

New Discoveries: A Math Educator's Journey

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Looking Back

When I was young, I believed I would have my life plan figured out shortly after I graduated college. I didn't. When I started teaching, I figured after a couple years I would have figured out how to be a highly effective and good teacher. I didn't. I really don't need to mention that here I am, in my 6th year of teaching, and I have NOT "figured everything out". However, I can honestly say my teaching skills have improved – in large part due to my peers and professors in the Master of Educational Technology program at Michigan State University. While I am not always able to see exactly how I've grown as a teacher over time, I know I have become able to take more risks in the classroom, such as using technology and differentiation to better reach my students and fostering stronger mathematical thinking, discovery and conversations. While high school students are a tough audience sometimes, I have received good feedback from my students and my principal about various aspects of my teaching. Overall, I am proud of what I've taken from my master's program and have enjoyed the learning journey these past three years.

In this essay I will highlight specific courses and projects that impacted the way I teach by categorizing them according to four of my principal's favorite "bumper sticker" slogans:

1. **"We learn the work by doing the work"** – creating a flipped classroom and trying to help students think like mathematicians
2. **"Get comfortable with being uncomfortable"** – taking risks such as differentiating and doing quickfires in class
3. **"Going from good to great"** – getting better at what I do by integrating technology effectively and helping my students' develop a growth mindset
4. **"Together Everyone Achieves More"** – using my personal learning network (PLN) to connect with other colleagues and grow professionally

Part 1: "We learn the work by doing the work"

In my first summer of master's courses, I was asked to do two projects that involved dreaming up a better classroom and putting a plan in place to achieve it. Honestly, I was pleasantly surprised that one of my projects for the CEP 806 class was to play! Well, it wasn't just "fun and games", but it was so valuable to have time to explore a topic I was interested in but might not otherwise have time to devote to exploring. When do we, as adults, get to play? I joined a few colleagues who had a similar interest to me and as a "Deep Play Group" we looked into the topic of a flipped classroom and teaching in a more student-centered way. By hearing from a professor (thanks Missy!) and reading "Flip your Classroom" by Jonathan Bergmann and Aaron Sams and "Teach Like a Pirate" by Dave Burgess, I became inspired to flip my classroom and try using better hooks to start my class. I wouldn't say I begin class everyday with a great hook, but I am slowly working on it. And as for flipping my classroom, well, after countless hours of work I've done it! I have made a video for each learning target in AP Calculus and Advanced Algebra (well, some are still in the making this year for Algebra).

Going hand in hand with those goals, I decided to focus on getting my students to "think like mathematicians" when I was asked to dream about a better (or ideal?) classroom in the CEP 815 project called "Imagine It." Having a flipped classroom means I have so much more time in class for my students to work on problem solving with their groups. I am definitely "learning the work by doing the work" as I try to support their perseverance in solving word problems and equip students with resources to answer their own questions. It's a long process. However, I like the trajectory my class is taking – even if the work will never be finished!

Part 2: "Get comfortable with being uncomfortable"

Something I noticed from day one – that I now value more than anything in this program – is that I was pushed out of my comfort zone every single day. Luckily we were told that the courses were planned that way, so it was intentionally part of the process. During the whole program, we did a quickfire almost every day where we had to learn a new technology tool and create something related to a topic in class in a very short amount of time (you may have seen quickfires in Top Chef!). Sometimes stressful for me, a perfectionist, I have ultimately realized how helpful these were in growing my ability to explore, collaborate with others, and push myself to do good (but not perfect) work. So...I've decided to implement them in my Advanced Algebra class! This is a new project this year and I was hesitant to even try it; designing a quickfire challenge for my algebra content is not always easy.

After brainstorming ideas with a professor (thanks Candace!) and buying supply bins, I committed to the idea and am slowly becoming more comfortable with turning my students loose to create their own problem or visually depict what we've been learning in class. Although there is room for improvement, it has been exciting to see their posts and watch how well they can collaborate and be productive in a short time.

Another project that pushed me as an educator was presenting at the Global Resources in Education and Technology (GREAT17) conference that was planned by my cohort of graduate students last summer for local educators and our colleagues in the master's program. My partner and I chose to research data based differentiation, so we ran a session that was differentiated – taking participants from gathering data, to analyzing data and forming groups, to using technology to differentiate the tasks students work on or the way they show their understanding of a topic. I have begun experimenting with differentiation in my class a little bit and although it is challenging to implement well, it is rewarding when students are able to practice exactly what they need to practice. Again, this requires me to “get comfortable with being uncomfortable” because I feel like I am not as easily in control of what all my students are doing, yet it is valuable because I definitely want to be able to help each student improve from where they are at.

Part 3: “Going from good to great”

Many aspects of this master's program built on my knowledge and interests and gave me new technology tools to use, which has helped me take my teaching “from good to great”. One of the most fundamental concepts in the course CEP 810 was to dispel a fairly common myth that technology, in and of itself, helps students succeed. Michigan State University professors Dr. Punya Mishra and Dr. Matthew Koehler have written about the TPACK model, which outlines how teachers need to consider the balance between Technology, Pedagogy and Content Knowledge within their context. Essentially, this means our mindset about technology needs to be adapted from “more is better” to considering how technology can be used when appropriate to enhance student learning. We reflected on how the internet has changed what people need to know and be able to do and what types of mindsets teachers have about technology. Suffice it to say that I am more intentional and purposeful with how I use technology – making sure it serves a purpose in my classroom like having students explore how various numbers in an equation affect the graph. I try not to use digital technology just to use technology when traditional

technology (tools) would suffice.

For students, having the right mindset – growth not fixed – also plays an important role in their learning. In the Wicked problem project for the CEP 812 course, I researched and reflected on the concept of “failure” with my partner. This is a “wicked problem” because there is no solution to students’ negative view of failure, yet I realized how I talk about failure/mistakes with my students and how I grade students really matters. This is all related to helping students develop a growth mindset, so I work hard to help my students focus on the learning journey and realize that even if math is hard they can make progress if they don’t give up. A quote I heard at a professional development once that I like using is “everybody knows something but no one knows everything” (anonymous). I believe that in supporting my students in this way it makes a difference in their learning and takes my teaching “from good to great”.

Part 4: “Together Everyone Achieves More”

Another large part of this program was to expand our ability to network and share ideas with other teachers because sharing our good ideas publicly will impact more teachers, and therefore students. I’ll admit I was hesitant to create a Twitter account or post something on social media about my classroom or learning in graduate school. However, I see the benefit of being able to collaborate or exchange ideas – or just share or borrow ideas – because truly “together everyone achieves more”. Surprisingly, I found a good article for a professional development session at work on Twitter! And I have certainly used ideas for lessons that I found through Twitter or math teacher’s blogs.

In mentoring a new colleague of mine this year, I have drawn on the experience I had in a project from CEP 800 where I used my PLN to “solve” a colleague’s problem of practice. By going through the design thinking process to empathize, define, ideate, prototype and test solutions to her challenge from class, I have seen what it takes to collaborate with and assist a colleague in a different situation than my own. This year that has helped me relate to my colleagues in a better way – seeking to understand their situation and create ideas that they can try to help address the problem they are facing. In sharing ideas with colleagues I have also had surprising new insights on ways to improve my own teaching. After all, together everyone achieves more. 😊

Who I am Today

I can hardly remember how I taught before this master's program...which is probably good because I know I'm a much better teacher today! Anyone who comes to my class can see how committed I am to helping my students learn and to support them on their journey to adulthood. I "learn the work by doing the work" when I spend countless hours preparing videos and researching or brainstorming new activities to engage my students and help them discover or think critically about a topic. I have possibly grown the most – yet it's still a challenge – to "get comfortable with being uncomfortable" and take risks and try new things in class like differentiation and quickfires. My desire to "go from good to great" has only increased during this program as I have more resources to use and a better mindset about teaching with technology. Lastly, I have experienced firsthand how asking questions and sharing ideas with other educators can improve my teaching because "together everyone achieves more".

While I would not have thought of having a leadership role before I began this program, I now realize how much I enjoy collaborating with and helping other teachers. Currently I enjoy being able to do this on an informal basis with my colleagues at work, rather than having a different role officially. In the mean time, I appreciate the ways that all four of these "bumper sticker" slogans are making their way into my life as an educator, even into my work with my students! Experiencing this challenging master's program has made me able to relate to my students' struggles and I encourage them using rhetoric from these "bumper stickers" as they proceed down their math journey.