

As a math teacher it is my responsibility to challenge and support my students in pursuit of three learning goals: (1) understanding the foundational concepts and ideas; (2) developing their problem solving and critical thinking skills; (3) learning to work collaboratively. To realize these goals, it's teachers' responsibility to invoke students' interest and enthusiasm towards math.

Foundational concepts and ideas are essential to learning and will greatly benefit students in their future life. Especially when I teach undergraduates, part of the homework is designed to increase the mathematical dialogues among the students. This process helps students realize the areas where they themselves understand or do not understand the concept. Students liked this part of homework as it improved their understand and ability to communicate mathematically. Further, it is very helpful to be able to represent and interpret a concept verbally and visually. In geometry class and probability class, pictures and colorful drawings helped the students see the higher dimensional geometric world out of the two-dimensional blackboard and interpret the abstract concepts in a concrete and vivid way, which increases their understanding of the concept.

Teachers are not simply passing knowledge, but helping students realize their potential and teach them how to learn. Teachers should not tell the students all the knowledge they know but help them find it themselves. As I introduce new concepts, I always ask the class to think about the new concepts and help them think what kind of problems the old theories cannot solve and why we expect a new one. When students ask questions, first I give proper hint, ask a motivating question to help them think and wait for their response. If they still look confused, I figure out what frustrates them. Usually it's because they don't understand some basic concept or definition deeply enough. Then I go back to that concept and reinterpret it for them. I encourage students to think about the initial problem again. In addition, for different students, teachers should use different strategy. For instance, when I help students to understand a math formula, for those students who are not used to abstract symbols, I try small numbers in the formula and then extend to the general case; and for those students who have a more rigorous mathematical thinking, I provided them some hint to prove the formula themselves.

Collaboration is very important inside and outside the classroom. The students in my class are of different majors, engineering, economics, social sciences, business, mathematics, etc. Math may have different faces to them and they have different

perspectives on math. When they work with group members, they can share minds with each other and learn to think mathematically together. In the “Ideas in Geometry” class, after I showed them how to glue a soccer ball using pentagons and hexagons, I provided some magnetic polygons to each small group to glue as many different polyhedrons as possible. Each student learned different constructions of polyhedra from their group members and started to see the geometric nature behind them. When there was no vivid discussion inside a specific group and all the members were just working on the project by themselves, I raised questions related to the project to encourage them to discuss and explain what they knew to other members. And when there were shy students, I talked with them more frequently than with other students and grouped them with their friends at the beginning of the semester. After several weeks when they felt more comfortable with class discussion, I grouped them with other classmates. The teacher’s role during the discussion is like a conductor in an orchestra who organizes different instruments to make harmonic music together.

Finally, teachers should invoke students’ interest and engage them to put their best effort into class and into life. The first step is to communicate with and understand the students. At the beginning of my first standalone class, “Ideas in Geometry”, I assigned an essay for the students to write about their interpretation of math and their math experience. Most of the students expressed an interest towards math even if they thought it was difficult. Later in the semester when we were discussing and designing tessellations, many said it was the first time they realized that math is great art.

I believe each student has their own math gene and it is the teacher’s responsibility to explore it and bring the best out of them.