

## Teaching Mathematics

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In my progression as a teacher, I have developed many beliefs about myself and my pedagogy. The most important belief that I have is that I want my students to leave the classroom with a conceptual understanding. Specifically I mean that I would like put an emphasis on students understanding these larger concepts rather than treating mathematics as many smaller, unrelated ideas where students memorize “random” facts. I want my students to focus on a conceptual understanding for many reasons, but mostly because it is more meaningful for students to learn this way. Making connections is essential for students to learn and a conceptual understanding fosters those connections. If they just memorize different algorithms and other rules in mathematics then students are likely to miss many connections. By focusing on larger concepts, students are indirectly forced to make these connections to see how each piece of the puzzle fits together to make the big picture. Students will not remember every piece of information they come across nor should they be expected to. However if they have a solid grasp of a concept, then they will likely extend that knowledge to solve new problems.

In order to do this in my classroom, it is important to make sure that students know what I am looking for out of them. I have explicitly told them what information I want them to leave with at the end of the year and what information is less important to me. For example, my geometry students have asked why we need to learn about vertical angles or linear pairs of angles. My response to this has been that in ten years from now, they probably will not need to know what vertical angles are, but they will need to be able to make logical arguments. However, we still need to learn about those angles because they are the tools that we are going to use to learn how to make and justify logical arguments.

Another of my beliefs is that students need to collaborate in some way. According to Jeremy Hodgen and Dylan Wiliam, authors of the article, *Mathematics inside the black box*, “pupils need to engage in mathematical argument and reasoning...hence, providing opportunities for students to express, discuss and argue about ideas is particularly important in mathematics.” Since mathematics often has many different ways to solve problems, students in my classes are frequently working together. Whether it is in pairs, small groups or as a whole class, students need to learn mathematics by collaborating to discover it themselves, giving them ownership of the mathematical ideas. Having students work together allows for them to see many different

strategies to solve problems, and this diverse thinking helps students develop a concrete grasp of topics.

In order to have students work well together and collaborate ideas, I will teach them how to work together. To begin this past year, students came up with teamwork guidelines, such as “compromise without arguing, stay focused towards a common goal and everyone contributes.” We discussed what the guidelines would look like and hung a poster in the room that I would occasionally refer back to in order to remind them about working together.

My stance on assessment is also one of my strongest beliefs, and I believe formative assessment along with summative assessment is essential. Briefly, formative assessment means assessing students while they are learning rather than after they have learned something. With this, formative assessment requires teachers to be flexible to accommodate a lesson for their students since they are gaining access into student thinking as a lesson is underway. There are many ways that teachers can learn about students’ understanding before a test or quiz. Asking questions that require thoughtful responses during class discussions and encouraging students to solve problems in multiple ways, are both strategies I use on a daily basis that provide me with insight to how students are thinking about a particular idea.

Furthermore, formative assessment is also about giving students responsibility by having them assess their own understanding of mathematical concepts. One way to do this is to give the student that information about their understanding of a concept. When I give my students feedback, I do not put a score on the paper, but I do write comments about trends (good or bad) in their work or ask leading questions that might help them come up with a different answer or strengthen their argument. For example, a comment might look like “Remember, we have to make sure that we give reasons when we write our flowchart proofs, how did you know for sure that these two segments were congruent? What are some special characteristics of parallelograms?” In their article, Hodgen and Wiliam talk about giving feedback and citing research that “when feedback focuses not on the person but on the strengths and weaknesses of the particular piece of work and what needs to be done to improve, performance is enhanced, especially when feedback focuses not only on what is to be done but also on how to go about it.”

Along with me giving students feedback, part of my formative assessment beliefs is that I give students the knowledge and opportunities to assess themselves. The most effective way that I do this is with the use of I can statements. This is a list of statements that begin with “I can...”

followed by objectives that I think that students should be able to do by the end of a unit. For example, some of the I can statements for the chapter on circles are I can...sketch and identify circle vocabulary or I can...solve problems using tangent conjectures. Underneath each statement are four categories that students circle at different points in the chapter to monitor progress. I use the I can statements before quizzes by letting them know what I can statements that I am expecting them to be ready for on a quiz or test and also I have them reassess themselves during class after various assignments to see whether they made progress or whether they need help.

Teaching mathematics means teaching students skills that they will use for the rest of their lives. Covering concepts in depth and providing students with an understanding of those concepts is vital for students to really understand mathematics. Also, students need to collaborate in order to share ideas and discover the mathematics themselves. This exposes students to a range of solutions and provides students with ownership of the concepts. Finally, I firmly believe that formative assessment is important in order to adapt lessons for the students and also to help them monitor their own progress and understanding of mathematics.