

# THE ROLE OF THE MATHEMATICS SPECIALIST IN ALBEMARLE COUNTY PUBLIC SCHOOLS, VIRGINIA

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A. LARUE-DAVIS  
*Albemarle County Public Schools*  
*Charlottesville, VA 22902*

## **Introduction**

The call for Mathematics Specialists in elementary and middle schools has become an increasingly visible effort as research uncovers our nation's trends in success rates and challenges with teaching students a deeper understanding of mathematics. Critical as an underpinning for higher levels of mathematics in high school and beyond, elementary and middle school mathematics form the building blocks of basic number sense, problem solving, logic, reasoning, and communication about quantifiable data. A solid foundation in these early years of mathematics is of paramount importance to our long-range national success in the global economy and business world our children will face as adults, which is why this issue has become a call for action in our nation today.

## **Mathematics Instruction**

In particular, strengthening our elementary mathematics instruction requires concentrated support for our elementary teachers in both content and pedagogy in order to provide instructional programs that advocate the teaching and learning of mathematics for deeper understanding. A significant distinction between teachers at the elementary school level and those at middle or high school levels is that in elementary schools teachers are generalists, being required to teach all content areas: language arts, social studies, science and math. Therefore, they often lack the mathematics background necessary to implement mathematics curriculum with rigor. Teachers in middle and high school levels, by contrast, typically teach a single subject, which is their specialty. Therefore, weakness in the mathematics portion of elementary teacher training unfortunately manifests itself in ways that are becoming increasingly evident in data analysis on our students' success in mathematics. If teachers lack deep content knowledge, they consequently lack understanding of how to guide mathematics discussion in the classroom. This discussion piece is critical in developing divergent thinking, and promoting reasoning and logic. The foundation of elementary mathematics needs strengthening, and this fact is well substantiated by research and data.

Strengthening deep mathematical understanding for all students is the goal. Based on the disaggregated data of Virginia's *Standards of Learning (SOL)* tests in mathematics, there is clear

trend data revealing achievement gaps between the percentage of pass rates of Caucasian students and students in subpopulations including African-American populations, children from poverty, those with learning disabilities, and students for whom English is a second language [1]. Not only is there a discernable achievement gap for subpopulations, but there is also recognition that the *SOL* tests are assessments of minimal standards. This fact makes it all the more disturbing, therefore, to note that more students are not achieving advanced proficiency levels in mathematics. The data reveal evidence that “teachers must be supported in deepening their own content knowledge along with content pedagogy knowledge” [2].

### **Mathematics Specialists**

One viable solution to this increasing need for support for elementary mathematics teachers is the model of the Mathematics Specialist. As defined by the Mathematics Specialist School and University Partners,

Mathematics Specialists are teacher leaders with strong preparation and background in mathematics content, instructional strategies, and school leadership. Based in elementary and middle schools, Mathematics Specialists are excellent teachers who are released from full-time classroom responsibilities so that they can support the professional growth of their colleagues, promoting enhanced mathematics instruction and student learning throughout their schools. They are responsible for strengthening classroom teachers’ understanding of mathematics content, and helping teachers develop more effective mathematics teaching practices that allow all students to reach high standards, as well as sharing research addressing how students learn mathematics [3].

As our nation recognizes the increasing need for Mathematics Specialists in elementary and middle schools, it is of value to examine what effects may already be seen in some of Virginia’s schools and school divisions where such Specialists have begun this important work. While an increasing number of the Commonwealth’s school divisions have already begun to embrace and fund initiatives to put Mathematics Specialists in their schools, other divisions are in a state of transition toward that goal, and are demonstrating efforts that reflect their collective energies as they think outside the box. The following is an account of some of the supporting work currently being done in Albemarle County Public Schools in central Virginia.

### **Albemarle County Public Schools**

Through the National Science Foundation's (NSF) funding of a six million dollar grant for systemic change in mathematics instruction, Albemarle County joined in a partnership with Virginia Tech (2000-2004), in a five-year intervention program providing professional development for elementary teachers upon the adoption of the national standards-based mathematics curriculum, *Investigations in Number, Data, and Space* [4]. This divisionwide teacher training initiative has provided professional training for a total of approximately 280 teachers thus far. The instructional team for this professional training model has included the Mathematics Instructional Coordinators for the division, as well as a Mathematics Specialist.

In addition to this training of experienced, practicing teachers already within the division, Albemarle County's efforts are also focused on working directly with all new elementary school teachers who teach mathematics. The model being implemented embraces a variety of formats, including strategies promoted strongly by the new program of studies which provides licensure for Mathematics Specialists in the Commonwealth of Virginia.

The Virginia Mathematics Specialist Program and the Virginia Department of Education have provided opportunities at several Virginia universities and colleges to attain licensure in this area. Working toward a Master of Education as a K-8 Mathematics Specialist through the University of Virginia, one Albemarle County Mathematics Specialist has been providing a model of support for fellow teachers within her school, while still being a full-time classroom teacher. This model has a transitional look about it, as support for Mathematics Specialists gains recognition for the importance of this work. Providing curricular support within the school, and assisting in the leadership of vertical articulation about expectations for K-5 math achievement within the school, have been high priorities for Albemarle County Public Schools. Using problem-based, inquiry instruction, the division is building consistency of expectation and experience for its students. They have greatly enhanced their collaborative efforts and site-based professional development to center around increased rigor in the development of mathematical reasoning and problem solving. Among other specific strategies used in this site-based approach has been the investigation and review of Bloom's Taxonomy and constructing higher-level tasks and assessments for students. Collaborative planning at each grade level has enabled teachers to carefully analyze assessment results with a focus on how and why certain cohorts of students demonstrate more success and mastery of mathematics content than do other groups. Teachers share and compare instructional techniques, and glean from one another "the best of the best." The Mathematics Specialist facilitates and participates in these grade-level collaborations, implementing content-focused coaching modeled after Lucy West's work [5]. Delving into the

mathematics behind the lesson and discussing student learning and specific instructional strategies, has strengthened the effectiveness of this mathematics instructional model. This Professional Learning Community model has had an excellent impact on the communication between colleagues as they work collaboratively and collectively for the improvement of student learning in mathematics.

Coordinating strategic scheduling and careful teacher planning, the Mathematics Specialist has been able to utilize planning blocks (when her homeroom students go to Physical Education class) in order to provide both pre-teaching and remediation to students in grades three through five within one school. The benefits of this pre-teaching strategy have been revealed through the success rates of the most at-risk students. Pre-teaching is an instructional strategy some teachers in Albemarle County explored greatly this year in working with at-risk math students. Rather than relying on remediation after the students demonstrate a lack of mastery, this strategy—sometimes referred to as “front-end loading”—involves dusting off prior knowledge, and building a stronger foundation for upcoming skills and concept acquisition. Once that background knowledge groundwork is laid, pre-teaching certain aspects of the specific skill set or concept helps trigger a series of improvements in the students’ learning, including improved self-confidence and attention during mathematics class. The cumulative effect is very notable. By pre-teaching concepts and content-specific vocabulary for the upcoming lesson, the Mathematics Specialist’s work enables these same students to enter class with an increased self-confidence in their ability to learn. They are more attentive in class, participate more confidently, and seem to retain more.

Working very closely with the classroom teacher, the Mathematics Specialist has not only been able to provide this strategic pre-teaching and remediation for at-risk students, but has also worked to develop compaction and differentiation of mathematics instruction for students with advanced capabilities. Developing a compacted fifth/sixth grade curriculum taught in fifth grade has enabled a large number of students from several of the division’s schools to receive rigorous, enriched mathematics instruction in above grade-level mathematics classes.

## **Conclusion**

Teacher training, content-focused coaching with modeling of lessons, collaborative planning, and working directly with cohorts of students, have become diverse ways of exploring the potential benefits of having a Mathematics Specialist available at the building level in order to work with teachers to strengthen their effectiveness with meeting the needs of students. It will be the students in Albemarle County and other school divisions around the Commonwealth who will

ultimately reap the benefits of this much needed, strategically targeted mathematics support for elementary teachers in a nation striving for excellence in mathematics. ■

## References

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