

WHAT COUNTS IN THE PREPARATION PROGRAM OF MATHEMATICS SPECIALISTS AND WHAT LESSONS HAVE WE LEARNED ABOUT WHAT NEEDS TO BE ADDED?

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Introduction

Five years ago, while I prepared for the transition to my new role as a site-based Mathematics Specialist, I was continually reminded of Tony Robbins' observation: "If you do what you have always done, you'll get what you've always gotten" [1]. During my training to become a Mathematics Specialist, my eyes had been opened to new ways of thinking about teaching math, new ways of learning through collaboration, and new ways of delivering professional development. I also knew that, even before I started this journey, I considered myself a successful teacher and so would many of the teachers with whom I would be working. In order to be effective in improving student achievement through my work with teachers, I understood that it would be important to develop my skills in working with adults, but I knew that would not be enough. I would need to have a vision of what I wanted mathematics instruction to look like and I would need a plan for making that vision a reality. I would need to set goals and be purposeful in planning effectively to meet those goals. This article will describe how the training provided during preparation to become a Mathematics Specialist enabled me to begin my work with teachers in an embedded professional development program. This article will also address what I found to be my own needs for continued professional development in my work as a site-based Mathematics Specialist.

Background

In the *Principles and Standards for School Mathematics*, the NCTM describes "a future in which all students have access to rigorous, high-quality mathematics instruction" [2]. To achieve that vision, teachers need ongoing and effective professional development opportunities. However, the NCTM also admits:

The reality is simple: unless teachers are able to take part in ongoing, sustained professional development, they will be handicapped in providing high-quality mathematics education. The current practice of offering occasional workshops and in-service days does not and will not suffice [2].

As a Mathematics Specialist searching for a guiding vision for working with teachers in site-based, job-embedded staff development the NCTM once again advises:

Imagine that all mathematics teachers continue to learn new mathematics content and keep current on education research. They collaborate on problems of mathematics teaching and regularly visit one another's classrooms to learn from, and critique, colleagues' teaching. In every school and district, mathematics teacher leaders are available, serving as expert mentors to their colleagues, recommending resources, orchestrating interaction among teachers, and advising administrators [2].

Mathematics Specialists provide site-based and in-depth learning experiences for individuals, grade-level groups, and vertical teams which are ongoing, reflective, and close to classroom practice [3]. Schools and school systems have provided professional development for in-service teachers, as well as mentoring programs for new teachers, but these programs have not been reported to be successful in providing for lasting change. The Virginia Mathematics and Science Coalition's "Mathematics Specialist Task Force Report" explains that these programs are not of sufficient duration and often they do not reach all teachers in a school [4]. Instead, administrators and teachers call for ongoing support for teachers "as they move through the continual changes encountered on their journey" of professional growth [4].

The Importance of Data

The definition of a Mathematics Specialist lists one of the seven functions as "interpreting data and designing approaches to improve student achievement and instruction" [5]. One goal would be to use data to guide instruction and also to evaluate at the school level if what we were doing showed a positive effect. While the emphasis on content-focused and data-driven program planning was an important part of the preparation program, I realized that a framework for using data efficiently and effectively had been missing when I went through the Leadership courses. What I discovered was that, even in a school with a dedicated full-time staff member to work with data, I found myself overwhelmed with the amount of data and the amount of time required to make sense of it for planning in a timely manner. When I was invited to participate on the instruction team for a Leadership III class in my fifth year as a Specialist, I was introduced to *The Data Coach's Guide to Improving Learning for All Students* [6]. The procedures and tools included in the guide proved to be excellent resources for identifying student learning problems and organizing data. Additionally, the guidelines for working with data teams have proved beneficial in helping teachers to move past excuse making and blaming to taking responsibility

and collaborating to solve problems. This new resource should prove to be a valuable addition to the preparation program for Mathematics Specialists as they develop skills in interpreting and using data when working with teachers to improve student achievement.

Provide Ongoing Support for Teachers

As a site-based Mathematics Specialist, I wanted to provide ongoing support for all of the teachers in my school. I did not want to be seen as someone who only worked with struggling teachers. I wanted to cultivate the idea that learning is a lifelong process and that professional educators are continually improving their practice. Another goal would be to meet regularly with all teachers in grade-level teams and in across-grade-level groups. During these meetings, we would focus on content, pedagogy, and using data to guide instruction. I would use these meetings as the backbone of my program of professional development to provide a common base of knowledge and experience. My plan included monthly meetings with grade-level teams during common planning times and quarterly across-grade-level team meetings that would meet during time after school created out of a flexible scheduling option. The support of the building administrator proved crucial by adding value to these meetings through her attendance and participation. I felt confident that the training I had received in content and pedagogy during my preparation program would prove beneficial in my work with teachers during these meetings.

Developing a Professional Learning Community

As a site-based Mathematics Specialist, the advantage of working with teachers over time to develop their content and pedagogical knowledge and to provide opportunities for personal reflection on their practice in professional learning communities was a new way of doing things, but one that I had successfully and personally experienced in the preparation program. A goal would be to provide those same types of experiences for the teachers in my school that I had found in the classes for preparation to become a Mathematics Specialist. I wanted to facilitate the development of a professional learning community that would focus on research and best practices while developing content and pedagogical knowledge over time. I realized that my knowledge of establishing and nurturing a professional learning community was limited to being only a participant. In order to facilitate a professional learning community, I used the resources and guidance from the National School Reform Faculty (NSRF): "...professional development initiative that focuses on developing collegial relationships, encouraging reflective practice, and rethinking leadership in restructuring schools—all in support of increased student achievement" [7].

I found further resources and guidance for the use of protocols in *The Power of Protocols* [8]. Additionally, Iverson recommends promoting a Professional Learning Community (PLC) with the following statement:

If schools are to be successful in nurturing professional learning, they must discard the common view of staff development as a series of events in which teachers act as passive recipients of knowledge. The notion of continuous intentional professional learning is based on a constructivist view of teachers' attempts to make sense of their practice by continual exploration of that practice in job-embedded settings [9].

Whether as a resource for personal professional development among Mathematics Specialists or in working with teachers at the school level, explicitly promoting the knowledge and skills necessary to facilitate a professional learning community would add to the preparation program for Mathematics Specialists.

Teacher Beliefs

I soon realized that working with teachers over time required a different set of leadership skills than I had used previously when presenting at conferences or even in one-shot professional development classes at the district level. I started revisiting the *Developing Mathematical Ideas (DMI)* materials used in the content classes for preparation, hoping the facilitators' guides would provide a framework for my work with teachers that would move us toward changing beliefs and the way teachers looked at how students learned [10]. I started wishing that, during my preparation, using case studies and videos as effective tools to lead professional development had been made more explicit. I realized that "mathematics teacher-leaders must themselves engage in ongoing learning and professional development" [2].

Additionally, as a part of the data gathered for the National Science Foundation (NSF) grant through which my position was partially funded, teachers completed a beliefs survey at the beginning of our work together and at the end of each school year during the project. One goal would be to move teacher beliefs along the continuum from a traditional approach to teaching mathematics to a constructivist or reform approach. As reported by Pat Campbell in a presentation at the "What We Have Learned Symposium" in December 2009, the results of the survey data from the schools that participated in the NSF project did show teachers moving away from a traditional belief system about teaching mathematics. However, the data did not show teachers embracing a reform or standards-based belief system. I had facilitated conversations

with teachers and administrators each year after the completion of the beliefs survey. I had embedded the belief statements into grade-level and across-grade-level professional development I created and facilitated with my teachers. I had shared journal articles with my teachers that described learning experiences that utilized best practices described in the belief statements. Even when our participation in the research grant was concluded, the teachers asked that we continue the practice of annually reviewing our beliefs so I knew we had opened up conversations around beliefs. However, I had to admit that I had not been explicit about how our beliefs affect classroom instruction and wondered how I could move teachers in this critical way toward changing their practice as a result of adopting new beliefs. I realized that my leadership skills in changing beliefs were lacking. I knew that if I could not affect teacher beliefs, change in practice risked being superficial and short term. I wondered if there were materials available that would provide a framework for professional development designed to move teachers through a process of constructing a belief system. Iverson describes the scope of this challenge:

One lesson learned is that being a provider of the professional development that will lead to the necessary changes requires new skills and knowledge for the mathematics specialist. Armed with improved content and pedagogical knowledge acquired in university classes, a mathematics specialist will face the challenge of transforming the beliefs, knowledge and habits of practice of both individuals and organizations [9].

I knew that my experiences in the preparation program had changed and clarified my beliefs toward how students learn, but I realized my training had not prepared me for the task of leading others to make similar changes during our work together. I reflected on the experiences that had led to my strong belief in a standards-based approach to teaching mathematics and wondered how I could provide similar experiences for teachers. One idea shared by Pat Campbell at the Symposium would be to use a model of instruction with teachers that incorporates a “stepping in, stepping out” model. The need to be explicit with teachers as a part of modeling, co-teaching, and coaching practice or during professional development opportunities might be helpful in making a connection for teachers between their experiences and their beliefs. I knew this skill was one I needed to explore and acquire as a part of my leadership repertoire.

Strengthening Leadership Skills

As a school-based Specialist, I would need to provide leadership in a variety of ways and would need to develop a variety of leadership skills. Even after nine hours of graduate-level Leadership courses, I realized I still needed to add to my knowledge and skills. As a school-based Specialist, I needed to find opportunities to strengthen my skills working with adult

learners. While the study of West and Staub's *Content-Focused Coaching* provided a successful model for working with individual teachers to improve their practice, what I needed was additional training in providing differentiated coaching for individual teachers [11]. As a Mathematics Specialist, I would need to be able to "demonstrate the ability to identify teachers' individual professional development needs, and individualize staff development efforts to include both formal and job-embedded professional learning experience" [6]. One goal would be to provide differentiated instruction for individual teachers. I found *Differentiated Coaching: A Framework for Helping Teachers Change* to be an excellent resource and would recommend adding it as a topic for discussion during the leadership training [12].

Balancing the Needs of Individual Teachers with School Structure

Trying to balance the needs of individual teachers with the need to make changes to an organization proved to be a daunting task. One goal was to balance my work with individuals with my work with grade-level teams and my work with across-grade-level groups. However, I found myself searching for some guidelines on what a good balance would be. Iverson describes a threshold model for professional development that parallels the work of reading specialists based in schools. From the description of the components of appropriate professional development to the development of individual knowledge leading to student-focused collaboration, this model seems to provide a good framework for Mathematics Specialists and would be a good addition to the preparation program. Additionally, the description of the various dimensions and the idea of a threshold model that moves the organization forward clarified for me how the work of Mathematics Specialists with various groups and in various capacities can work together to meet the common goal of promoting student achievement [9].

Looking Back, Looking Forward

After working as a school-based Mathematics Specialist for five years, revisiting my preparation program was a good opportunity to reflect on what was helpful and what I found I needed on the job. The exposure to programs such as *DMI*, Cognitively Guided Instruction, and *QUASAR* provided models for professional development that I have found useful in my work. The exposure to and participation in a Lesson Study provided one of the most valuable parts of the preparation program. I would consider using a lesson study approach to the work of the instructors in developing content coursework and then incorporating the "stepping in, stepping out" model described above to make the teaching and coaching moves explicit. Exposure to the resources from *The Power of Two* helped clarify the purpose of and model for an effective co-teaching practice [13]. Again, using these materials in a Leadership course and then modeling

and making explicit the characteristics of effective co-teaching would be a valuable addition to the preparation program. The exposure to professional resources in books and journals, along with the sharing of those resources with colleagues, added tremendously to my knowledge base as well as my ability to locate and use resources as needed. With the continued addition of more relevant resources to the literature of coaching, mathematics education, and professional development, I would include even more opportunities for participants to share in study groups, as well as using electronic tools such as blogs or sharepoint sites to share reviews and findings. Additionally, one of the great strengths of the preparation program is the collaboration between various interest groups. At this point in the development of the Mathematics Specialist model, there are Specialists working effectively in schools that can provide insight into the development and refinement of the preparation program and also serve as mentors to Specialists-in-training. While there may not be enough Specialists to serve one-on-one as mentors to pre-service Specialists, perhaps a Teacher-in-Residence model might be a valuable addition to the program. A Specialist working half time in an elementary school and half time as part of the university teaching team could open up new opportunities for improving the preparation program. Fisher's model for a Teacher-in-Residence describes benefits to the district, the university, and also to the preparation program [14].

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