

RECRUITMENT, RETENTION, AND REPLACEMENT OF PARTNER SCHOOL DIVISIONS

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Introduction

The National Science Foundation (NSF) grant, "Researching the Expansion of K-5 Mathematics Specialist Program into Rural School Systems," is adapting and transporting to smaller remote divisions a promising established elementary (K-5) model for preparing Mathematics Specialists from large urban and suburban school divisions. The grant was awarded in August 2009.

Since then, a total of fourteen Virginia school divisions have participated at some time in the rural elementary school grant. Twelve of these divisions have National Center for Education Statistics (NCES) identifiers as Rural Distant, Rural Fringe, Distant Town, or Rural Remote; the two remaining divisions are identified as either Small City or Large Suburb [1]. The NCES provides district details for the 2010-11 school year, including locale designation used for the two NSF grants. In FY11-12, eight divisions fell below .3000 on a state index of relative wealth. The index, discussed later in this article, is capped at .8000.

An overlapping NSF grant, "MSP Institute: Mathematics Specialists in Middle Schools," built on the same promising established K-5 model, is preparing Mathematics Specialists for placement in middle schools. A total of sixteen divisions have participated in this grant since its award in July 2009. More than half of these divisions have NCES identifiers as Rural Distant, Rural Remote, or Rural Fringe. Five fell below the .3000 level on the state index for FY11-12. Eight divisions have participated in both the rural elementary and middle school grants. All eight of these divisions have NCES identifiers as Rural Distant, Rural Remote, or Rural Fringe. All eight were below the .3000 level for FY11-12.

With primary focus on these NCES-identified rural divisions, this article analyzes matters of recruiting partner divisions to participate in the projects, retaining their participation through the period of the grants, and replacing original divisions that withdrew with new divisions.

Extensive effort has been expended on these tasks by members of the project management team and local school division personnel. Most changes occurred during the early years of the grants. Issues related to division entrance and withdrawal are state policy-related. They involve compliance with Virginia Standards of Quality provisions, such as staffing ratios and educational mandates, as well as the Virginia Standards of Accreditation and the federal No Child Left Behind legislation as implemented in the Commonwealth. Compliance with state policy has considerable economic cost at the local level.

There have been additional local issues that have influenced rural partner divisions' abilities to maintain their grant commitments. These include remote locations, challenging physical geography, sparse populations and low tax bases, as well as few accessible higher education and occupational opportunities. Furthermore, the economic crises of recent years have adversely affected state and local public education budgets, limiting discretionary spending. This article reviews and analyzes the participation of the thirty divisions that took part at some time between the initial recruitment efforts and the conclusion of the grants. The discussion is in two sections: Participation by NCES Code and Participation by Selected State Economic Factors.

Participation by NCES Code

Recruitment: Actively Seeking Participation

As the opening moves in sparking local division interest in these two Mathematics Specialist projects, the primary investigators designed a pair of attractive brochures and distributed them statewide to division superintendents and mathematics supervisors. The brochures encouraged school divisions to participate in one or both of the grants. They made it clear that many school divisions in Virginia are making use of well-prepared Mathematics Specialists to support and coach teachers in developing teaching approaches leading to greater student success in mathematics. Furthermore, these efforts have been supported by both state and federal agencies. Research from a prior NSF grant investigating the impact found that overall, students in schools with elementary Mathematics Specialists for three years had statistically significant higher scores on the *Virginia Standards of Learning* mathematics tests than those schools without such Specialists [2].

The brochures outlined clearly and specifically the grant commitments *to* school divisions, such as Specialist-in-training salary support in the initial school placement year, the offering to teacher participants of a Mathematics Specialist master's degree program, and

stipends for the participating teachers. The expected commitments *of* the school divisions also were detailed. The divisions were expected to identify schools and teachers for participation, provide additional salary support for one to two years, require principals to attend two, 1-day workshops to learn about supporting their Mathematics Specialists, and designate an individual to serve on the Partners Steering Committee. Steering Committee members advise the grant management team on how the project might support the Mathematics Specialists and their principals in their schools.

Project team members, most prominently the two principal investigators, were energetic and persistent recruiters. They traveled throughout Virginia calling on numerous personal contacts they had developed over the years, visiting superintendents and central office personnel, and also attending gatherings of potential school division candidates. Targeted recruitment efforts were focused wherever interest was expressed. Links to on-line information were provided, as were lists of school divisions that had participated in previous NSF-supported Mathematics Specialists' studies and those divisions that had already committed to one or more of these new opportunities. Particular attention was paid to identifying pairs of comparable schools which would subsequently be randomly assigned to either treatment- or control-school status for the research component of each grant project.

Moreover, the principal investigator for the elementary grant foresightedly recruited one alternate pair of comparable schools and six additional Specialists-in-training from partnering divisions. Such vision was crucial to maintaining the number of school pairings necessary to ensure the validity of the project's statistical analysis. Contacts with other Mathematics Specialist training programs were made and maintained to establish reservoirs of individuals in non-grant training who, if needed, could be called upon to replace any Specialists-in-training who might withdraw from the program in the early months of professional development prior to in-school placement as Mathematics Specialists.

Despite genuine interest on their part, a number of divisions declined to participate in the grant activities. The decisions not to participate stemmed from two factors. One was the requirement that the divisions pay a large portion of the salary costs associated with their employees admitted to the training program. This requirement primarily discouraged the less affluent divisions. The second factor was that a number of more affluent divisions were stymied

in their participation by already having a number of Specialists positioned in their schools. This precluded their inclusion in the treatment/control school research.

Recruitment: Successes

The principal investigators' perseverance ultimately produced a roster of eighteen distinct participating school divisions, with twelve divisions in the middle school grant and thirteen in the elementary school grant. Seven divisions were participating in both. Pairings of comparable schools based on size of student enrollment and percentage of students eligible for free and reduced meals were determined for the research component, with some pairings crossing division lines; and, Specialists-in-training were selected.

Specialists in the elementary grant cohort began coursework in the winter of 2010 and were placed in their schools in Fall 2011. The middle school grant's first cohort of Specialists began coursework in Summer 2010 and were placed in their schools in Fall 2012. The middle school grant's second cohort began coursework in Summer 2012 with placement expected in Fall 2014.

Both the size and the composition of the rural school and middle school cohorts differ. The rural school grant had twenty-one pairs of schools (treatment/control) and one cohort of twenty-one Specialists-in-training. The expectation was for each of the trained Specialists to serve in one of the twenty-one treatment schools, supported by a combination of NSF grant money and local division funds for two years.

The middle school grant began twelve pairs of schools (treatment/control) and two cohorts each with twenty-five Specialists-in-training. Twelve Specialists-in-training in Cohort I were identified as research subjects to be placed in the treatment schools; twelve Cohort II Specialists-in-training are being prepared for placement in the control schools at the conclusion of the research study. The partner divisions agreed to provide the additional Specialists-in-training, who are not expected to be placed in the schools participating in the research effort, with opportunities to serve as Mathematics Specialists in other division schools upon successful completion of the training program coursework.

Retention: Systems, Schools, and Specialists

As the grants have developed and progressed, considerable attention has been placed on retention: retention of partner school divisions, retention of school pairs, and retention of

Specialists-in-training. These three units are tightly linked, and recruitment efforts continued whenever attrition occurred.

Retention of adequate numbers of Specialists-in-training has been the prime focus. The loss of a Specialist-in-training threatened the continuation of a pairing of participating schools, and thus the integrity of the research component of the study. In the case of a partner division with only one Specialist-in-training, the continuation of the partner division was in jeopardy should the Specialist-in-training not be quickly replaced. Moreover, the loss of a school required re-examination of the pairings of comparable schools prior to assignment to treatment-control status, frequently requiring the recruitment of another school or the activation of a waitlisted school. This was necessary in order to maintain the research design. Furthermore, the loss of a partner division put at risk not only the research portion of the grant, but also the placement of grant-trained Specialists in that division's schools. Therefore, efforts were also made to recruit replacement divisions.

Retention: A Closer Look

An examination of the participating school divisions, schools, and Specialists reveals a variety of forces influencing ongoing presence in the two projects. Three original partner divisions withdrew during the implementation period of the grants. One division withdrew from the rural grant; two divisions withdrew from the middle school grant; and, two other divisions withdrew from the research portion of the middle school grant while continuing in the Specialist-in-training portion.

Three of the five withdrawing divisions are considered rural. These rural partner divisions discontinued their grant participation when each of their sole Specialists-in-training withdrew. Concise descriptions of the reasons for these withdrawals follow.

The sole Specialist-in-training withdrew from the elementary school grant for personal reasons at the end of the second of 10 sessions of planned study. The timing of this withdrawal coincided with the start of the small division's new school year and the partner division was obliged to withdraw its participation. Similarly, the sole Specialist-in-training abruptly withdrew from the middle school grant just before the first round of coursework began with the Summer Institute, an intensive five-week residential program. Replacement of this Specialist-in-training was not possible, as the timing coincided with the beginning of the training program, so the

partner division necessarily withdrew its participation. The withdrawal of a partner division from the middle school grant was triggered by the unexpected job-related family relocation of the sole Specialist-in-training to a distance away in another school division.

In addition, one of another rural division's two middle school Specialists-in-training withdrew from the program. The withdrawal was triggered, again just before the school year began, by an administrative decision changing that Specialist-in-training's teaching assignment from mathematics to English. The Specialist-in-training understandably considered this subject matter switch an impediment to her completing mathematics content and pedagogical course assignments, as well as becoming an effective mathematics presence among the faculty. However, the division continued its partner participation with its one remaining middle school Specialist-in-training.

Two urban/suburban divisions each separately made administrative decisions that effectively ended their participation in the research portion of the middle school project. As the 2011 school year drew near, each division elected to provide additional mathematics instruction resources to each of its middle schools. The infusion of this extra support meant there were no longer any schools in these divisions able to serve as controls, and thereby provide the necessary promised research data. Nevertheless, the two divisions remained participants in the preparation portion of the grant. The Specialists-in-training were thus able to complete their studies and continue in division middle schools, some in leadership roles as Mathematics Specialists at the start of the 2012 school year.

Administrative decisions occurred in another division participating in the middle school grant following the departure of a strong mathematics supervisor. Months after the grant's initiation and prior to this significant personnel change, the division had chosen to increase its grant participation by adding a pair of schools and an employee engaged in non-grant Specialist training. This addition offset a withdrawal elsewhere in the grant triggered by a division decision to change a Specialist-in-training's school placement. Sometime later, the participation of one Specialist-in-training was nullified by a local administrative choice regarding placement. Again, this individual was replaced with another division employee engaged in a non-grant training program, again maintaining the research commitment. These movements reinforce the importance of having a strong bench.

After one year of data collection in the rural grant, two divisions that were participating in the research project closed a total of three elementary schools due to declining student enrollment. School boundaries were changed within the divisions. As a result of these actions, two school pairings were lost from the rural grant.

Replacement

At the onset of the projects, the principal investigators actively recruited more than the minimum number of divisions, schools, and potential Specialists required. These efforts maintained the integrity of the research program and sustained the number of participating divisions at satisfactory levels.

Thirteen divisions were on board at the start of the elementary grant and thirteen divisions are participating at the present time. Because one division left and one division joined during the early stages of this grant prior to data collection, a total of fourteen have participated at some time during the duration of the grant. The middle school grant began with fourteen divisions and currently has twelve. Sixteen divisions have participated at some time during this grant as four withdrew and two joined.

The withdrawal of a Specialist and subsequent withdrawal of a division early in the rural school grant was offset by the recruitment of another division. This new division brought a pair of schools to the research portion of the grant, as well as a teacher who was currently participating in a Mathematics Specialist training program not affiliated with the rural school grant.

In the middle school grant, the withdrawal of two Specialists-in-training led to the withdrawal of two rural school divisions. The two losses were balanced by the recruitment of one division that brought two pairs of schools and two teachers also engaged in Mathematics Specialist training outside the NSF grant.

Also in the middle school grant, as noted previously, two divisions left the research portion of the grant when their administrations added mathematics support personnel to the control schools. The two losses were compensated by the recruitment of one division with a suburban/urban coding. This late-joining division was able to contribute two pairs of schools and

two teachers engaged in non-NSF grant training, covering both the two lost Specialists-in-training and the two pairs of schools.

Participation has stabilized. There has been no further attrition of Specialists or divisions in either grant since the first half of 2011. Clearly, the success in maintaining adequate numbers of cooperating school divisions, schools, and Specialists has been due to the grant leaders' immediate and continuing emphasis on encouraging retention, and their ability to replace Specialists-in-training from several sources, as well as their ability to recruit replacement divisions already involved with Mathematics Specialists.

Encouraging Retention

Retaining Specialists-in-training and enabling divisions to benefit from these in-school coaches have been keystones of grant activities since initiation. Promoting equitable access to Mathematics Specialists by rural and less wealthy divisions throughout the Commonwealth has been a driver of many decisions made along the way. Demonstrating that training and support for Mathematics Specialists can be feasible in every Virginia school division—from the far western mountains to the Atlantic Ocean—is critical to gaining local and state political and financial support for school-based Mathematics Specialists and training programs. Therefore, from the beginning, several strategies were implemented to enable school divisions and Specialists-in-training to maintain their commitments and efforts. These successful strategies, first developed for the rural school grant based on lessons learned from prior NSF Mathematics Specialist preparation projects, were largely replicated by the middle school project, which has had an overall majority of rural divisions participating. These strategies are outlined below.

Initial Recruitment of Waitlisted or Alternate Pairs of Schools and Specialists-in-Training — Alternate Specialists-in-training were recruited and fully engaged in the professional development program to increase the likelihood that all participating divisions would have Specialists, despite attrition, as well as to support the qualitative research study in the K-5 grant. Thus, a reservoir of alternate Specialists-in-training existed to replace Specialists who might discontinue participation. There was awareness of Mathematics Specialist training programs independent of the grants.

Instructional Designs and Technology Support for the Master's Program — Great attention was paid to adapting the master's degree training program to meet the challenges of delivering content and pedagogical training to individuals scattered throughout Virginia. Participants in previous training programs had been located geographically closer to each other. These students had met

regularly in classes and worked together on assignments, and therefore were able to develop personal relationships and support groups.

However, with the wide geographical dispersal of the K-5 and middle school grant students, the reliance on instructional technology increased dramatically. There was more on-line instruction, including on-line break-out group work and electronic submission of assignments. A blended format, which included several face-to-face weekend meetings for the content and leadership courses otherwise conducted on-line, was developed and used. The Specialists-in-training appreciated these weekend meetings for the opportunities to become personally acquainted with other students and with their instructors.

Focus on Supporting the Specialists-in-Training through Tailored Coursework and Interpersonal Connections — Considerable effort was made to find useful teaching formats and to support the students technologically and personally in their remote locations. The three residential Summer Institutes, which had been developed during the prior grant, were improved and continued, and were highly valued by participants.

Facilitating strong student-student relationships, as well as effective student-instructor relationships was important in maintaining enthusiastic Specialist-in-training participation. Relationship building, working with principals and colleagues, and doing independent research and study were particularly emphasized in the three educational leadership courses. Goals were to foster the independence of widely-dispersed Specialists working separately in their schools, and to assist them in building personal support networks in their school communities that would continue after placement. For example, the first such collaborative project required the Specialist-in-training to meet with the receiving principal if moving to a new building; or if remaining in the current location, to have a meeting with the current principal to focus on the transition from classroom teacher to the role of Mathematics Specialist.

Principal and Central Office Administrator Participation in Regional Workshops and School-Based Activities — A series of workshops was developed for all elementary treatment school principals because many rural school divisions do not have supervisory positions dedicated to mathematics. Grant personnel offered intense and interactive instruction during two 2-day and one 1-day sessions which addressed topics, such as the division and school visions for mathematics instruction, the role of the Mathematics Specialist, and planning for the Mathematics

Specialist's entrance into the school community. Principal attendance and participation were enthusiastic and central administrators with responsibility for instruction also frequently attended. After the overwhelmingly positive response from the rural group, this program was modified and offered to the middle school principals and administrators who responded with similar positive feedback.

Retention by NCES Division Descriptors: Data

Data were collected on the retention of the original partner divisions during the terms of the two grants. The data were examined by participation in the middle school grant, by participation in the elementary grant, and also by participation in both grants. Categories of analysis included "Continued Full Participation," "Continued Reduced Participation," and "Withdrawn." ("Reduced Participation" is defined as the division's continuing in the grant, but with fewer than the original number of Specialists and/or original school pairs.) Percentages of "Continuing Full Participation," as well as "Continuing Full or Reduced Participation" were calculated.

When the data from both the rural and middle school grants are combined, we find a total of twenty-two divisions, thirteen of which continued full participation. Five of the ten urban divisions in this combined group continued full participation (50%) as did eight of the twelve rural divisions (67%). Nineteen of the twenty-two original partner divisions (86%) continued full or reduced participation during the terms of the grants. Only three divisions, one in seven, withdrew.

Table 1**COMBINED RK-5 AND MS GRANTS ORIGINAL PARTNER DIVISION PARTICIPATION OVER TIME BY NCES CODES**

Combined RK-5 & MS Treatment divisions only*	Original: Continued Full Participation	Original: Continued Reduced Participation	Original: Continued Full or Reduced Participation	Original: Withdrawn	% Original Continuing Full Participation	% Original Continuing Full or Reduced Participation
Rural 16	9	4	13	3	56%	81%
Urban 10	5	2	7	0	50%	70%
Combined 22	13	6	19	3	59%	86%

*Any division participating in both grants is counted twice in this combined section.

NOTE: All five control-schools-only divisions continued according to the terms of the agreement.

There are cautions in drawing conclusions from this data. It must be kept in mind that the N's in these categories of analysis are small. Thus, the analyses could be skewed by the action of one division in a small group. There were thirteen original divisions in the rural grant and fourteen in the middle school grant, with some divisions participating in both grants.

Moreover, while the contributions of the control schools are vital to the research portions of the grants and thus greatly valued, these analyses do *not* include the actions of the divisions that provided only control schools to one of the research studies. None of these divisions discontinued participation, enabling the integrity of the research investigations.

To summarize, five of the ten original divisions in the middle school grant have rural NCES descriptors and five have urban NCES descriptors. Five divisions (three urban and two rural) have continued full participation (50%). Two rural divisions withdrew. One rural division and two urban divisions reduced participation. The sole middle school division to maintain full participation has a rural descriptor.

Two-thirds of the 12 original divisions in the rural elementary grant (eleven divisions with rural NCES descriptors and one division with an urban NCES descriptor) have continued full participation (67%). Three have continued with reduced participation. One division became ineligible to continue after losing its sole Specialist-in-training. Although percentages are misleading when numbers are small, for the record, the participation of Rural Remote, Distant Town, and City Small divisions was 100%.

Retention by NCES Division Descriptors: A Closer Look at the Data

Decisions leading to divisions either withdrawing from grant participation or reducing participation from the original levels were either policy-driven or Specialist-driven. The policy decisions were made equally by divisions with urban and rural descriptors. All of the Specialist-driven decisions were in rural divisions.

Two urban divisions made similar and independent decisions to end participation in the research portions of the middle school grant. Responding to requests from principals and parents, the school boards and administrations of these two divisions agreed to provide additional mathematics instructional assistance in each of its several middle schools. Of course, these actions resulted in the divisions having all treatment schools and no control schools.

These two divisions are similar in their relative wealth compared to most other divisions in the state. They are also similar in their access to many schools of higher education, large populations, and considerable numbers of well-educated citizens who are involved in their local schools. They are similarly desirable locations for teachers due to salary levels and amenities of urban living. They are geographically compact.

A third division-level policy decision was necessitated by declining enrollment and subsequent redrawing of school boundaries across several elementary schools in this geographically large rural county during the second year of Mathematics Specialist placement and data collection. As a result, two school pairings were lost. This decision did not reflect dissatisfaction with the mathematics grant. The division continued to participate in the elementary grant with its remaining pairs of treatment/control schools. The decision was driven by the constraints of low enrollment, rugged geography, and low local wealth.

Another policy-driven change was related to an effort to improve student performance on tests of English language skills. The assignment of a participant in the middle school grant training program was changed from mathematics in an effort to boost language arts achievement.

Three Specialist-driven decisions to discontinue participation in the training program forced the withdrawal of their rural divisions. One division's sole K-5 Specialist-in-training abruptly withdrew after the professional development sessions were well underway, but before school placement. Another division's sole middle school Specialist-in-training withdrew just as the first summer session began. Another division's sole middle school Specialist-in-training withdrew unexpectedly mid-year due to family relocation.

The timing of the resignations stymied finding suitable replacements among division personnel in training Mathematics Specialist training programs. Twice before, when rural Specialists-in-training had resigned at the end of the school year, replacements had been secured. However, in the three cases described above, these sparsely populated Rural Distant/Rural Fringe divisions did not have the "bench strength" to replace the abruptly resigning personnel.

Participation by Selected State Economic Factors

Retention by Selected Economic Factors

This section presents data about both elementary and middle school partner divisions in order to provide context for the funding and policymaking landscapes present when decisions about their Mathematics Specialists programs were being considered and enacted. The segments that follow outline policy requirements for state and local elementary and secondary education funding, analyze changes and trends in partner divisions related to the state funding formula for public schools known as the local composite index, and describe recent state and local funding for education. The final segment addresses the impact of these policies and funding mechanisms on staffing, one of the most important and costly components of public school operations, and considers staffing decisions made in grant divisions.

State Policy: The Constitution of Virginia

Article VIII of the Constitution of Virginia sets forth the framework for governance of public elementary and secondary education in the Commonwealth of Virginia; it is appropriately known as "the education article." Article VIII Section 1 reads:

The General Assembly shall provide for a system of free public elementary and secondary schools for all children of school age throughout the Commonwealth, and shall seek to ensure that an educational program of high quality is established and continually maintained.

Article VIII, Section 2 reads:

Standards of quality for the several school divisions shall be determined and prescribed from time to time by the Board of Education, subject to revision only by the General Assembly. [Note: The members of the Board of Education are named by the Governor and confirmed by the General Assembly.]

The General Assembly shall determine the manner in which funds are to be provided for the cost of maintaining an educational program meeting the prescribed standards of quality, and shall provide for the apportionment of the cost of such program between the Commonwealth and the local units of government comprising such school divisions. Each unit of local government shall provide its share of such cost by local taxes or from other available funds.

Herein the General Assembly sets the floor of the educational program (that is, the above-mentioned Standards of Quality, familiarly known as the SOQ), determines the amount of funding required for the floor program, and then obligates the local governments to pay a portion of the legislatively-determined costs.

In 1992, after several years of debate, the General Assembly approved the direct election of the school board in a locality if a majority of the qualified voters in such a referendum vote in favor of changing the method of selection to direct election. Prior to passage of this legislation, all local school board members were appointed by members of the local governing body; i.e., the county board of supervisors or city/town council, or in a few cases, a school board selection commission appointed by the circuit court. Eleven years later, 85% of the Commonwealth's 133 local school boards are elected and 15% appointed, according to information from the Virginia School Boards Association in 2013. The proportions are similar to the situation with the grants' partner divisions: 86% elected, 14% appointed.

Local school boards, elected or appointed, do not have fiscal autonomy. That is, they do not have taxing authority and are dependent on the local governing body for transfers of local

funds to support school division operations. Every year, the local governments and local school boards have important and frequently lively discussions over the level and purpose of the school division funding request, as well as the sufficiency of local revenue sources to support K-12 education, and other services and programs provided by the local government. These discussions typically generate considerable citizen interest and pressure regarding the appropriate levels of educational programs and staffing, local funding, and local taxes.

Complicating these negotiations are state limitations on local governments' access to sources of revenue. Local real estate property taxes provide by far the majority of local revenue. Business, sales, and lodging and meals taxes contribute much smaller amounts. State legislators have been reluctant to grant additional taxing authorities to local governments. Thus, this over-reliance on local property taxes in the absence of other significant revenue sources strains local budgets, especially in times of declining or stagnant property values. It also places locally-elected governing body members in the crosshairs of voters should they vote to increase local taxes to support school operations.

State Policy: The Local Composite Index

State education funding policy, as enacted during the early 1990s, is that for Virginia as a whole, the state assumes 55% of the statewide costs of funding the Standards of Quality (SOQ), leaving 45% of the funding to be provided collectively by the local governments. It is the legislature's policy to provide proportionately more funding to those school divisions judged by it to be less able to fund the so-called local share than it does to those school divisions judged more able.

These funding adjustments are provided through a controversial formulaic measure of the local ability to pay, widely known as the local composite index (LCI). The LCI compares a trio of local measures of wealth—real property values, adjusted gross income, and local option sales taxes—to the statewide averages of these same measures. Adjustments are made according to both student and total populations [3]. This index ranges from just under .2000 at the less affluent end to .8000 at the more affluent. The state budget adopted by the General Assembly enumerates provisions for calculating the LCI, with new LCI figures being calculated every two years to be in effect for the upcoming state two-year budget period.

To understand how this formula works, consider the following example. A local government with an index of .2000 would receive 80% of required SOQ expenditures from the state and would be responsible for the remaining 20% of the floor program. At the other extreme, a local government with an index of .8000 would receive 20% of its required SOQ expenditures from the state and be obligated to provide the other 80%. Thus, an SOQ-mandated teaching position estimated by the state to have an annual cost of \$36,000 requires those divisions with an index of .2000 to come up with \$7,200 in local dollars and those with an index of .8000 to find \$28,800 in local funds.

Although the funding formula methodology is sometimes criticized for not reflecting variations in local revenue sources and local needs for services, as well as for using dated wealth indicators, it has remained in place for forty years [3]. These local perceptions are supported by the finding that local spending efforts have exceeded by far the amounts the legislature has determined as sufficient to meet the local share of SOQ costs. According to Virginia Department of Education figures, local government education funding during the last few years has exceeded the amount deemed by the state government as necessary to meet the required local share by *more than \$3 billion annually*. This amount illustrates the stark difference between the state and the local government's views regarding elementary and secondary school funding requirements on the part of both the state and local levels.

Participating Divisions and the Local Composite Index

Table 2 shows ranges into which the calculated LCI for both elementary and middle school partner divisions fell for both FY11-12 and FY13-14. The LCI figures are recalculated every two years using data from the three wealth indicators previously noted as well as student/total populations from previous years. The LCI for FY11 and FY12 was calculated in November 2009 using 2007 data. The LCI for FY13 and FY14 was calculated in November of 2011 using 2009 data. The LCI calculations for these fiscal years are used in this presentation as they span a majority of the RK-5 and middle school grant periods.

Table 2
LOCAL COMPOSITE INDEX (LCI) OF ELEMENTARY (K-5) and MIDDLE SCHOOL
(MS) PARTNER DIVISIONS
Fiscal Years 2011-12 and Fiscal Years 2013-14

LCI RANGE	Number of K-5 Partner Divisions FY11-12*	Number of K-5 Partner Divisions FY13-14		LCI RANGE	Number of MS Partner Divisions FY11-12**	Number of MS Partner Divisions FY13-14
Less than .2000	5	3		Less than .2000	5	2
.2001 to .3000	2	4		2001 to .3000	1	3
.3001 to .4000	3	3		.3001 to .4000	5	4
.4001 to .5000	2	2		.4001 to .5000	1	1
More than .5001	2	1		More than .5001	4	2

*One elementary school division (NK) became ineligible to participate in the grant research and is included only in the K-5 Partner Divisions FY11-12 column above.

**Four middle school divisions that became ineligible to participate are included only in the MS Partner Divisions FY11-12 column above.

NOTE: School divisions added as partners to the MS project are included in both columns.

For FY13 and FY14, more than 80% of the Commonwealth's 136 school divisions have an index below the midway point of .5000. The indexes for the thirteen partner school divisions in the elementary project, with the exception of one division, are below .5000 for FY13 and FY14. This means that these low-index local communities are responsible for less than half of the costs of the state-recognized foundation education program required by the state. At the same time, the local communities are responsible for all additional costs incurred if they choose to provide educational programs above this state minimum.

As noted in the opening paragraphs, one of the key pieces of the local composite index calculation compares the wealth indicators (real property values, incomes, and sales taxes) of a particular locality to the statewide averages for these indicators. Such a comparison often yields surprising results not readily understandable by the layman or by the local governing bodies. For the thirteen elementary partner divisions, the LCI for FY13-14 increased from the previous FY11-12 calculation in ten of the divisions, indicating these localities became relatively richer as measured against state averages. For the three divisions whose LCI decreased, each of the three measures of wealth declined.

However, in those elementary divisions that experienced LCI increases purportedly reflecting relative increases in wealth, three saw drops in all three indicators. Five divisions saw increases in either one or two measures. Only one division whose LCI jumped had increases in all three measures of wealth.

For the middle school partner divisions, a review of Table 2 also shows the dispersal of the LCI to be distributed similarly to the elementary divisions. Three-fourths of the middle school divisions show indexes below .4000. For the twelve existing middle school partner divisions, the LCI for FY13-14 increased from the previous calculation in seven of the divisions and decreased in five divisions. It is notable that the divisions where the LCI dropped experienced declines in all three measures of wealth. Two other divisions with declines in all three measures of wealth nevertheless saw their composite index increase slightly.

Two middle school partner divisions that became ineligible to participate in the research portion of the project continued to participate in the Specialist-in-training component. Their decisions to provide enhanced mathematics instruction resources to all middle schools, not just the treatment schools, obviated their continuing as controls. These policy decisions hinged, practically speaking, on the financial ability of each division to provide additional funds for these efforts.

As noted in the "Recruitment" section of this article, some less affluent divisions that were approached about participation in the project were unable to do so because of the requirement for a local financial commitment. The analysis above indicates that, nevertheless, school divisions that did sign on and stay with the elementary or middle school projects are more evident at the lower LCI (less affluent) ranges. Specifically, more than half of the elementary

partners (seven of thirteen) and nearly half of the middle school partners (five of twelve) had very low LCIs of less than .3000.

Furthermore, by recalling that more than 80% of school divisions in Virginia have an LCI below .5000, we may conclude that a majority of grant partners tended to be among the state's markedly less affluent school divisions. Making such a considerable funding commitment to enhancing mathematics instruction while facing limited financial capabilities was a difficult, albeit commendable, policy decision for such local school boards to make.

Funding Trends

In the previous section, we devoted much attention to the local measures of wealth that drive the apportionment of state and local public education funding. From this discussion, it is apparent that local wealth and thus local educational programs vary markedly in the Commonwealth of Virginia.

In this section, we turn our attention to analyzing dollars spent on K-12 operating expenses for FY09 and FY12. During FY09, local school divisions were making their decisions about whether to take advantage of the grant opportunities for improving local mathematics instruction. Thus, this year is a meaningful time to look at the state and local funding in these divisions.

During FY12, there was stability in grant participation by divisions. This stability permits the benchmarking of funding trends over the previous three-year period during which state and local budgets were severely stressed. This analysis is based on information presented in the 2009 and 2012 Superintendent's Annual Reports (Table 15—Sources of Financial Support for Expenditures, Total Expenditures for Operations and Total Per Pupil Expenditures for Operations), excluding the estimated sales and use tax revenues returned to the locality on the basis of school age population [4].

State dollars for public elementary and secondary education decreased from FY09 to FY12 in every partner school division in the two grants, with the exception of one middle school partner. This situation is consistent with the overall statewide decline in state education dollars during the so-called "great recession," when state funding dropped from \$5,274 per pupil in FY09 to \$4,546 per pupil in FY12. This situation forced school divisions across the state to examine

their local educational offerings, and make budget and policy decisions to deal with the new state funding reality. During this period, local funding increased to make up for the loss of state dollars in some, but not all, of the partner school divisions.

During this time period, local funding increased in seven of the thirteen elementary partner divisions. Most of these divisions increased local dollars by several hundred thousand dollars. However, two divisions increased local funding by \$4 million or greater. In both of these cases, sizeable jumps in two or three wealth indicators drove the increase in the amount of required local funding.

The seven elementary divisions also saw decreases in year-end average daily membership (student enrollment). Three had decreases in the LCI, with year-end average daily membership holding steady in two divisions and increasing slightly in one. It is significant to note that in the three divisions where the LCI decreased, thus signifying a lesser local funding obligation, local funding nonetheless increased.

Among the existing middle school partner divisions, local funding increased in all but three divisions during this time. Of the divisions that increased local funding, the LCI also increased or remained relatively stable in seven. Student enrollment increased in three of these divisions, while remaining steady or dropping in the other four. It is significant to note that in two divisions where the LCI decreased (thus less local funding for education being required by the state), local dollars appropriated to the school divisions nonetheless increased. Student enrollment also increased in both of these divisions.

Economic factors and the resultant educational policy decisions affected not only the recruitment partner school divisions, but also forced some partner divisions to withdraw from grant participation. In contrast, they enabled the participation of replacement divisions.

As noted earlier in this article, a total of five partner divisions became ineligible to participate in the research projects for various reasons. Three of these five divisions had LCIs below .4000. Though these divisions had shown both the willingness and the ability to participate in the research projects, their relative poverty, small populations, and rural locations combined against ready replacement of the departed Specialists-in-training.

The other two were relatively large school divisions with extensive existing instructional and support resources available. In each division, both student enrollment and the amount of additional local dollars spent on their schools increased between FY09 and FY12 when state dollars dropped. As noted previously, the policy decisions that resulted in their ineligibility revolved around the desire and financial ability of the two divisions to provide additional dollars to address mathematics instruction and achievement needs across all of their schools.

In the middle school project, two school divisions having Specialists-in-training in non-grant programs were able to step in. These replacement divisions had an LCI in the .3001 to .4000 range, and again, notably, were large school divisions with considerable instructional resources in many schools, as well as increasing student enrollments. Quite significantly, both also had local populations voting with their pocketbooks to support their local schools. Each locality dipped into local coffers to the tune of tens of millions of dollars above the state's required local funding effort.

Staffing

It was noted earlier that the state shares the costs of funding the SOQ with local governments, providing more funding to those localities less able to support their schools. In this section, an analysis of funding of instructional and support positions in partner school divisions, as reported by the Virginia Department of Education, reveals that the state shares, with the local governments, the costs of just under 2/3 of the total positions in the school divisions (pupil transportation positions are excluded, being funded through a different mechanism). The salary and benefit costs of the additional positions in excess of those required by the SOQ are borne entirely by the locality. They result from local choices to provide, for example, lower pupil-teacher ratios or additional course offerings not required by the SOQ.

Due in part to the varying sizes of student enrollment of the participating school divisions, the number of total personnel employed by the middle school grant divisions is much larger than in the elementary partner divisions. Despite these differences in size, the percentages of shared and local positions are remarkably similar across both the RK-5 and middle school partner divisions, and are consistent with the statewide figure of 64% of all positions reported being SOQ positions (see Table 3).

Table 3

Partner Divisions	Total FY12 SOQ-Funded Positions (state and local share)	Total Positions Reported on Annual School Report (FY12)	State and Local Shared Positions (percentage)	Locally-Funded-Only Positions (percentage)
Rural K-5	6,564	10,399	63.1%	36.9%
Middle	32,054	49,888	64.3%	35.7%

Going deeper into the numbers, we find that the percentage of shared positions ranged from 56.3% to 75.1% in the elementary partner divisions. In the middle school partner divisions, the percentage of shared positions ranged from 50.4% to 74.6%.

For comparison, a similar analysis of FY10 funded positions among elementary partners found about forty more total SOQ-funded positions in FY10 than were reported in FY12. However, the total number of positions reported (which also includes those locally funded) had declined by nearly 2,000 by FY12. In existing middle school partners, SOQ-funded positions increased over 1,700 from FY10 to FY12, while the total positions reported decreased by nearly 4,800.

With the exception of one small school division, every partner school division reported a smaller number of total positions for FY12 than for FY10. A faltering economy and the resulting smaller school budgets during the period likely are to blame for the cutbacks in the number of school personnel being employed during this period. Class sizes may have gone up; elective courses may have disappeared.

Local governing bodies and school boards across the state typically view the state-required staffing levels as a “minimum” and, in many cases, not sufficient to carry out educational programs to the level and degree desired locally. They utilize locally-generated tax revenues to fund a higher level of staffing, which can be seen in the form of lower class sizes and expanded course offerings. So that the state education budget is not driven by the costs of such local aspirations, state policymakers reasonably do not contribute a share of funding to every position a local school board chooses to have in excess of those required by the Standards of Quality.

Among the elementary partner divisions, it is noteworthy that the highest percentages of “local only” positions were found in three divisions with LCI below .3000. Of the employees in these divisions, 41-44% fit that bill. Among middle school partners, the four divisions having the highest percentages of “local only” positions had an LCI below .3200. Thus, despite their low ability to pay, these divisions have made policy choices to employ personnel in greater numbers, solely at local expense, to meet educational needs and desires.

Statewide, an overall increase in the number of shared funding positions over the two-year period and corresponding decrease in the number of total positions reported, may be driven by policy decisions taken by local school divisions during tight economic and budget times. First meeting the SOQ requirements to fund mandated positions (for which the funding obligation is shared) decreased the number of positions funded solely by local dollars.

Also of note is a state policy decision during this time period that could be driving a shift to more shared funding positions. In 2009, the state capped its funding for school support personnel positions. The change amounted to a more than a 30% pull-back in state funding assistance for positions such as central office positions, as well as clerical, technical, and maintenance personnel. This abrupt change likely contributed to a reduction in the number of total personnel as local dollars were shifted to fund the costs of paying a larger share for support personnel positions.

Examples of local positions above those mandated by the state would be those necessary to reduce or maintain class size, especially when the division chooses to have smaller classes than those dictated by state staffing ratios. Additional positions accommodate changes in student enrollment, needs or location, allow supplemental (not required) courses of instruction, and address other educational goals of the community. Furthermore, support positions are needed to meet additional administrative requirements identified by the local school board as necessary to meeting local educational goals as well as state educational mandates. In recent years, increased needs for technical computer and network support are key examples of critical support positions, as are support personnel needed to assist in implementing the state-mandated testing program.

Employment of school personnel always is a critical policy decision for school boards because employee salaries/benefits typically comprise the bulk of any local school division

budget. School divisions that had agreed to participate and remain in the grant projects were quite cognizant of the local financial commitment required for such participation. In tough times, these divisions necessarily weighed continuing the local supplemental funding for Specialists-in-training involved in the research project against employing the costs of other instructional or support personnel.

Economic Factors Roundup

In the face of the economic pressures of declining state dollars for public education and the relatively low wealth of many participating partner divisions, the school divisions that participated recognized the important benefits to their students and communities of increased student achievement in mathematics. School divisions that did sign on and stay with the elementary or middle school projects continued their commitments to preparing mathematics coaches that would enhance the capabilities and capacities of classroom teachers to deliver instruction in mathematics.

These enduring commitments are demonstrated by the following analysis. As a result of local initiative and/or being required to increase local funding for schools through the state formula, nearly 2/3 of the partner divisions in both research projects increased local dollars to their schools during the time in which state dollars were declining.

Making such a considerable funding commitment to enhancing mathematics instruction while facing limited financial capabilities was a difficult, albeit commendable, policy decision for such local school boards to make. The two National Science Foundation research projects—"Researching the Expansion of K-5 Mathematics Specialist Program into Rural School Systems" and "MSP Institute: Mathematics Specialists in Middle Schools"—have benefited greatly from the choices of the participating partner school divisions to use increased local funds to train local Specialists, and to provide research data for analyzing the benefits and challenges of training elementary and middle school Mathematics Specialists.

Conclusion

Goals set out in the middle school grant proposal included the following two objectives: 1) preparing a group of fifty exemplary middle school teachers to provide intellectual leadership as school-based Mathematics Specialists; and, 2) determining the extent to which a quality Institute experience results in transforming the participating teachers from effective classroom teachers to disciplinary leaders. Among the goals in the proposal focused on elementary school

systems at the K-5 level were these two: 1) scaling a promising model for preparing and supporting K-5 Mathematics Specialists across rural settings; and, 2) determining the impact of these Specialists on student achievement, on teachers' beliefs and instructional practice, and what factors influence the impact of these Specialists in rural schools.

Meeting these goals required the recruitment of divisions, schools, and Specialists-in-training. Changes occurred in the composition of all three groups over the several years the grants were active, but project team members were resourceful in their efforts to retain or replace most of the few divisions, schools, and Specialists-in-training which became ineligible to continue.

The strong motivation of divisions to persevere in dedicating funding and personnel to training Specialists, employing Mathematics Specialists, and participating in data collection and research investigations throughout the grant years was the foundation on which the grant work moved steadily forward. As important was the persistent dedication over the course of several years of the Mathematics Specialists to complete the rigorous coursework and school leadership training required. With them, the research and training goals of the two grants were completed. With them, new models and methods for providing strong mathematics instruction at the K-5 and middle school levels have been advanced.

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