TEACHING OF MATHEMATICS
A PHILOSOPHY

TANLEY BROWN
SENIOR SEMINAR
Introduction

Because mathematics is a way to describe the world within which we live, it is important for students across the United States to have a firm grasp on the intricacies of the subject. This being said, that understanding should transcend simple rules and theorems, instead including practical applications and problem-solving abilities. As an educator, there are many different strategies which can be used to help students flourish into everyday mathematicians. However, no teacher is able to complete the necessary groundwork for each individual student, and thus students and teachers must work in tandem to achieve classroom goals and objectives.

Goals for Teachers

Establish Classroom Norms

As a teacher, it is of utmost importance to develop expectations and procedures for your classroom early in the school year. These norms should be purposefully designed to contribute to student learning and growth, and should be enforced consistently from the start of the school year to the end of the school year. Classroom norms should include respecting each other, following rules, and focusing throughout the full extent of class. In addition to standard classroom expectations, there should be an expectation of open communication. This means that students will ask questions when the explanation of their peers or the teacher is not sufficiently clear and that students will engage in open and constructive dialogue about mathematical topics of the unit (Stephan, 2014, p. 538).

Spur Student Growth

As a mathematics teacher, it is inherently apparent that teachers should contribute to the mathematical growth of students. As a direct result of participating in a math class students should expand their previous mathematical knowledge base and mathematical thinking abilities. However, students should also develop their interpersonal, citizenship, leadership, and life skills through their time in the classroom. While students are participating in classroom discussions, they will practice traits such as civility, patience, and critical thinking. These skills are important to create the safe space necessary for communicative and interactive mathematics classrooms. Through their explanations and communications, students will develop leadership skills, which will contribute to their efforts in and out of the classroom setting. Additionally, the culmination of these skills will remain important throughout the lives of students.

In order to contribute to student growth in these areas teachers should work to, “become familiar with, and to participate in, the salient political and ethical conversations of our day” (Chinnery, 2007, p. 2). As teachers role model ethical behaviors and political awareness, it is crucial that teachers not influence the development of beliefs of their students, but instead encourage them to investigate and create their own, personal beliefs. In order to do this, teachers should maintain a neutral stance, while encouraging consideration of both views of the topic. Teachers should encourage the development of empathy and integrity throughout this process. And, as these conversations are in the math classroom, they should happen within a mathematical framework.
Lead a Dynamic Classroom

As a teacher, it is important to create an environment that will engage students and keep their curiosity aglow. One strategy that seems to find success is to increase classroom discussion through meaningful group work. In fact, this has been shown to increase proficiency over just one year (Edwards, 2012, p. 178). Teachers should expect these discussions will require them to have extensive knowledge about, “what students are likely to do with [content] and whether they will find it easy or hard” (Ball, 2008, p. 401). In order to help the conversation progress, teachers need to work on their ability to listen to students and direct their conversation, especially in classrooms where students must, “lay down a mathematical path as they go, rather than follow a well-trodden trajectory” (Yackel, 2003, p. 117).

Goals for Students

Actively Participate

Students should do more than merely listen or take notes. They should engage with material as it is presented and question things which are unclear. Even more, they should be able to explain, in full, how they were able to achieve their answer. To fully understand, they should be able to explain their answer in multiple forms (geometric, algebraic, etc.) and in simple terms. This high level of engagement with the curriculum truly shows active participation and will pay off as students learn more and remember more from each class.

Persevere

When learning math and discussing new topics, it’s common and productive to make mistakes. This is why it’s important for teachers and students to contribute to a safe environment focused on perseverance and learning, instead of correct results. Keeping a positive attitude and enforcing respect amongst each other will help this safe space persist through the struggles and turbulent discoveries.

Mathematical Content Knowledge

Critical Thinking and Problem Solving

Ultimately, mathematics describes the parameters and experiences we have and helps us create postulates about abstract aspects of our world. Additionally, the study of mathematics helps students develop crucial critical thinking skills. These skills will help students not only succeed in math classes, but also in future problem solving endeavors. These two skills are needed in each profession and are ways to increase ones ability to think logically and think on their feet.

Conceptual Understanding

Students should be able to move past a calculation-based understanding of mathematics in order to understand the intricacies of concepts within math. This is important, especially in foundation classes, so that students have more, lasting memories of mathematical strategies and applications. For instance, one teacher found that, “[students] have often memorized some rules,
which are then partially forgotten. They do not know why they work” (Stephan, 2009, p. 23). This is problematic because it leads to errors down the road, and shows how important a thorough conceptual understanding is, especially in math classrooms. In fact, students who have adopted a conceptual orientation will likely engage in longer, more meaningful discussions (Thompson, 1994, p. 8).

**Technology in the Classroom**

**Meaningfully Incorporated**

Technology can be an extremely useful tool for mathematical modeling and for engaging students actively throughout classes and project-based learning. However, technology should always be meaningfully incorporated, and not just fill the place of a traditional item. For instance, if merely completing simple arithmetic, there is no need to use iPads. However, if you’re demonstrating that no matter how you manipulate a triangle the angle sum is 180 degrees, technology can be a useful visual proof and an extremely convincing, memorable tool.

**Wide Range of Uses**

In addition to being meaningfully incorporated, technology should be used in a wide variety of settings and with a wide variety of activities. In today’s world, being able to use technology effectively is crucial. However, in order to effectively incorporate technology students should be exposed to a wide range of technologies, so that they have experiences to draw from when deciding which technology is the most useful. Furthermore, “teaching through games and simulations has a potential to engage today’s students who are masters of multitasking through information and communication technologies” (Demirbilek, 2010, p. 709).

**Conclusion**

The face of education is continually evolving and there is no trademark, perfect teacher, so it is crucial for teachers to remain up to date on research, legislature, and professional development opportunities. As teachers learn the best ways to reach their students, they should also communicate successes and failures to a network of teachers. Then, teachers have a team to fall back upon, and are able to see what has worked in other classrooms, or failed to work in other classrooms. One of the most important things teachers have the opportunity to do is to remain a life-long learner, continually working to improve classroom environment and teaching strategies.
References


