working to change such perceptions is central to my teaching focus.

Mathematics is a powerful lens that offers a unique and interesting view of a myriad of real-world phenomena. I look to understand my students’ perspectives in the hopes of fostering meaningful discussion about how mathematics fits into their lives. Encouraging students to see how the mathematics we learn connects to their interests and aspirations, I believe, provides them with a powerful source of intrinsic motivation.

I challenge students to question the mathematics we discuss by posing them a simple question: why? This encourages students to engage more deeply with the mathematics and, hopefully, offers them a glimpse into how it may relate to their own lives. As an instructor for a large first year class, I have had the opportunity to put this mentality into practice with a cohort of life science students. In my experience, this group of students is typically mathematically discouraged; through their previous experience, they have grown to view themselves as “non-math people”. To inspire students to reconsider these self-perceptions, I redesigned the course in question to emphasize how the mathematics we learn directly connects to their future undergraduate and post-graduate lives. One of the ways to accomplish this is by framing concepts in terms of models of biological phenomena and focus on the real-world applications. Students seemingly reflect on these connections, and enjoy their time with mathematics more.

I have developed a keen interest in how problems-based and active-learning techniques can be implemented in the mathematics classroom. These learning practices are effective pedagogical tools for getting at the essential question of “why?” that is central to my teaching philosophy. I also believe that, just as in other sciences such as biology or chemistry, there is a place in the mathematics classroom for experimentation and play. Rather than blindly accepting the content, these types of activities encourage students to discover the material for themselves, promoting a deeper understanding. To engage students as active participants, I incorporate clicker questions which provide instant feedback and promote peer-to-peer discussion. By allowing students to first answer on their own, and then discuss with a partner and answer again, we look to mirror the research process that they are likely to encounter in the future. I try not to focus so much on the correct answer, but rather on the process of how we get there. To compliment these tools, I believe there is still an appropriate time and place for a traditional style of lecturing. Lecturing is best used, in my opinion, to consolidate the learning we hope the students have already gained from the activities we have just done.

In my classroom, I look to promote a community-centred learning space. Students often work in groups for assignments, and in-class activities. By doing so, we emphasize the importance of collaboration between peers and cultivate effective mathematical communication. When working in a group setting, students strengthen their own understanding by reflecting on the content, and assisting peers in their own learning; these types of interactions are instrumental to the development of self-efficacy and a growth mindset.
The attainment of a growth mindset is of the utmost importance in a mathematics classroom, especially for non-math/non-science majors (although, math/science majors are equally benefited when developing a growth mindset). This concept of perseverance and non-stagnating knowledge is a difficult notion to embed in “non-math” individuals, as their educational experience, thus far, has taught them otherwise. To best serve the students in their own growth, I train my teaching assistants to help promote this key concept. Our teaching assistants are front line experts, in many ways, and when allowed to be active members of the classroom or tutorials, they are able to transfer additional skills that we, as instructors, may have missed. I push my students to reach past their preconceived notions of themselves and be willing to fail. By doing so, we teach our students the importance of growth and that there is always opportunity to be better.

My viewpoint on assessment has shifted in the recent months. With the switch to online learning, for most, I believe that our “traditional” assessment approach is hindering learning, and does not accomplish the goals that it sets out to meet. Through research, reading and conversations with a variety of colleagues and peers, I have become a champion of the “ungrading” model for undergraduate, task-based courses (something like first-year calculus, for instance). By setting a list of standards, we are able to track student learning directly; enforcing a policy on the number of standards a student must master to indeed master the content. This model of assessment has shown to increase student learning, and indeed allow students to develop perseverance through their struggles. The model often offers a variety of opportunities for students to resubmit work, if they did not “master” the content initially. This allows students to reflect on and communicate their misunderstandings and improve as mathematicians. I strongly believe that this model of assessment is the best practice for junior undergraduates.

This “ungrading” model, of course, can be implemented anywhere throughout an undergraduate mathematics program, but on occasion it may not fit the mold perfectly. In this case, I tend to favour the use of formative over summative assessments. By offering students constant opportunity to reflect, they are able to grow as mathematical thinkers. In assignments, quizzes or check-in conversations, I try to incorporate a real-world problem or issue as much as possible, allowing students to be team members in this scientific exploration. I also dedicate time in each assessment to allow students the opportunity to grow as effective communicators of science and mathematics. Often communication ideas, in a mathematical sense, is quite difficulty for our students. I look to bolster this ability by focusing on how to appropriately explain their reasoning, not only to me or their peers, but to a lay audience. Summative assessment, much like lecturing, still has a place in a mathematics classroom. However, I believe by shift the focus to large, memorization-based test and exams to a multitude of “check-in” assessments, we alleviate student stress. In turn, by providing multiple avenues to success, we encourage our students to become more involved in their learning.

Throughout all I do as an educator, I strive to stay student-focused; I provide every opportunity I can for my students to grow as mathematicians, scientists, and people. We often discuss primary literature, on-going events, and the mathematics that is present in all of it. By engaging the class in pertinent mathematical discussion, I hope to ingrain the importance and practicality of content we have discovered throughout the course. To assist my students within the classroom, I develop a list of learning objectives in collaboration with my students. Additionally, to eliminate the need for a conventional textbook, I have in the past created a set of comprehensive, pre-populated notes and practice problems. This style of content delivery has been shown to improve student focus and allows me, as the instructor, to go more in-depth with examples, as well as concentrate on the
aforementioned mathematical discussion. I strongly believe in the use of free and accessible litera-
ture in the classroom, as it reduces the financial burden placed on the students. This comes with
a caveat that any open access materials should be vetted properly by the instructor, or developed
by the instructor with student learning in mind.

Teaching is a central, enjoyable and inspirational part of my life as a mathematician. Students
are truly a joy to be around, and seeing their faces as they succeed in such a conceptually difficult
field is amazing. Each time I teach, I learn just as much from them, as, I hope, they learn from
me. I truly believe that education is a team effort between myself and my class. All-in-all, being
an educator is the most rewarding undertaking of my life.