

A Valuable Diversion

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As a software engineer at the SAS Institute in Cary, NC, I use my education and training in applied mathematics every day. I draw on lessons I have gained through experience in my industry jobs, including four years as an applied mathematician at the Boeing Company and three years in a data mining group in New Orleans. I have had many opportunities to explore the diversity of scientific computing applications used in industrial applications, including data fitting, high-performance computing, and numerical analysis. However, unlike many of my peers at SAS and at my other jobs, I also bring another valuable experience to my work, having served as a Teach For America high school math teacher in one of our nation's highest-need school districts. This article is a reflection of those two years, noting the impact on the students I taught and the impact on my career since then. I hope this account of my experiences will be useful to advisers of undergraduate mathematics majors who might be considering applying to Teach for America, and more generally to graduate students and young mathematicians contemplating various career paths.

Background

In 1992 I had recently graduated from Loyola University in New Orleans with a Bachelor of Science in mathematics and was considering my options. At the time, graduate school was a logical path for someone with my major, but I was not ready to immediately continue several more years of school. I wanted to expand my horizons and grow as an individual.

I learned about an organization called Teach For America. The organization offered recent college graduates the chance to impact educational inequity in America by teaching for two years in some of the nation's highest-need schools. Through the experience participants had the opportunity to develop leadership and problem-solving skills and a deeper understanding of some of the problems facing public education. Although many people cautioned me about postponing graduate school and losing touch with mathematics or falling behind, Teach For America offered the perfect opportunity for the growth I was looking for.

I became a corps member in the summer of 1992 and was placed in the Rio Grande Valley of Texas.

I was assigned to teach algebra and pre-algebra at Pharr-San Juan-Alamo (PSJA) North High School, in Pharr, Texas, a small farming community on the Texas-Mexico border. The Rio Grande Valley is known for its prolific agriculture industry, especially the Ruby Red grapefruits that grow abundantly along nearly every highway; the Rio Grande Valley is also home to some of the nation's most impoverished counties and fastest-growing populations.

Teaching Algebra in the Rio Grande Valley

According to a 2006 SchoolMatters report (<http://www.schoolmatters.com>), approximately 41 percent of the students in the PSJA district are classified as Limited English Proficiency, and approximately 90 percent are classified as economically disadvantaged. In 1992, PSJA North High School was no different; I arrived to find that many of my students were English learners and that most of them were eligible for free or reduced lunch. Core classes such as math, English, and science typically had enrollments of thirty or more students, which was the case with the classes I taught. Many students had interrupted school experiences due to migrant lifestyles or tenuous living conditions.

Early in my first year I found that I was teaching many students whose mathematics proficiency far exceeded their placements, especially in the three pre-algebra classes I taught. As I evaluated the early homework and tests of the students in my classes, I quickly realized that many of them possessed math skills well beyond pre-algebra, but most likely poor language skills had prevented them from scoring higher on English-based placement exams and thus placing in a higher level class. I decided I would not let a language barrier impede their mathematical growth and began working with some of the students in my pre-algebra classes to accelerate their studies. We set out to cover the state-prescribed Algebra I objectives so that these students could bypass the normal intermediate algebra class that followed and move directly into geometry the following year.

I set up a system during class time so that some students would work alone or within small groups on an accelerated curriculum, while I focused on the rest of the class. For a final exam, I gave the accelerated group a year-end exam from an Algebra I class known to be one of the most advanced. The group scored high on the exam, and with the

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results I was able to convince the principal to allow them to advance.

I began my second year with a great deal of confidence, having survived a tumultuous first year and come away with a number of successes. I started the year by building on the successful system from the previous year in each of my classes. While I continued to provide brief lectures to each class as a whole, I also divided the students into small groups of three or four, in which they worked independently. I encouraged them to assist each other in learning, and after the brief lectures, I would move from group to group, spending time with the groups that most needed my attention. In essence, I had tailored my lessons so that the numerous barriers obstructing each individual's mathematics learning could be addressed. In the end, only one other class in the district outscored my classes on the state-instituted year-end algebra exams.

My relatively deep understanding of mathematics allowed me to create a somewhat nontraditional system for my students, and it challenged them in rigorous ways. Furthermore, because the students responded well to my nontraditional approach, it validated my feelings and ideas in the face of the challenges posed by teaching in the demanding environment of a high school classroom. This reciprocal relationship meant that the more the students responded to my teaching, the more confidence I gained and the more comfortable I became as a teacher. It is exactly that confidence and comfort that I took away from my two years of teaching and into graduate school and my professional life.

Pursuing Graduate Education in Applied Math

When I did begin graduate school at North Carolina State University after my two-year commitment to Teach for America, I was reminded of that initial warning about losing touch and falling behind. There were certainly students in my cohort who seemed to have a stronger grasp of technical details, or who more quickly latched onto the theory. However, I had several advantages over my peers that set me apart: there were few students who had been exposed to nonacademic environments; who were comfortable speaking in front of a large group; who were confident enough in themselves to embrace the adversity of graduate school; or who had practiced teaching skills. My maturity and real-world experience allowed me to quickly catch up on the technical knowledge. As a teacher, I encouraged my students not to rely on tricks and mnemonic devices, but to instead focus on the general principles of the theory and exercises; this allowed them to effectively tackle new problems and face exams with confidence. Likewise, one of the keys for me in graduate school success was moving beyond algorithmic details and embracing

general theoretical principles, and I often reflected on the encouragement I offered students when I myself was trying to step back and understand theoretical concepts of specific exercises.

Professional Career

The skills and confidence I developed from the classroom have continued to follow me throughout my professional career. Following graduate school I joined the Boeing Company as an applied mathematician in September of 2001, four years after beginning my Ph.D. studies. At Boeing, my group's work was divided between researching new technologies and providing advanced mathematics in support of engineering processes. However, as a result of the unexpected and tragic events of September 11, the context for the work and the priorities of our group changed drastically and research funding at Boeing was greatly reduced. Again I relied on the confidence I had gained through my Teach For America experience. Although I was trained as a numerical linear algebraist, I adapted to the new environment by quickly learning new disciplines and finding opportunities to work in analytic geometry, operations research, and physics modeling projects. As a result, I had the opportunity to contribute to models of wind tunnel data, the efficient routing of airplanes through the national airspace system, and models of fracture propagation. I learned that in industry perseverance and agility in challenging situations, and the ability to quickly learn new technologies, are traits that are far more valuable than a focused expertise in a specific field of research.

Conclusion

More than a decade later, I now have the luxury of reflecting on my experience teaching, and I can state unequivocally that those two years were pivotal to who I am today. The two years I spent teaching at PSJA-North High School as a Teach For America corps member made a difference in the lives and education of the students I taught and made a difference in my own professional and personal life. I continue to benefit from the insight, skills, and confidence of that experience. In addition, as a parent and civic-minded community member, I have significant insight on educational inequality and specifically on the need for innovative teachers and curricula in math and science, both in my own community and the nation as a whole. Looking ahead, I am enthusiastic about being well-qualified to contribute to technological research in an industrial setting, and I am equally enthusiastic about advocating improvements in math education, particularly for underserved students who deserve an excellent education, perhaps by serving on my local school board or by volunteering with one of the many innovative science programs available to high school students.