Teaching Statement
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Mathematics is a social science that requires students to engage with concepts as a cohesive social unit. While bigger class size is typically seen as a barrier to good learning, I choose to view having more students as an opportunity for creating a more diverse community. Creating an environment for students where they feel comfortable sharing their ideas and being creative is important. Further, developing confidence in students to approach novel problems is key to lifelong success. Emphasizing these strategies in courses I teach moving forward will benefit my future students. In total, I believe students learn best in a diverse and welcoming community by completing rich tasks.

Building a sense of community in a classroom is very important, especially at the beginning of a course. Without a sense of community, students often feel alienated and would be less likely to feel engaged. In fact, the Community College Survey of Student Engagements (CCSSE) predicted classroom success via measuring student engagement [1,2]. Giving students a welcoming space to engage in classroom activities can be accomplished in many ways.

One key method for building community is to learn student names as quickly as possible [2]. This helps give each student a sense of identity and communicates that the instructor truly cares about them. It also allows the instructor to hold their students accountable. For example, this past semester I had students write down their names and some facts about themselves on notecards, and used these to study and memorize my student's names. This then allowed me to call on specific students for questions and to 'voluntell' people to share out at the board in front of the class.

Another helpful strategy to increase student - student bonding is to encourage students to share contact information [2]. This is especially important early on in a semester, because it paves the way for collaboration outside of class, and those students can use each other as resources. Even something as simple as sharing notes when someone misses class can help keep people on track. In my experience, this helped decrease the amount of things on my plate for teaching, especially when students had to miss class, because they were able to ask their classmates for help.

According to the 2022 CCSSE Benchmarks, roughly 80% of respondents reported having shared ideas from class with others outside of class, while only 20% of respondents reported having helped other students within class [1]. This is not surprising considering most students will be more confident explaining an idea to someone not in the class than a fellow student. While "research in education and cognitive development confirms that the process of explaining can foster learning" it is important to increase the amount of student-student explanation in the classroom [3]. Giving students ample opportunities to explain their thought process and even to challenge the thought processes of other students leverages the sense of community to further student learning.

One other key component to a successful classroom experience is the incorporation of rich tasks into the instruction and assessment materials. Typically rich tasks are open-ended,

require complex problem solving skills, and develop student autonomy [2]. Creating an open-ended task makes a task rich because it allows students to creatively problem solve. When there is not a specific right or wrong answer, it frees students to think outside of the box and not learn a rote process. Open-ended tasks are also important for preparing students for the real world, because this closely mimics the open-ended nature of applying mathematics to real life situations.

A nice example of an open-ended task is to have students watch a recording of a formula-one speedometer as a racecar travels around a track, along with a timer, and asking the students to estimate the total distance of one lap around the track. Estimating the distance forces the students to relate the pieces of information they are given to the concepts they have learned in class related to instantaneous rates of change, especially the relationship between distance and velocity. It also forces the students to strategize and perhaps split up roles within the group. It might make sense to have one participant writing down speed at different times, another participant writing down the time the speed was sampled, and another student deciding when to sample and giving the other students a signal of some sort.

A task that is open-ended but does not require complex problem solving skills will not contribute much to student growth. Keeping in mind that these tasks are intended to be guided, it is appropriate to choose tasks that a student would struggle to do by themselves, but can accomplish with help. This help could come in the form of student collaboration or from the instructor themselves. Loosely speaking, such a task would be considered within the Zone of Proximal Development (ZPD) [2].

The main purpose of implementing such tasks in the classroom is to help students gain confidence. Building intuition and the ability to solve types of problems they have never seen before helps students be successful in life. Not only is it possible for people to solve novel problems, but we have an obligation to teach those around us to solve novel problems, including the students in our classrooms. The contradiction is that while students will only be in the classroom for a short period of time, they will become lifelong learners. In this sense, a course and the tasks included should not only teach students a baseline of concepts, but should also prepare them to independently learn new things beyond the classroom.

I know I have succeeded teaching a class when I have established a community and guided the students through rich tasks. While these are not the only concepts contributing to student centered learning, they are what have resonated most with me, and are what I will focus on implementing the most in my courses moving forward.

Citations:

[1] (2022) *Community College Survey of Student Engagements- 2022 Cohort 2022 Benchmark Frequency Distributions.* CCSSE.

[2] Martha, L. & Abell, M. L. & Braddy, L. & Ensley, D. & Ludwig, L. & Soto, H. (2018). *MAA Instructional Practices Guide.* MAA Notes Series, 89.

[3] Williams, J. J., & Lombrozo, T. (2010). *The Role of Explanation in Discover and Generalization.* Cognitive Science, 34, 776-806.

Murphy, G. L., & Allopenna, P. D. (1994). The locus of knowledge effects in concept learning. Journal of
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