

ON BECOMING A MATHEMATICS SPECIALIST—FROM UNLIKELY BEGINNINGS

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The year is 1966, I'm eight years old and in the third grade. It's a typically hot and muggy afternoon in the deep south, which is why the unscreened windows of my elementary classroom are raised. The slow turning ceiling fans keep a sleepy beat as the teacher directs fifteen of us, from a class of about thirty, to the front of the room. We line up along the chalkboard rail and open our math textbooks to the page with the lists of multiplication and division facts. The drill is that we each take a turn reading and quickly answering the next fact listed in the column.

I'm not prepared. I haven't memorized the facts yet. I'm sweating and it's not due to the temperature in the room. I manage to find a place near the end of the line to delay my turn. The knot in my throat seems to constrict my breathing. I pray for an easy fact. Please don't let me get 7×8 , or 9×6 .

I listen to the other children take their turns. Kim got an easy one: 3×4 . That's 12. Why couldn't I get that one? Bobby gets 4×7 and misses it. He always misses them. Drill is delayed as the teacher performs her ritual of public humiliation by reprimanding Bobby in front of everyone. I look into my teacher's face while she scolds Bobby. She's focused on Bobby, so it's safe to look at her. I think how her angular features are as sharp as her tongue.

I feel bad for Bobby and look away to the open window. Thick, cracked, white paint separating from old wood testifies to the age of this building. I notice a big black fly buzzing in vain, trapped between panes of glass. I wonder how many children have been trapped in this room like that fly in the window. With nowhere else to turn, I look back down into my textbook.

Then I notice something else! Column one states $3 \times 4 = \underline{\quad}$, and directly across in column two, is $12 \div 3 = \underline{\quad}$. The answer to each fact is the first number in the fact directly across from it. I count my place in line and count down the column to see that the fact will be 7×8 , a fact that I do not know. On my turn, though, I confidently call out $7 \times 8 = 56$.

Round two comes around and I get another fact correct. I don't know my facts, yet I've managed to keep it secret! I breathe easily as round three rolls around. The teacher is emphasizing speed, speed, speed!

Suddenly, the world comes to a complete stop as I hear myself call out $5 \times 4 = 24$. I realize this is the wrong answer as I'm saying it. I know this one. It's one of the easy facts. Of course $5 \times 4 = 20$. I wonder what happened. I realize I must have miscounted down the column. I realize that 24 goes with 6×4 , the next fact under the one I called out.

Wait. What is happening? My teacher has figured out my strategy. She is telling the rest of the class, "If Little Miss Smarty Pants thinks she can get through life cheating, then she's sadly mistaken...let this be a lesson to everyone as Miss Smarty Pants stays in for recess and copies the page five times..."

I'm horrified that my classmates think I am a bad person, but even more embarrassed that they think I'm stupid. I want to scream out that I really do know 5×4 . It's one of my easy ones. In shame, I look back out the window. Big tears swell in my eyes, making the fly look as if it's buzzing under water.

So how is it that years later, this traumatized third grader has become a county Mathematics Specialist? Why is she now so passionate about being a change agent for teaching mathematics for enduring understanding? More importantly, how is she affecting the learning and doing of mathematics for all students and teachers? That is the story I'd like to share.

First of all, I did what many math phobics do: I avoided math as much as possible. I memorized facts and formulas for tests and forgot them as soon as I could. Just passing the test was always my goal. Being able to memorize using the visual-memory file drawers in my brain allowed me to do just that. Throughout elementary and middle school, the gift of memorizing served me well. But even with A's and B's, by high school, I knew something very powerful about myself: "I'm not good at math."

I affirmed this belief when I "hit the wall" while taking Algebra in the ninth grade. That experience sealed my perspective about my ability to think and reason mathematically. Memorizing had failed me. Being able to recall formulas helped little because I had no idea when or how to apply them. I have horrid memories of shame, sitting at the dining room table with my civil engineer father, whom I adored, stressing over factoring binomials. I still feel anxious when

I hear the words, “If a plane leaves Boston traveling at....” Oh, how well an understanding of how the distributive property works in two-digit by two-digit multiplication would have served me then!

Suffice it to say I only took the required courses in high school and college, struggling through them. I chose the likely major that lots of college-bound females of the seventies who thought they weren’t good at math chose, that of elementary education. Safe, yet honorable.

Flash forward a couple of decades to find me passionately immersed in ongoing professional development involving the teaching and learning of mathematics. About ten years ago, a few events came together to entice me onto this unlikely path. First, the Virginia Department of Education was developing a state test for the newly created *Standards of Learning (SOL)* [1]. As a fifth grade teacher at the time, my first and continuing thoughts were: my students are going to need to really understand this stuff if they are ever going to pass the state tests. Secondly, my county implemented a new type of teacher initiated professional development plan. Rather than choosing to create goals for language arts, an area I considered my comfort zone, I chose to focus on my perceived area of weakness: math. Finally, at about that time, the assistant superintendent of instruction introduced the Lead Teacher Initiative, whereby a classroom teacher is paid a stipend to act as a liaison between the Department of Instruction and their school for a specific content curriculum. No one was fighting over the Mathematics Lead Teacher position, so I went for it. Just like in the fairy tales, the three elements combined to work their magic to transform me from fearful math learner to confident math teacher.

It was about that time that I joined a collaborative teacher’s group called Teaching For Understanding. Begun by the mathematics supervisor of my county, we met monthly to discuss professional articles on the teaching and learning of mathematics. We would unpack the big ideas about concepts, before the term “Mathematical Big Ideas” had become a catch phrase. University professors and guest speakers specializing in teaching mathematics would visit our group to engage us in relevant professional development. Then one day, it happened. I stopped thinking about mathematics as discrete ideas and began to realize the interconnectedness of the mathematical themes. I began to appreciate mathematics as an exquisitely beautiful language for representing one’s thinking.

With my desire sparked, I participated in and successfully completed some graduate math education courses, if for no other reason than to free my math demons. Now, I am currently

working with a cohort of Virginia educators to complete a master's degree in Elementary Mathematics Education, funded by the National Science Foundation (NSF). All of these experiences have empowered me to pursue a more focused teaching path as a leader of mathematics reform for my county.

I am now in what I refer to as my "Disciple Era," where I've gone from having a personally vested interest in learning math to spreading the good word about how to teach it for deep conceptual understanding. The *Professional Standards for Teaching Mathematics* publication asserts that, "to reach the goal of developing mathematical power for all students requires the creation of a curriculum and an environment, in which teaching and learning are to occur, that are very different from much of current practice" [2]. In my current position of Mathematics Instructional Resource Teacher, I have the duty and opportunity to work with all students and their parents, as well as with the teachers, to create such an environment. There are, however, obstacles.

There are many persistent obstacles to making significant changes in mathematics teaching and learning in schools. Among these are beliefs and dispositions that both students and teachers bring to the mathematics classroom, as well as the assumptions held by school administrators, parents, and society in general about mathematics curriculum and instruction [2].

Most teachers that I've worked with recognize the value of moving their instructional practice toward an emphasis on mathematical reasoning, conjecturing, proving, and connecting mathematical ideas to applications for problem solving. However, it seems teachers are initially resistant and somewhat reluctant to make changes because of their deep seated belief that they just don't have the time. Then, there are the administrators who recognize the effective impact elementary Mathematics Specialists are having on raising student achievement, yet insist that budget constraints prevent them from being able to fund such initiatives. Of course, my position stands that we don't have time *not* to make time for implementing shifts in our delivery of instruction, and we can't afford *not* to afford the class released Teacher Leader positions that can make it possible.

Change will take time. It will also require sustained systematic support upon which teachers can rely. Enter elementary Mathematics Specialists. In this role, I provide systematic support through ongoing professional development by co-planning, co-teaching, and debriefing lessons with the teachers on staff at my school. Together, we assess student products to inform instruction, plan relevant and engaging mathematical tasks to build upon student understanding,

and collaborate toward building a mathematical community of learners. I provide schoolwide staff development in the form of Best Practice Days, in which my principal provides substitute release time for teachers to participate. Sometimes, I structure these into morning and afternoon sessions to allow groups of teachers from different grade levels to meet and participate in activities and discussions. Other times, I group grades together to focus specifically on an aspect of the curriculum pertinent to those teachers. I also plan and host parent information nights, Family Math Nights, countywide in-services and workshops for other teachers in the county, as well as for instructional assistants.

My passion is to complete the vision for mathematics education described in the *Principles and Standards for School Mathematics*. This vision is highly ambitious and “requires solid mathematics curricula, competent and knowledgeable teachers who can integrate instruction with assessment, education policies that enhance and support learning, classrooms with ready access to technology, and a commitment to both equity and excellence” [3]. The *Professional Standards for Teaching Mathematics* publication gives direction for moving toward excellence in teaching mathematics and makes a case for implementing five major recommended shifts in current practice [2]. I use my role as a site-based Teacher Leader to facilitate the implementation of these shifts in practice.

I’ve had the privilege to work collaboratively with staff and administrators who understand and share the vision for high quality, engaging mathematics instruction for all students. I am proud to work in a school with a diverse population that brings with it challenges associated with language learning and poverty. As a school, we’ve exceeded the requirements for passing the *Standards of Learning Test* and we’ve met the requirements of the No Child Left Behind legislation yet another year, with our focus on learning math with understanding, rather than on teaching to the test [1].

As the school-based Mathematics Specialist, I feel that I can capitalize on what I consider my greatest teaching asset: my ability to motivate others. I have a knack for knowing where someone is in their learning, and then sparking a desire to move forward and grow successfully. I have demonstrated many times a talent for building a community of learners willing to develop and explore mathematics concepts, whether it is in a classroom of fourth and fifth graders, a staff meeting of teachers, or a parent workshop.

I often begin teacher or parent workshops and seminars by providing an index card with the task to describe a math memory from childhood. It is rare to find a positive, upbeat anecdote. Most

people conjure memories of failure and disappointment. Having come from such memories of math, I suppose it is at least a little ironic that I grew up to become “The Math Lady.” I have wondered what would have changed had my third grade teacher focused on the fact that I had noticed a pattern underlying a very important mathematical concept: the inverse relationship between multiplication and division. A teachable moment was lost to accusations of cheating. This Math Lady, although still uncomfortable with the reference, is on a mission. My mission is to ensure that mathematics is accessible to all students from their earliest exposure to its content in the school setting, so that each may fulfill his or her potential to pursue any path in life where their dreams may take them. ■

References

- [1] *Standards of Learning for Virginia Public Schools*, Board of Education, Commonwealth of Virginia, Richmond, VA, 1995.
- [2] *Professional Standards for Teaching Mathematics*, National Council of Teachers of Mathematics, Reston, VA, 1991.
- [3] *Principles and Standards for School Mathematics*, National Council of Teachers of Mathematics, Reston, VA, 2000.