

MATHEMATICS SPECIALISTS TASK FORCE REPORT

VIRGINIA MATHEMATICS AND SCIENCE COALITION
TASK FORCE

PREFACE

Charge from VMSC — In Fall 2002, the Virginia Mathematics and Science Coalition (VMSC) Board directed that a task force be established to prepare a case and write a report to present to Local Education Agencies (LEA), the Virginia Department of Education (VDOE), the Virginia Board of Education, and policy makers as to how a Teacher Specialist will improve student learning. Consideration should be given to Mathematics Specialists at both the elementary and middle school levels. This report should include, but is not limited to, job description, competencies, preparation, and licensure.

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Introduction

Over the last decade, several compelling studies and reports have identified the strong connection between student achievement and the quality of teacher knowledge and skills [1-3]. Furthermore, Sanders and Rivers as well as Monk and King found that low-achieving students made significantly greater performance gains when assigned to effective teachers [4,5]. The National Research Council's report, *Educating Teachers of Science, Mathematics, and Technology* informs us that, "the kind and quality of teachers' in-service education can make a difference in how their students achieve" [6]. Richard Elmore reports that professional development focused on student learning must be tailored to address the difficulties encountered by real students in real classrooms [7]. School-based Mathematics Specialists will allow elementary and middle school level teachers to benefit from site-based and in-depth learning experiences which are ongoing, reflective, and close to classroom practice [8]. Efforts to support Teacher Specialist programs are taking root across the Commonwealth of Virginia as school divisions look for ways to raise student achievement by improving mathematics instruction. For the purposes of this report, we will define instruction as what teachers do. Instruction consists of the interactions involving teachers, students, and content. To frame our work and to guide our research we asked the question, "What interventions or deliberate efforts to improve instruction

will be enhanced by a Mathematics Teacher Specialist, and what preparation is necessary to take on this role?”

We believe any efforts aimed at improving instruction require a departure in some degree from current practice. Implementation of these efforts requires teachers to learn new knowledge, skills, and practices, as well as increasing their capacity to use more effectively what they already know and can do [9]. Research informs us that teacher knowledge profoundly affects student achievement. Students perform better when they are able to learn from teachers who have a deep understanding of the mathematics in conjunction with a sound knowledge of teaching methods [6]. In today’s high stakes education climate, students who are not taught by highly qualified teachers may be penalized. For example, they may be retained at grade level or not allowed to graduate. There is a need for highly qualified teachers, but the education profession is faced with a scarcity of teachers who possess a profound understanding of the mathematics they teach. Highly qualified teachers in all classrooms are mandated in the federal No Child Left Behind (NCLB) legislation.

To help teachers improve instruction and become increasingly expert, we must recognize teaching as a lifelong journey of learning rather than a final destination of “knowing” how to teach (Linda Darling-Hammond, in a March 2000 presentation to the WestEd Board of Directors). We must ensure that teachers have the necessary support as they move through the continual changes encountered on their journey. From our interviews and observations, we have learned that a variety of strategies are underway across the Commonwealth to improve instruction in mathematics. The common element among all of these interventions is that classroom teachers must make changes in their instructional programs and practices. In Virginia schools, these changes center around implementing new and innovative curricula, increasing teacher learning through professional development opportunities or coursework, restructuring instructional time, and establishing accountability for outcomes.

Effective mathematics teaching is complex, requiring both a broad base and a special content knowledge for successful instruction. The *2000 National Survey of Science and Mathematics Education* conducted by Horizon Research, Inc. for the National Science Foundation reported that only 60% of the elementary teachers in their survey felt qualified to teach mathematics [10]. Surveys and interviews with school division personnel indicate Virginia

teachers at the elementary and middle school levels lack profound understanding of the content, as well as a comprehensive knowledge of content pedagogy. In elementary schools, teachers are typically generalists, with minimal coursework in mathematics. Often, these teachers have had only one or two mathematics courses in college. While Virginia has raised the requirements in mathematics coursework for those seeking middle school certification, many middle school mathematics teachers do not have the equivalent of a mathematics major or minor in college. In many cases, middle school teachers are former elementary teachers who have moved to middle school.

Virginia, just as other states, has an increasing number of teachers entering the classroom through alternative licensure routes. School divisions are finding that while these teachers may have the content knowledge for the workforce, they lack the specialized content knowledge and content pedagogy for effective teaching. Subject matter knowledge is not sufficient for effective teaching to take place [11]. In their government commissioned report, they also state, “[Without training in pedagogy] it appears that prospective teachers may have mastered basic skills, but lack the deeper conceptual understanding necessary when responding to student questions and extending lessons beyond the basics.”

To address these issues, the Virginia Department of Education, along with Virginia school divisions, have provided staff development and coursework for teachers in both content and in pedagogy. School divisions have implemented mentoring programs for new teachers. The Task Force learned through informal observations and interviews that these interventions have not been sufficient for various reasons. Often it is not possible to scale up staff development learning opportunities to reach all of the teachers in a school. Most of these learning opportunities, as well as the mentoring programs, are not sustained over time; thus, the impact on teachers’ beliefs and behaviors is marginal. Virginia teachers and administrators reported to the Task Force that ongoing, site-based assistance is necessary to adequately support teachers in the change process. One way to provide this sustained support is to develop and maintain a cadre of Mathematics Teacher Specialists who can offer meaningful and consistent site-based guidance to their colleagues.

Evolution of the Lead Teacher Program in Virginia

The concept of a content Teacher Specialist is not a new concept in Virginia, but it is an evolution of the Lead Teacher model established in Virginia more than ten years ago. In 1992, the Virginia Mathematics Coalition, now the Virginia Mathematics and Science Coalition (VMSC), joined with the Virginia Department of Education, the Virginia Council of Teachers of Mathematics, and others in a National Science Foundation-funded project, V-QUEST. The goal of V-QUEST was to prepare elementary and middle school teachers to serve as “Math Leaders” or “Science Leaders” in their schools. Over the three years of funding, participating K-8 mathematics and science teachers increased their content knowledge in mathematics and science along with content pedagogy during intensive and focused summer institutes. These Teacher Leaders returned to their schools to lead efforts toward improving teaching and learning in mathematics and science.

A 1997 report by Critchfield and Pitt documented the variety and effectiveness of Lead Teacher programs in nine representative Virginia school divisions three years after V-QUEST ended. These school divisions reported the Lead Teacher served as a curriculum leader and a resource for teachers, as well as providing staff development for teachers [12]. Several divisions attributed the rise in test scores to the work of the Lead Teachers. The report also illuminated the significant variations across Virginia in how the Lead Teacher program evolved and was sustained. The greatest differences were seen in the preparation and support for the Lead Teachers. In some divisions, there had been no additional training beyond the V-QUEST training. In other divisions, there was modest, unfocused, and inconsistent training. Some divisions were able to secure grant funding to support continued preparation for Teacher Leaders. One division secured an ExxonMobil Teacher Leadership Grant in mathematics. Several divisions participated in SCHEV Eisenhower grants focused on preparing Teacher Leaders. However, it was clear from this report that without a statewide infrastructure to prepare Specialists, these nine divisions had difficulty maintaining a pool of highly qualified Mathematics Specialists.

In March 2002, a survey of 43 Virginia school divisions conducted at a meeting of the Virginia Council of Mathematics Supervisors indicated that the Teacher Leader concept lives on in schools across the Commonwealth. However, there is no stability in the programs because there is no statewide agenda to continually prepare content-based Teacher Leaders or content

Specialists. In addition, there is presently no license to validate the Teacher Leader or to recognize teachers who have participated in learning opportunities that might prepare them to be Specialists.

Further analysis of the surveys revealed that 23 different titles are used to designate the state's Mathematics Teacher Leaders. The primary responsibility of these Leaders was to serve as liaisons between the school boards' central offices and the school sites. The surveys indicated a critical need for the Mathematics Teacher Leaders to take a more active role in providing staff development for teachers and leadership for the building level mathematics program. However, we learned from these surveys that a number of barriers stand in the way. Teacher Leaders need a deeper understanding of the mathematics content being taught. In addition, Teacher Leaders need more knowledge about mathematics content pedagogy (how both students and adults learn to make sense of mathematics), and they need to develop leadership skills as well as skills to facilitate adult learners.

On May 20, 2002 the Virginia Mathematics and Science Coalition, the Virginia Council of Mathematics Supervisors, and the Virginia Council of Teachers of Mathematics, with support from ExxonMobil Education Foundation hosted a forum, "Moving from Teacher Leaders to Mathematics Teacher Specialists," in Fredericksburg, Virginia. At this time, representatives from school divisions across Virginia indicated their commitment to providing high quality mathematics and science programs for all students. As school divisions continue to move forward to strengthen their instructional programs so that no child is left behind, what support will classroom teachers need? The participants in this forum agreed that a well-prepared Mathematics Teacher Specialist could be an effective support for classroom teachers.

Rationale for Mathematics Specialist

Rising Expectations for Students — Virginia educators and politicians have set forward an agenda to ensure that every student has the opportunity to study in a high quality mathematics program that prepares them for further study in mathematics, as well as to be productive members of society. Expectations for student learning have been defined in the nationally recognized framework, the Virginia *Standards of Learning (SOL)* [13]. A state assessment system has been implemented to monitor student progress toward meeting the Virginia *SOL* in mathematics. In grades K-8, Virginia students are assessed in mathematics at the end of grades 3, 5, and 8. Under

the NCLB legislation, additional assessments in mathematics will be implemented at grades 4, 6, and 7. At the secondary level, students enrolled in Algebra I, Geometry, and Algebra II must take end-of-course assessments.

Accountability weighs in, as students must pass prescribed numbers of end-of-course tests in order to graduate. Each year, greater numbers of students are passing the *SOL* tests. However, many children across the Commonwealth are still not passing these assessments and are at risk of not graduating from high school. Most troubling are the results of tests at the elementary and middle school levels. An examination of the 2002 Virginia *SOL* test results posted on the Virginia Department of Education website reveals that 20% of third graders, 29% of fifth graders, and 29% of eighth graders did not pass the 2002 *SOL* grade-level tests in mathematics.

The disaggregated data from the 2002 *SOL* tests in mathematics reveal that across Virginia, there are gaps between the percentage of Caucasian students passing the tests and the percentage of the subpopulations who passed the tests. This can be illustrated by looking at a few of the smallest gaps. In mathematics at grade 3, there is a 22-point gap between the Caucasian and African-American populations, and a 29-point gap between the Caucasian population and the disabled population. We see similar differences between the Caucasian population and the Limited English Proficiency (LEP) population, as well as the Hispanic population.

While concerned with the numbers of students not passing as well as the gaps between populations, we are just as concerned that more students are not passing at the advanced proficient level. It is important to note that just passing these tests indicates only minimal expectations for students.

Improving Instruction — There is a pressing need for schools across Virginia to improve student learning, and we believe this will be best accomplished by implementing instructional programs grounded in the teaching and learning of significant mathematics for understanding. However, as subject matter becomes more complex, teachers need a deeper knowledge of that subject matter to help their students learn at higher levels [14,15]. Teachers must be supported in deepening their own content knowledge along with content pedagogy knowledge.

A number of national reports have begun to call for the placement of Mathematics Specialists in elementary schools. These reports (*The Mathematical Education of Teachers*, 2001; *Adding It Up: Helping Children Learn Mathematics*, 2001; National Council of Teachers of Mathematics *Principles and Standards of School Mathematics*, 2000; *Keys to Math Success: A Report from the Maryland Mathematics Commission*, 2001) have converged around this common idea [15-18]. Each report calls for qualified Mathematics Specialists to be placed in schools as a resource for improving instruction. We believe that school-based Specialists will serve as a resource in professional development, teaching, curriculum development and implementation, mentoring new teachers, and parent and community education.

Virginia teachers at the elementary and middle school levels must possess a deep understanding of the mathematics they are teaching, an understanding of how it connects to higher levels of mathematics, and a skillful use of methods to guide students in the learning of mathematics. Teachers must understand students' thinking and how students develop mathematical proficiency. In addition, teachers must continually refine their mathematics content pedagogical knowledge (in an ever changing teaching environment) to teach in such a way that every child becomes proficient in mathematics.

Teachers, and ultimately students, in Virginia can benefit greatly from the multiple learning opportunities content Specialists can bring into the school and the classroom. Well-prepared Teacher Leaders in a Specialist's role can have a significant influence on strengthening content, pedagogical, and assessment knowledge of those classroom teachers who are poorly prepared to deliver significant mathematics programs. Staff development must be seen as an integral part of teachers' professional lives. Job embedded professional development provided by content Specialists is critical for improving instruction and student learning [1, 19-20].

Mathematics Specialists

Role of the School-Based Specialist — Teacher learning is a catalyst for school reform and improvement in teaching and learning. As shown in this report, staff development efforts are unlikely to be either effective or enduring without carefully considering provisions to support the growth of teachers' understanding of their practices. Improvement in student learning is not as simple as teaching teachers how to teach differently, but requires working in classrooms in such a way that the teachers are continuously supported in the process of changing their teaching

practices. Teachers, with support from a building-level content specialist, can develop strong expertise in the teaching and learning of mathematics [7]. A Specialist is a teacher whose interest and special preparation in mathematics content and mathematics content pedagogy is matched with special teaching or leadership assignments to support teaching and learning [21].

Building-level administrators seldom have the time or the expertise in mathematics to lead the changes to improve instruction in mathematics. The NCTM *Principles and Standards of School Mathematics* states: “There is an urgent and growing need for Mathematics Teacher Leaders—Specialists positioned between classroom teachers and administrators who can assist with the improvement of mathematics education.” [18] Teacher Specialists in Virginia’s elementary and middle schools will be first-hand observers and participants in the school culture. These Specialists will be aware of the needs of the school, provide solutions that address those needs, and help ensure that every child becomes proficient in mathematics.

Adam Gamoran and colleagues used information from a multi-year study conducted by the National Center for Improving Student Learning and Achievement in Mathematics and Science (NCISLA) to examine what successful schools and school divisions are doing to transform teaching in mathematics and science [22]. The teachers in this study reported that the most important resources of the change process were time spent planning and learning with other teachers and in collaboration with experts inside the school.

Franke, Kazemi, Shih, Biagetti, and Battey found that professional development was more effective in helping teachers make significant changes in their practice if teachers were able to reflect on their own students and practice rather than hypothetical students and situations [23]. Furthermore, Fennema, Carpenter, Franke, Levi, Jacobs, and Empson, in their work with teachers implementing Cognitively Guided Instruction, found that site-based support was paramount in facilitating changes in teachers’ beliefs, knowledge, and instructional practice—changes that were found to ultimately enhance student achievement [24]. The Task Force believes that school-based Specialists in mathematics teaching and learning can fill the role of experts in teaching and learning and that their work can be distributed within a number of different models.

We have learned through interviews and surveys that within the past two years, several school divisions in Virginia have implemented building-level, “mathematics specialist” type positions. Each division and in some cases each school, has defined the role of that “specialist”

type position to meet their individual needs. Since there is no state sanctioned definition of “mathematics specialist,” there is no common language around this role, and school divisions have chosen to use different titles for the position. Not having state licensure results in no confirmation of who is highly qualified to fill the role. The Virginia stories below will illuminate both the benefits of the school-based “mathematics specialist,” as well as the difficulties created without state licensure and institutionalized preparation programs.

- In Stafford County, full-time Mathematics Specialists have been placed in six elementary schools to co-teach classes, to provide site-based and job-embedded professional development to teachers and paraprofessionals, to coach first and second year teachers, to analyze student assessment data to inform instructional planning, and to provide parent education programs. Stafford is using a grant from the ExxonMobil Foundation to provide staff development to provide the skills and knowledge to meet the requirements of the job; however, this preparation is not recognized outside Stafford County.
- In Dinwiddie County schools, full-time Mathematics Resource Teachers in each elementary school are doing a “push-in” program where they go into teachers’ classrooms to work with small groups of students and to model lessons for teachers. They also collaborate with teachers in analyzing assessment data and in planning mathematics instruction. Without state licensure, there is little recognition of their work outside Dinwiddie County.
- In 1988, Alexandria City schools began participating in the Chicago Math Project for Mathematics Specialists training. Two sets of Mathematics Specialists were trained during the grant period. However, once the grant ended, the initiative lost energy. The concept of a Mathematics Specialist was not recognized by the Commonwealth, and therefore was not self-sustaining. The project is underway once again with an ExxonMobil grant.
- For the past eleven years, Hanover County schools have participated in an ExxonMobil grant to prepare Teacher Leaders. In fact, these teachers have become strong and capable leaders within their schools and are ready to assume staff positions with release time to

assist their peers. However, since there is no statewide designation for Mathematics Specialists, their preparation and expertise is not validated or readily identified.

- Eleven Title I schools and one targeted assistance Title I school in Prince William County added a full-time Mathematics Specialist's position in 2002-2003. Without state licensure or state sanctioned competencies, principals did not have immediate evidence of which applicants were most qualified for the job.
- Norfolk City schools have maintained Project Math Lead that was begun during the V-QUEST project. Significant staff development funds are dedicated to the ongoing training and support of these teachers. However, the qualifications of the Specialists vary greatly. In addition, there are thirteen Title I schools with Title I Mathematics Teachers and four additional schools with Mathematics Resource Teachers. Principals choose the teachers for these positions with no state licensure or identified competencies to inform their decisions. Statewide infrastructure for preparing Specialists and for licensing Specialists would enhance the Norfolk program.

As shown in the examples above, consensus continues to grow across Virginia that Mathematics Teacher Specialists can facilitate teacher learning, leading to improvement in student learning. Based on our research and from information gathered during interviews and surveys in Virginia schools, the Task Force recommends that school-based Mathematics Specialists be prepared to assume any or all of the following responsibilities.

Recommended School-Based Mathematics Specialist Responsibilities

- Translate mathematics standards and research into classroom practice to support implementation of the *Virginia Standards of Learning* and the National Council of Teachers of Mathematics *Principles and Standards of School Mathematics*.
- Plan and facilitate professional development sessions to focus on the needs of staff members in the implementation of a high quality and challenging mathematics program for all students.

- Work collaboratively with building administrators and staff to plan, implement, and evaluate effective mathematics programs that support the improvement of teaching and learning.
- Work collaboratively with teachers to implement a variety of instructional and assessment strategies to meet the needs of a diverse student population.
- Support teachers in identifying, implementing, and refining the use of instructional resources and strategies through coaching, co-teaching, and modeling lessons.
- Work collaboratively with administrators and teachers to analyze student work, to identify students' level of understanding and/or proficiency, to interpret assessment information to inform the instructional program as well as to assist teachers in differentiating instruction.
- Facilitate parent workshops in mathematics and share ways to work with their children in mathematics.
- Provide ongoing assistance to new teachers, especially first year teachers and “career switchers” in mathematics content and mathematics pedagogy.

Preparation for the Mathematics Teacher Specialist

The Context for Learning — Teachers in a program leading to an endorsement as a Mathematics Specialist need to be in an environment where they can work collaboratively, feel free to make mistakes, and learn from the mistakes. They need challenging mathematics content, which at the same time is related to school mathematics. Typically, higher education mathematics departments do not offer the kinds of courses that would be appropriate for these teachers [6]. It is crucial that the faculty in the college of arts and sciences and the faculty in the education department collaborate with school divisions to plan and deliver programs to prepare school-based Mathematics Specialists. Schools of education should look for ways to reinforce and integrate learning, rather than maintaining artificial barriers between courses in content and pedagogy [6].

The Task Force believes it is important that Specialists develop a broad range of vision about the mathematics curriculum, student learning, and teaching. Mathematics Specialists need to learn significant mathematics in situations where good mathematical content pedagogy is modeled. Based on current research in mathematics teaching and learning, they must increase their content knowledge as well as deepen their knowledge of both school mathematics content and content pedagogical issues. School-based Specialists will provide leadership in a variety of ways, and must have the opportunity to strengthen their own leadership skills, to develop

facilitation skills for adult learning, to analyze and draw on current research in teaching and learning, and to become effective change agents. The Task Force recommends that Mathematics Specialists demonstrate the following competencies.

Recommended Competencies for Mathematics Specialists

- Support a commitment to every student learning mathematics.
- Possess a deep understanding of the mathematics that teachers teach including, a core knowledge base of concepts and procedures within the discipline of mathematics that incorporates the following strands: number systems and operations; geometry and measurement; statistics and probability; and, functions and algebra.
- Focus on a thorough development of basic mathematical ideas and skills, with an emphasis on understanding the sequential nature of mathematics and the mathematical structures inherent in the content strands.
- Display careful reasoning and an understanding of the connections among mathematical concepts and procedures in solving problems.
- Possess an understanding of and the ability to use the five processes: becoming a mathematical problem solver; reasoning mathematically; communicating mathematically; making mathematical connections; and, using mathematical representations.
- Possess the ability to use and interpret meaningful measures of students' skills and understandings in mathematics.
- Evaluate students' work and students' thinking and use this to inform instruction.
- Support the use of technology to improve teaching and learning mathematics.
- Demonstrate the ability to collaborate with teachers through co-teaching, mentoring, and coaching.
- Demonstrate the ability to identify teachers' individual professional development needs, and individualize staff development efforts to include both formal and job-embedded professional learning experiences.
- Demonstrate the leadership skills necessary to facilitate staff development in mathematics content, mathematics pedagogy, and assessment of student learning.

The Task Force reviewed the possible role and responsibilities that a Specialist in a Virginia school might take on, and the competencies necessary to carry out these responsibilities. Based on our review of research at the national level, as well as information gathered from school

divisions in Virginia, we recommend that a candidate seeking an endorsement as a Mathematics Specialist have completed at least three years of successful classroom teaching experience in which the teaching of mathematics was an important responsibility. In addition, the Mathematics Specialist should have graduated from an approved Mathematics Specialists preparation program (master's degree level); or, completed a master's degree-level program in mathematics, mathematics education, or related education field with at least thirty semester hours of graduate coursework in the competencies described above, including at least 21 hours of coursework in undergraduate or graduate-level mathematics.

Recommendations for Mathematics Specialists Preparation Programs — Not only must Mathematics Specialists have mathematics content knowledge, but they must also possess a conceptual understanding of the principles underlying its topics, rules, and definitions [6, 16]. In addition, they must possess pedagogical content knowledge that includes, but is not limited to, useful representations, unifying ideas, clarifying examples and counter examples, helpful analogies, important relationships, and connections among ideas. Pedagogical content knowledge is a subset of content knowledge that has particular utility for planning and conducting lessons that facilitate student learning [25].

Teachers preparing to be Mathematics Specialists must have the opportunity to take classes that include content in number and operations, functions and algebra, geometry and measurement, as well as data analysis, statistics, and probability. Technology, as a tool for teaching and learning, should be integrated into coursework as appropriate. Furthermore, these classes should incorporate the five processes: becoming mathematical problem solvers, reasoning mathematically, communicating mathematically, making mathematical connections, and using mathematical representations. Classes must be relevant to the work of Mathematics Specialists, allowing them to develop a deep understanding of the mathematics content. Instructors must model effective content pedagogy and allow Specialists the opportunity to demonstrate their ability to implement effective teaching practices in their school. The key aspect is to verify that teachers can transfer what they have learned in the college setting to their work as a Specialist.

To build leadership skills, courses must be offered that will enable candidates to build a deep understanding of how students learn mathematics and of pedagogical knowledge specific to mathematics teaching and learning. Candidates will learn to develop curriculum that is based on

current research, including national and state standards for mathematics, and will design instruction that meets the needs of diverse learners.

Coursework will enable candidates for the Mathematics Specialist endorsement to develop skills in analyzing individual student performance on a variety of assessment protocols, and in analyzing and interpreting individual as well as collective test data. They will use the results from these analyses to inform instructional decisions. In addition, candidates will learn to gather and interpret relevant data about instructional strategies and instructional programs to facilitate improvements in student learning.

Programs preparing Mathematics Specialists will include the opportunity for candidates to develop skills in planning, implementing, and evaluating job-embedded support, and in staff development for all teachers including the mentoring of new teachers. Candidates for the Mathematics Specialist licensure must possess the skills and knowledge necessary to effectively analyze and interpret research. Mathematics Specialists must develop effective communication skills to share research-based knowledge and skills with administrators, parents, and the greater community.

Recommendation for Mathematics Teacher Specialist Licensure

How do we ensure that mathematics receives equal attention in the elementary and middle school curriculum and in teacher instructional programs as literacy currently receives? This Task Force strongly believes that the foundation for student success in both reading and mathematics begins in kindergarten, and then must be nurtured throughout elementary and middle schools. Virginia state licensure provides professional recognition and legitimacy to reading programs and to Reading Specialists. Across Virginia, school divisions can immediately identify teachers who are prepared as experts at teaching reading by their license. In this same way, we believe that a teacher in a school who carries the title of Mathematics Specialist will immediately be recognized by other teachers, administrators, and parents for their expertise in teaching and learning mathematics.

In June 2003, the Virginia School Board approved the creation of a license for Mathematics Specialists. This endorsement will provide the needed impetus for higher education institutions to develop preparation programs for Mathematics Specialists. The collaborative

efforts among colleges of education, colleges of arts and sciences, local school divisions, and the Virginia Department of Education will bring about the ongoing routine and appropriate preparation of Mathematics Specialists in Virginia.

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