

## Teaching Philosophy

Rebin Muhammad

My primary teaching goal is to encourage students to think of math as something to be enjoyed and discovered. I accomplish this by creating a fun and engaging classroom environment, improving student mindset, reaching out into the community to bring math to a wider audience, working to meet the needs of diverse and underserved student populations, and collaborating with other educators to continue to develop the best possible teaching methods for my classroom.

In order to make classes more engaging for students, I focus on creating interesting activities that students can enjoy while learning new concepts. For example, in Precalculus I have students create a function that when graphed using Desmos spells their name. In the Upward Bound program for first-generation college students, I created an activity called [Dot in a Box](#) to help students better understand Euclidean and non-Euclidean geometry (taxicab geometry). In Math for Elementary Teachers at Ohio University, I had students learn about methods of teaching fractions using art, like Islamic Geometric Patterns (IGP).

One of my greatest priorities as an instructor is helping students improve their mindset. I want to not only help students learn about math but also help support them in making the right decision when they have a difficult time in life. My own mindset on this subject was profoundly influenced by an experience I had with a young student. When teaching at a middle school in a rural area of Kurdistan, Iraq, one of my students committed suicide when he was just 15. From that day I have often thought about how I could have prevented that from happening. This is one of the reasons I always try to find activities that not only possess strong mathematical concepts but also are meaningful to students' lives, such as the [dateline](#) activity in Precalculus.

Since I first began teaching at Ohio University, I have surveyed students during the first week of class regarding their attitudes about math, and in their responses they often express fear and anxiety. I then ask students to write one word on the blackboard that they think about when they hear the word math. By the end of week one, they have two assignments: one of them is to write a mathematical autobiography and the second one is to create a cartoon that expresses their feelings and attitudes toward math. Together, these materials provide me with a glimpse into the mindset of my students. I use this understanding in combination with the feedback I gain from quizzes and discussions to help students change their mindset, especially since most of them have negative views about mathematics. Eventually I use this knowledge about students to offer extra credit assignments, tailored to individual student needs, like reading a chapter of a book (such as *Becoming the Math Teacher You Wish You'd Had* in Math for Elementary School Teachers and *Mathematical Mindsets* for Precalculus for Survey in Calculus) or having students read an article and write a short paper about it.

Improving student mindset is especially poignant in Math for Elementary Teachers since they will have a massive impact on the next generation's mindset about mathematics. These students come with a fixed mindset about the material they have learned, based on how they were taught math in school, and believe there is only one way to do the math. I begin by challenging them to create a different algorithm than the one they were taught (like in vertical addition) and then asking them to create a new algorithm by themselves. They are then challenged to decide which algorithm is best. In this way, students do not only depend on a single interpretation of the material that they have been taught by a teacher, but they come to their own understanding of it and they also personalize it.

My interest in teaching math to the public developed from the fact that when I was an undergraduate student in Kurdistan there was not a single Kurdish writer who wrote about math for the public. I saw this as an opportunity and a challenge and started translating math articles from Arabic and English to Kurdish and published them to the only Kurdish math magazine available at the time, *Zansti Sardam*. After I finished my master's degree, I started writing for a newspaper and a blog about the new mathematics curriculum in the Kurdish Regional

Government (KRG). This writing gave me insight into the gap between educators in K12 and higher education. I then created my own blog <https://birkary.wordpress.com> and started writing math posts and math education posts. Those posts are for the general public and the way I needed to write and explain benefited me as an educator in my classes. Also, my classroom experiences helped me to become a better math blogger. My English language blog can be found at <https://igpadventure.com>, which is an exploration of the creative use of Islamic Geometric Patterns in math education from elementary to university levels.

In 2016 I was honored with the opportunity to be the first person to interview Fields Medal winner Caucher Birkar. The interview appeared in the Kurdish newspaper *Awene* (<https://goo.gl/QSj6rs>). My interview served the purposes of both informing Kurdish people about this famous mathematician and encouraging math educators to listen to him and his strong opinions about math education in the KRG. Interviewing Caucher Birkar also gave me a chance to gain insight from a world-class mathematician.

Since I have lived in the United States, I have continued to promote mathematics as a fun and engaging human activity. One of the best examples of this are the math activities I have created based on Islamic Geometric Patterns (IGP). During the last three years I have been promoting IGP in many locations, including the [Grand Rapids Art Museum](#), [Grand Rapids Community College](#), the Julia Robinson Mathematics Festival, Math Nights in rural areas near Athens County, the [2019 National Math Festival](#), and undergraduate math courses. The IGP activities I have designed and utilized have ranged in target level from 4th grade (4-color theorem and 2-color theorem) to activities for the undergraduate level (such as wallpaper group).

I have worked with programs that specifically target diverse and underserved populations at Ohio University's Upward Bound program, which focuses on low-income high school students, Bridge to Enter Advanced Mathematics (BEAM), targeting high-performing low-income middle and high school students in New York City, and at the Qualla School for Gifted Students supporting the highest achieving students in their area. I was able to teach advanced mathematics to underserved students by utilizing creative and physical ways of teaching. I used physical IGP tiles from Iran to teach about Frieze and Wallpaper patterns, rock-paper-scissors to teach algebraic properties like magma and the associative property, and hula hoops to teach about isomorphisms. I achieved extraordinary success with students who would otherwise be given little opportunity to show and develop their mathematical strengths.

I am always open to collaborating with other educators and colleagues in developing more innovative and effective methods for teaching math. For example, I designed a lesson on IGP connecting culture, art, and geometry for a professor who taught Introductory Geometry for Middle School Teachers. I also collaborated with other colleagues to create a flipped classroom for Precalculus at Ohio University. Being open to applying new styles of teaching prompted my department to choose me to teach a pilot inquiry-based learning Calculus class with another professor using a free textbook called [Active Calculus](#).

The central focus of my teaching philosophy is based upon creating an engaging classroom, improving student mindset, and bringing math to the community, but it is also vital to me that my teaching philosophy continues to grow and develop through my interaction with students, my experiences in the classroom and with the public, and through interaction with other educators and experts in math and math education.