

Learning & Teaching

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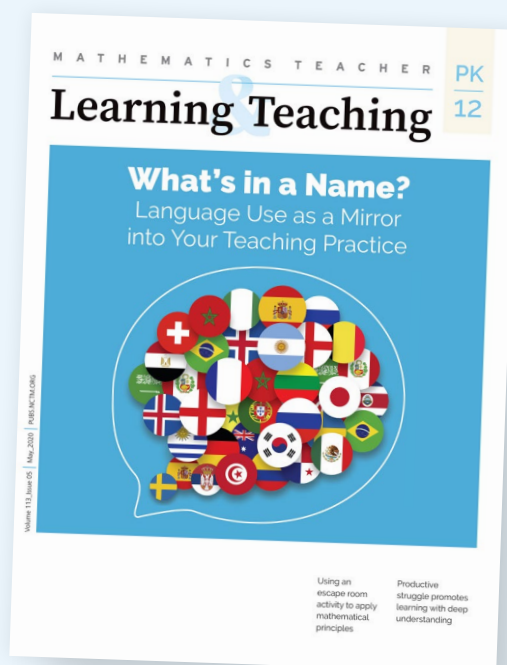
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Teaching Is a Journey This Happened to You Too?

This department provides a space for current and past PK–12 teachers of mathematics to connect with other teachers of mathematics through their stories that lend personal and professional support.

Rachel Wiemken, Maria Nielsen Stewart, Gabriel Matney, Timothy Folger, and Tami Matney

As a group of five mathematics teachers who span three generations and 12 grade bands, we embrace the many advances our profession has made over the years. However, some long-standing challenges in mathematics teaching and learning remain, and these challenges came to light during our cross-generational reflections. We were brought together as a result of our experiences at a midwestern university, experiences that included roles as preservice teachers, graduate research assistants, a classroom mentor teacher, and a professor of mathematics education. We matriculated in teacher preparation programs, and we have provided instruction to preservice teachers. We have codeveloped mathematics tasks to engage students across districts. Collectively, we have taught 41 years of K–12 mathematics in four US states: Arkansas, Missouri, Ohio, and Oklahoma. We have taught in schools broadly categorized by state departments of education as *urban*, *suburban*, and *small town*. We have taught elementary, middle, and high school mathematics. Despite differences in the students, the grades we taught, and the dates our careers began, we realized our common experiences; these experiences were the basis for this article. We share our collective story here in hopes to connect with others who have had similar experiences, to offer support and ideas for overcoming challenges, and to seek community discussion and solution sharing among those who desire to teach mathematics differently.

FIRST-YEAR EXCITEMENT MEETS CHALLENGES

Fresh out of college, we were excited to get into our classrooms and design lessons using the teaching practices recommended in *Principles to Actions: Ensuring Mathematical Success for All* (NCTM 2014). It did not take long for that vision to become clouded by the daily reality of gathering materials, preparing multiple courses, learning school-specific procedures, organizing our classrooms, and performing other demanding tasks. Although the bulk of our mathematical learning experiences spanning K–16 had been through lecture-based approaches in which we practiced other people's ideas, we imagined enacting a different learning experience for our students.

Early in the year, we encountered several roadblocks that hindered us from implementing the research-based mathematical learning experiences we intended for our students. Some of these challenges, often heard from our colleagues, were as follows:

My (our) students are too low to engage in rich mathematical tasks that require sense making and connection. They need me (us) to tell them exactly how to do it or they will never understand.

I have too much content to cover in a year. I do not have enough time for rich mathematical tasks that ask students to reason and problem solve for themselves. If the students do not

make the mathematical connections from the task, then I will have to spend additional time reteaching the content directly to them.

I need to prepare my students for state testing. Their graduation and my evaluation are dependent on these tests. I need to focus on material that will adequately prepare students to take this test.

These challenges, common to us all, were hard not to internalize. We had high hopes and enthusiasm going into our first year of teaching. We were lucky to have wonderful colleagues who were earnest and eager to help us. On top of sharing old course materials, they shared insight on the nature of the school community, administration expectations, and, sometimes, specific students. More often than not, these comments from knowledgeable and more experienced educators weighed heavily on our minds. The comments created in us a lack of belief in our ability to meet the unique learning needs of each and every student. We did not want to seem like naïve first-year teachers; however, we wanted to provide students with opportunities to demonstrate their knowledge without preconceived bias. We hoped to provide each and every student an engaging learning opportunity where their mathematical brilliance would form through the productive struggle of reasoning and sense making.

The struggles began to surface at the beginning of the year when we were given a textbook. We were instructed to follow a suggested pace based on the specific sections and units. Every day had assigned content that felt inflexible. From our college courses, we had experienced moments of authentic mathematical learning (Fleener and Matney 2007) when we explored mathematical concepts deeply across several days. How could we go deep with the content when we had a different section containing multiple concepts to teach every day? We truly questioned if we had instructional time to provide this type of experience to our students *or* enough planning time to redesign the current curriculum map. It felt high risk to tackle the curriculum, especially when we were already struggling to have material prepared for class every day. A feeling of inadequacy slowly crept in as we tried to keep up with our colleagues and stay on pace for the standardized test students would take in the spring. We felt bound to the curriculum map so that we could “cover” all the tested material before April. There was a lot of pressure to not step outside of the structure and teaching style that was already being used by other teachers who enabled their students to pass these tests. With these discouraging challenges during our first year, we resorted to some teaching practices that were not research based just so we could keep up. We desperately wanted to change our teaching, for our students and for our own professional longevity. Before the end

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of our first year, each of us was determined to make a change.

OVERCOMING DISCOURAGING CHALLENGES

We knew that the small changes we were making in our own classrooms were not enough and recognized the need to invite our colleagues on our journey. As we experienced success, we reached out to teachers for help with the design and implementation of the lessons. We invited them to come and see what our students were thinking about and learning. We not only worked with the other mathematics teachers on our teaching team, but we asked for input from other teachers in our building. It became apparent that creating lessons using the eight teaching practices in *Principles to Actions* (NCTM 2014) was not exclusive to the mathematics classroom. We found that many of the other teachers in our building were interested in implementing these mathematics teaching practices within their classrooms but felt overwhelmed by the challenges they faced. By inviting them to overcome these challenges together, we found common ground and were able to implement the mathematics teaching practices that embodied our desire for new approaches to instruction and benefited from their many years of teaching experience. We began working more closely with our mathematics teaching department by having conversations about where we could make improvements within our courses. We looked across assessment, lessons, tasks, collaborative activities, and even classroom management approaches. As we talked with our colleagues, we decided areas where we needed to start making changes by agreeing on what was most important to us, our students, and our schools. For specific examples, we encourage you to hear about our specific experiences in the supplementary videos below.

After we had decided where to make changes, we researched best practices as identified by NCTM and other mathematics professional organizations. We tried to find innovative lessons by looking at NCTM's *Illuminations* site (link online), *Illustrative Mathematics* (link online), and others. We read articles and books about best approaches for our classrooms, such as *Principles to Actions* (NCTM 2014), *Mathematics Teacher: Learning and Teaching PK–12*, and others. Exploring the Common Core State Standards (NGA Center and CCSSO 2010) also helped us identify what was most important to be teaching in our classrooms. In addition, we brought ideas we had from our own work and asked our colleagues to share about their experiences in their classrooms.

CONCLUDING THOUGHTS

There has been a shift in education in the past several years, and the reflections mentioned here led us to realize that we are the generations between. We are the generations of those who were taught mathematics in mostly lecture-based formats. We are the generations who often spent hours memorizing and applying processes that we did not understand. We have experienced a disproportionate number of years of learning in a different way than we now seek to teach. However, we have realized that to help our students experience a new kind of mathematics, we cannot work alone. We cannot work in isolation. Through communicating with our colleagues, we were able to combine experience with innovation, and we found new approaches to teaching that more closely resembled the eight teaching practices (NCTM 2014). Not all of our colleagues agreed to such an arduous task without hesitation. We have great respect for all our colleagues and appreciate their professionalism.

Our experiences with students and their engagement in authentic learning of mathematics have led us to concentrate more on the mathematics teaching practices rather than the allure of exclusively focusing on testing outcomes. For each and every student to learn essential concepts and experience the joy of mathematics (NCTM 2018), we have transformed our teaching to give students meaningful learning experiences (for more information see video 1 [link online]). We created norms for our classes, which focused on reasoning, problem solving, and student learning (for more information see video 2 [link online]). As a result, we now closely assess student learning and allow it to guide the pace of instruction rather than a static preconceived pacing guide. Trusting in the professionalism of our colleagues and wise teachers who shared their innovations, we have been able to overcome our initial fears related to student testing (for more information see video 3 [link online]). Although students are still required to take state-mandated tests, we no longer place state testing at the center of our instruction. Instead, we recognize that if students have a deep, conceptual understanding of the topics, they are more likely to remember how to apply them in testing situations (for more information, see video 4 [link online]). By having the courage to take instructional risks and work on enacting the teaching practices (NCTM 2014), we have witnessed student success. We shared our student success with our colleagues to change preconceived notions of what students are able to do (for more

information, see video 5 [link online]). In fact, it was their success that ultimately convinced us that they are more able to demonstrate knowledge on state assessments when they have a deep understanding of the content and efficacy of working out mathematics

problems for themselves. We invite other teachers to join us in the process of refining lessons year to year. If we want our innovative ideas to be realized, we also need to listen and have professionally honest and informative conversations with our professional colleagues. —

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