

# **From Content Experts to Change Agents: The Case of the Vermont MSP**

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*Janice Hinton<sup>1</sup> sat in the classroom of 4<sup>th</sup> grade teacher Brenda Kennedy at Meadowbrook Elementary School. Hinton had formerly taught 3<sup>rd</sup> grade at Meadowbrook, before being hired three years ago as the Vermont MSP site coordinator at her school. In this position, Hinton was released from classroom teaching and was responsible for working with teachers to improve student learning in mathematics. Hinton provided support to teachers at Meadowbrook through a variety of activities, including helping them with lesson planning, which was her task this day with Kennedy. At Kennedy's request, Hinton met with her twice each week to discuss strategies for teaching mathematics to a class of students with a wide range of abilities. In addition to lesson planning, Hinton also occasionally co-taught with Kennedy to help demonstrate some of the strategies they discussed. In their meeting this day, Hinton and Kennedy discussed the effectiveness of a strategy that Kennedy had recently implemented of teaching students in four ability groups. Kennedy expressed concern that her lowest performing group was not progressing and that it was difficult for her to spend enough time with this group. With Hinton's support, the two teachers reconfigured the class into three groups, then mapped out a week of instruction that specified what each group would do and who, between Hinton and Kennedy, would work with them.*

*At the launch of the Vermont MSP, Hinton was hired into the site coordinator role on the basis of her graduate degree in mathematics education. While Hinton had been viewed by her colleagues as a leader in the past, based on her knowledge of mathematics, the site coordinator role had positioned her as a change agent, to directly impact mathematics instruction among all teachers in her school. In addition to working with teachers in Meadowbrook, Hinton also participated in Vermont MSP professional development for site coordinators in the project. When she met with the other eight MSP site coordinators during these events, Hinton learned how the roles of the site coordinators differed from one another. While all site coordinators had a common purpose of improving mathematics instruction in their schools, the roles were designed to lead change that addressed the particular needs of each school.*

## **INTRODUCTION**

The Vermont MSP<sup>2</sup> was launched in 2003 with the award of a Math and Science Partnership (MSP) grant from the National Science Foundation, with work continuing through 2008. The Vermont MSP built on an existing program designed to develop mathematics teacher leadership—the Vermont Mathematics Initiative (VMI), a masters' degree program at the University of Vermont that focused on developing teachers' mathematics knowledge and skills. The two programs were tightly linked and had shared leadership. Ken Gross, a founder of VMI and professor of mathematics and education at the University of Vermont, served as principal investigator (PI) of the Vermont MSP. The former executive director of VMI, Regina Quinn, was the Vermont MSP project director and co-PI. A second co-PI was Doug Harris of The Vermont Institutes, a research and development organization that administered the MSP grant. A third co-PI was Marc Hull, who was Commissioner of Education in Vermont at the time of the

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<sup>1</sup> Pseudonyms are used in all vignettes, which are based on accounts of project leaders and participating teachers.

<sup>2</sup> The official title of the project is the Vermont Mathematics Partnership. Throughout this case, the project is referred to as the Vermont MSP.

MSP proposal and who continued to serve as co-PI until his death in 2005.

The mission of the Vermont MSP was to improve mathematics teaching and learning for K-12 students in the partner school districts. This mission translated into five main goals: developing teachers' understanding of mathematics, providing support systems to partner schools, developing and using ongoing assessment systems, providing high quality mathematics professional development for teachers, and contributing to the research base on mathematics teaching and learning. Teacher leadership was a central strategy for accomplishing these goals. Vermont MSP teacher leaders participated in developing and delivering professional development and other forms of instructional support to teachers in their districts. Project leaders defined the role of teacher leaders in supporting the overall goals of the Vermont MSP:

- Teacher leaders are effectively utilized in every school to provide guidance and support to other teachers, and to help lead continuous school improvement.
- Teacher leaders have access to high quality professional development materials to support teachers in developing a deep understanding of mathematics.
- Teacher leaders have a variety of strategies to support and promote effective mathematics education in their schools and districts.

The Vermont MSP offered to the partner school districts short, content-rich mathematics professional development courses. In each partner school district, VMI graduates were recruited for Vermont MSP teacher leader positions. These teacher leaders helped develop and present the mathematics courses, and supported teachers at their schools to implement what they were learning in the Vermont MSP courses.

This case describes the teacher leadership program of the Vermont MSP and how the program moved teachers with content expertise into roles as change agents who could affect instruction across their schools and districts. The case begins with an overview of the partner organizations in the Vermont MSP, followed by information about the context for mathematics teacher leadership in Vermont and a description of the strategies used by the Vermont MSP to achieve its goals. This information is followed by a discussion of key issues identified by the project leaders as shaping the design and implementation of the program, as well as the leadership roles of participants. The case concludes with a discussion of the sustainability of the teacher leadership program of the Vermont MSP.

## **Description of the Vermont Math and Science Partnership**

The Vermont MSP was a partnership of several colleges, universities, and school systems across the state who worked together through the conceptualization and implementation of the project. Most of the colleges and universities involved in the partnership were centrally located in the Burlington and Montpelier areas of the state, including the University of Vermont, Norwich University, and St. Michael's College. The Vermont State Colleges system was also a partner, particularly Castleton State College, the key partner in southern Vermont. Another partner was The Vermont Institutes, an education non-profit organization in Montpelier with a focus on research and evaluation.

The partnering institutions of higher education played multiple roles, including development and delivery of course content for the partner schools, direct support of teachers and teacher leaders in the K-12 setting, participation and leadership in research, publication and materials development, and logistical and technical support. The Vermont Institutes administered the grant, supported school sites in a needs assessment process, and conducted the internal evaluation of the project.

Seven school districts located around the state served as partners—three in the Burlington and Montpelier areas, and others located further south. The districts were Barre City, Hartford, Milton, South Burlington, Rutland Northeast Supervisory Union, Rutland City, and Mettawee. The districts began participation in the project in two Tiers. Tier I districts were involved in the first year of the implementation of the Vermont MSP programs, and included Barre City, Hartford, Milton, and South Burlington. The remaining districts began working with the Vermont MSP the following year. The districts ranged in size from Mettawee Community School with fewer than 200 students to the Rutland City district serving about 3,000 students. These seven districts were selected for participation because they had multiple teachers who were involved in VMI (the graduate studies program that preceded the Vermont MSP and continued throughout the years of the project). Project leaders believed that the districts' involvement with VMI demonstrated a sustained and significant commitment to improving mathematics performance of all students. The number of schools participating in the MSP in each of the districts varied, depending on how many schools within the district were involved in VMI. As a result, participation in the partnership included a single school in two districts (South Burlington and Mettawee) and multiple schools in the others. A total of sixteen schools across the seven districts were involved in the Vermont MSP.

The Vermont Department of Education, as a partner in the Vermont MSP, was heavily involved in the development of the MSP proposal. The Department remained involved during the implementation of the project and played a key role in connecting the Vermont MSP to major policy initiatives in areas such as teacher quality, mathematics assessment, and school improvement and accountability systems. The Department also sponsored Regional Education Service Agencies, some of which developed individual partnerships with the Vermont MSP program.

## **The Context for Mathematics Teacher Leadership in Vermont**

The Vermont MSP built on the existing Vermont Mathematics Initiative (VMI), which was launched in 1999. VMI was a three-year master's degree program to train K-8 teachers to be mathematics teacher leaders in their schools and districts. Mathematics content knowledge was the cornerstone of VMI. Under the mantra "competence leads to confidence," VMI focused on developing participants' understanding of mathematics content and concepts, ability to conduct action research about their teaching practices, and leadership skills. The premise of VMI was that as teachers become more knowledgeable about mathematics, they would be able to communicate their knowledge more effectively to their students, to other teachers, and to school and district administrators—hence becoming a resource to others in their schools and districts.

Through 2009, over 300 teachers representing more than 90 percent of Vermont's school districts had participated in VMI, typically taking two courses during summer institutes and two during each academic year of the three-year program.

VMI leaders and school and district leaders had anticipated that graduates of the program would be positioned to become leaders in their schools, and often these teachers did become recognized as exemplary mathematics teachers by their colleagues. VMI graduates, however, had not easily found avenues to directly influence mathematics teaching and learning beyond their own classrooms, thus limiting the project's influence. A Vermont MSP project leader explained:

*This MSP grant kind of grew out of another project, the Vermont Mathematics Initiative. At the time that we wrote the [MSP] grant, our concern was that the teachers who were participating [in VMI] were clearly benefiting but for them to go back and lead work at their schools, our question was, how can we help the whole teaching population in a school increase their understanding of the mathematics?*

VMI leaders and school and district leaders saw the MSP grant as an opportunity to develop a strategy that focused on whole school improvement in mathematics education to complement the VMI focus on developing the content expertise of the individual teacher. The Vermont MSP provided a structure in which VMI graduates moved beyond serving as informal, on-site content experts to becoming change agents who would work directly with teachers across their schools to improve mathematics instruction and, consequently, improve mathematics learning for a larger number of students. Said a Vermont MSP project leader who had worked on VMI:

*What I saw was how difficult it was for them to translate what they had learned into the classroom. We wrote the Vermont MSP grant with the idea of looking at how to help people translate what they were learning into the classroom, and how to enact changes that affect the students of teachers across the school. It was the idea of how to structure things so that people in VMI are not the only ones who benefit, but that their whole school can benefit.*

As the Vermont MSP was implemented, the state policy context contributed to the project's momentum. The Vermont Department of Education recognized a need for high-quality mathematics professional development and was already supportive of VMI. In addition, during project implementation, interest increased at the state level in using teacher leaders to support professional learning communities as well as formative assessment, two strategies central to the Vermont MSP. The alignment of the Vermont MSP with the interests of the state Department of Education led to state officials inviting project leaders and teacher leaders to present on these topics at state-wide meetings on mathematics instruction and teacher leadership.

## **MSP Strategies**

Four main strategies of the Vermont MSP focused on the preparation, support, and deployment of Vermont MSP teacher leaders. These strategies were to: (1) create site coordinator and other teacher leader positions at each Vermont MSP partner site that support teachers in improving

mathematics teaching; (2) provide on-site mathematics courses for all school staff led by mathematicians, mathematics educators, MSP staff, and site coordinators; (3) provide support for site coordinators in the form of mentoring and professional development; and (4) conduct on-site research studies on instructional strategies that promote student achievement. One particular research project would emerge as a central strategy of the Vermont MSP—the Ongoing Assessment Project (OGAP).

### **Vermont MSP site coordinator and other teacher leader positions**

Project leaders of the Vermont MSP collaborated with the leadership of each partner site to design Vermont MSP teacher leadership positions to improve mathematics instruction across each site. The number of teacher leadership positions and their exact responsibilities varied to fit the needs of each site: however, there were some common features for the role that were required by the Vermont MSP. In order to participate in the partnership, sites were required to create a site coordinator position, fully released from classroom teaching responsibilities (although in Mettawee, a very small school, the site coordinator position was half time). Site coordinators worked within the schools in their districts that participated in the MSP. Site coordinators in five of the sites were effectively district-based positions that worked in multiple schools across their districts. In Mettawee and South Burlington, the coordinators worked entirely within a single school as no other schools in their district participated in the MSP. Funding for the site coordinator was shared between the Vermont MSP and the school district. In total, nine site coordinator positions were created, with two sites employing two coordinators.

Depending on the size and organization of each partner site, additional mathematics teacher leader positions besides the site coordinators were also created as part of the Vermont MSP. In the sites that had additional Vermont MSP teacher leader positions these positions were either partially released from classroom teaching or had no release time, with the expectation that teacher leader work would occur outside the regular teaching schedule.

The Vermont MSP provided a basic job description for site coordinators, which offered guidance to school leaders hiring for these positions. Site coordinators required a strong mathematics background and the ideal candidates were VMI graduates interested in working beyond their own classrooms. As a result, the great majority of site coordinators and other teacher leaders hired during the Vermont MSP were VMI graduates or teachers enrolled in VMI at the time.

The Vermont MSP outlined some common project responsibilities for site coordinators, which accounted for approximately half their work. Site coordinators were expected to serve as school-based liaisons to the project; be available to serve on cross-site development teams to study topics central to the project's work; participate in needs assessments at their schools; and facilitate the development and implementation of work plans based on results of the needs assessments.

Beyond the role as liaisons and involvement in cross-site development teams, the site coordinators' work was shaped by school and district needs. Toward this end, the Vermont MSP facilitated the completion of a needs assessment at each partner school to inform the work of the

Vermont MSP in general and of site coordinators in particular. One site coordinator spoke of how her work had been framed around her school's needs:

*[The school focus] came from the needs [assessment]. We got together and talked about where are we, what do we need. The Vermont MSP had done a needs assessment and guided us through what step was most appropriate, and gave us support there.... The Vermont MSP helped get us moving; we were stuck a lot of years. Once we got moving, our eyes were open to not complaining about the problem, but bringing it to the surface and doing something about it.*

The focus of the needs assessment process was a “tightly coupled/loosely coupled” model, whereby all participating districts were tightly coupled as to the goals they pursued, but loosely coupled as to the methodology and strategies used to accomplish the goals. Project leaders insisted that nothing would be placed off-limits in terms of what the site coordinators and other teacher leaders would do, so long as it contributed to reaching the project's overarching goal of improving mathematics learning for *all* students. Project leaders believed that this common goal prevented the development of a teacher leader positions in which, for instance, teacher leaders spent all of their time working directly with students, because working with a single group of students would limit their influence on all students. In addition, project leaders believed that the overarching goal required that teacher leaders worked across grade levels within their schools and not limit the work to a single grade.

In addition to the site coordinator position, some partner districts used MSP funds to support other teacher leaders. The number of additional teacher leader positions and their responsibilities were determined by the results of the school needs assessment. A total of twenty-one teacher leader positions were created, in addition to the site coordinators. The number of teacher leader positions in the districts varied from none in Mettawee, which was the smallest site, to seven in Milton, the largest. Project leaders noted that important factors in the overall model of teacher leadership in a Vermont MSP school were the number of students and teachers in the school, the school-wide capacity for mathematics instruction, and the lay-out of the school campus (with some sites consisting of multiple schools that required some travel). One school, for instance, had a number of Vermont MSP teacher leaders due to its large student population and significant needs in its mathematics instructional program. This school had two teacher leaders who were released from classroom teaching: a site coordinator who was a graduate of VMI and coordinated Vermont MSP work at the school, and a math specialist who had participated in VMI and supported teachers and students in the classroom. This same school also had other Vermont MSP teacher leader positions, namely, a math resource teacher at each grade level. These math resource teachers (three of whom were VMI graduates) supported the work of the site coordinator and facilitated grade-level meetings each week focused on mathematics instruction. The math resource teachers retained their full classroom teaching workload, in addition to their leadership responsibilities.

### **On-site mathematics courses for teachers**

Funding from the NSF grant supported the development of a series of mathematics courses that were taught on-site in partner schools as professional development for all teachers responsible

for teaching mathematics. The courses were developed by teams of university mathematics faculty and experienced mathematics educators, including site coordinators and other Vermont MSP staff. The VMI coursework was a model for some of the Vermont MSP courses, but the purpose and audience for the courses was different. While VMI was a graduate degree program open to teachers across the state who wished to develop their mathematical knowledge for teaching, the Vermont MSP courses comprised a professional development program open to all mathematics teachers in partner school sites. VMI courses were taught in a specified sequence, while Vermont MSP courses were intended as stand-alone courses tailored to district and school needs.

Some Vermont MSP courses were modified versions of VMI courses and others were developed specifically for the Vermont MSP. Course content was determined by considering Vermont Grade Level Expectations and the standards of the National Council of Teachers of Mathematics (NCTM), as well as the specific needs of the school identified through the Vermont MSP needs assessment. In modifying VMI courses for use in the Vermont MSP, instructional teams selected a subset of content and activities, since Vermont MSP courses were shorter and could not cover the same amount of content. In addition, Vermont MSP courses were designed with more attention to direct application to teachers' classrooms, bearing in mind that these courses would be taken by teachers from the general teaching population rather than teachers committed to the VMI graduate degree course load. A project leader provided an example of how this adaptation of course material, from a VMI course to a Vermont MSP course, was made for a particular concept—the Pythagorean Theorem:

*In the [VMI] graduate course, there is an activity that had to do with the Pythagorean Theorem. We analyzed that activity, looking at the prerequisite understandings that teachers would need to get the most out of it, and how to build an understanding of square numbers, square roots, areas, properties of triangles. We developed a three-day workshop that culminates in the Pythagorean Theorem activity, which is one-hour in the graduate course. So the Vermont MSP gives more time to explore the concepts, and doesn't assume that people have a depth of understanding.*

Some of the courses developed (or adapted) and offered through the Vermont MSP were:

#### Elementary

- Laying the Foundation: Building a Deep Understanding of Number in the Primary Grades
- Building Upon the Foundation: Developing Understanding of Mathematical Operations in the Primary Grades
- Problem-Solving with K-4 Students

#### Middle and High School

- Geometry in the Middle Grades
- Making Informed Decisions: Data, Statistics & Probability
- Modeling Change: Using Algebra to Analyze Change
- Proportional Reasoning in the Middle Grades

Vermont MSP courses were typically offered as summer institutes of one or two weeks, with one or two follow-up sessions during the school year. In addition, courses were sometimes offered as semester-long courses during the school year. Courses were often held on-site at the schools involved in the partnership, but were sometimes scheduled at other locations and opened to mathematics teachers statewide. They were taught by teams similar to those that developed the courses: university mathematics faculty and site coordinators. A project leader spoke of the importance of having mathematicians and practitioners, including teacher leaders, co-develop courses:

*It is so much richer when the two pieces are planning together. [For instance] in talking about the Pythagorean Theorem workshop, the mathematician involved was ready to start with a high level of algebra and manipulating equations algebraically. Because others of us had worked with elementary teachers who knew this would freak people out and they would not understand but, if you back up and say, “What is critical to understand?,” then you can design activities to make this more powerful. So that back and forth, the integrity of the mathematics, by having university mathematicians involved, it makes [the course] so much deeper than it might be if it was just developed by people with an education background.*

### **Support for the Vermont MSP site coordinators**

Because the Vermont MSP had emphasized that site coordinators should be selected based on their knowledge of mathematics instruction (and had urged selection of VMI graduates), the Vermont MSP did not provide “up front” training of site coordinators in advance of their placement in schools. Instead, the project adopted an “on-the-job training” approach to helping site coordinators become change agents in their schools and districts. Rather than offer courses to site coordinators on how to work with other teachers, each site coordinator worked closely with a Vermont MSP mentor—a project staff member assigned to work with that school on a regular basis. A project leader who served as mentor described how she helped site coordinators work through developing the relationships and political savvy they would need to lead change in their schools:

*Some of it was meeting with that person to help plan, anticipate issues, etc. In most of the school systems, there are so many political challenges, it was really important to be able to develop a relationship where they could call someone like me to talk through the really tricky things that most of these people had not done a lot of work in, as an administrator would have—to navigate that netherworld between teachers and administrators.*

The mentoring was seen as “embedded professional development,” as opposed to learning in a course environment. This mentoring was highly individualized, following the project philosophy that the practice of teacher leadership should be shaped by local context. The mentor worked with the site coordinators (and other Vermont MSP teacher leaders positions, if present in that site) to develop and implement a work plan that addressed needs identified in the needs assessment. One former mentor noted that, in one Vermont MSP site, he assisted the two site coordinators in planning professional development days and bi-weekly meetings they facilitated

for K-6 teachers in their district. The former mentor explained that the site-specific, individual mentoring of site coordinators was intended to build capacity for leading change in the site:

*The idea was to help perpetuate the system so that when the Vermont MSP left, we left something behind. We have all been in situations when professional development ended and that was the end of it. We tried to take a different tack and think, "What can we leave behind?"*

In addition to on-site mentoring, the Vermont MSP provided cross-site development teams as another form of professional development, focused on topics that could be applied across the sites involved in the partnership. These were groups of Vermont MSP staff, higher education faculty members, and site coordinators who engaged in research and development around topics identified by the project as having implications for their work. Cross-site teams were formed to study the topics of formative assessment in mathematics, special education and mathematics, math language, equity, and middle level mathematics. The participation of teacher leaders on these teams was viewed as an important part of their professional development by helping develop them as intellectual leaders while also building their capacity to engage in research and development likely to contribute to the change effort. A project leader explained:

*Having those site coordinators come together to work with mathematicians, other math education faculty, and having them all work together as professional colleagues was a great form of mentoring. I think that increases people's knowledge, and [provides] an opportunity for them to almost apprentice.... We felt this was an important part of teacher leader development, to build their capacity to do that kind of work as well as being able to contribute intellectually, so that people can think of them as an intellectual resource as opposed to the Mr. Fix-It.*

The Vermont MSP also offered a more formal opportunity for site coordinators and other teacher leaders to develop their skills. Annual institutes of one to three days focused on various aspects of mathematics leadership, such as leadership around change, facilitating effective meetings, and promoting adult learning. The institutes were attended by school teams, including the principal, site coordinator, other teacher leaders, and sometimes other teachers from the school. Involving school teams helped build school-level support for the work of Vermont MSP site coordinators and other teacher leaders and was another way to ensure that their roles were focused on meeting school needs.

### **On-site research studies: Ongoing Assessment Project (OGAP)**

Cross-site development teams engaged in on-site research, led by Vermont MSP staff or external consultants. Each team engaged in a research review and then used the findings of this review to inform the work the team would do around its assigned topic. Cross-site development teams were typically comprised of some combination of Vermont MSP staff, higher education faculty, external consultants, and site coordinators.

At the launch of the Vermont MSP, project leaders funded cross-site teams to study a number of different topics within mathematics education. After two years, project leaders altered this

approach to focus on involving all site coordinators in the work of a single cross-site team, the Ongoing Assessment Project, or OGAP. OGAP was a collection of materials to support formative assessment in specific mathematics topics in grades 2-5. The materials included a set of test items and tools for using the test items and analyzing the results. The decision to focus on OGAP was made in reaction to the tremendous interest in the work voiced by site coordinators and what project leaders saw as the growing promise of the work of OGAP. The OGAP work began in 2003 at a time when formative assessment was moving to the forefront in Vermont, as well as across the country, as an effective approach to improving student learning. Because of this crucial timing, OGAP gained momentum and prominence within the Vermont MSP and across the state, becoming one of the defining initiatives of the project. A Vermont Department of Education official remarked that OGAP was one of the strongest features of the Vermont MSP because it provided a way to show evidence of student learning, which was of great interest to the Department:

*I think the good thing about the Vermont MSP, and I am most familiar with OGAP, is that they from the beginning thought consciously about evidence of student learning. I think that strong link between professional development and mentoring support from teacher leaders and then the real flashpoint, the instructional intervention by teachers and how, data-wise, they can demonstrate improvements in learning—that is one of the things that we are lacking in a lot of our professional development programs. That is the bottom line to me and my colleagues; show me we are improving student learning. The strength of the Vermont MSP is they were able to take the time and think carefully to make sure they did that. OGAP has pretty dramatically shown that those interventions and professional development support really improved student learning.*

Site coordinators played an integral role in developing OGAP, and, according to project leaders, their participation in the OGAP development process served as one of the most significant professional development experiences they received through the Vermont MSP. A small group of site coordinators were part of a subcommittee which included project leaders and other education experts who conducted a review of the research on cognitive development and created a bank of test items aligned to state standards. Members of the subcommittee reviewed over 200 articles on cognitive research and mathematics pedagogical content knowledge published in the four prior years and used the research to develop the test item bank. The items focused on grades 2-5 with an emphasis on fractions and multiplicative reasoning, which, a project leader stated, covered about 80 percent of the elementary curriculum.

In the next year, the participating members of the subcommittee became the trainers of remaining site coordinators in the partnership, to prepare them to bring OGAP into their work with teachers in their schools. In the first part of the year-long course, site coordinators who were not involved in the development of the test items received training in the use of the OGAP materials, reviewed the cognitive research that supported the test items, and used the materials in real-time with students. During this phase of the course, the participants received mentoring from site coordinators who had helped develop the OGAP materials. In the second part of the course, the course participants then supported a team of two to five classroom teachers in their schools in implementing OGAP.

## **Key Issues that Shaped the Design and Implementation of the Teacher Leader Program in the Vermont MSP**

Project leaders of the Vermont MSP identified key issues that proved to be critical for helping the site coordinators and other Vermont MSP teacher leaders become change agents in their schools and districts. Key issues represented actions taken by project leaders that contributed to the success of the Vermont MSP as well as challenges these leaders addressed in order to achieve project goals. Attention to these key issues shaped the design and implementation of the teacher leader program of the Vermont MSP. Discussion of each of these issues highlights strategic thinking as well as reflections in hindsight by project leaders, and offers insights for other designers of teacher leader programs.

- Teachers with strong content knowledge still needed support to learn how to affect other teachers' classroom instruction.
- The responsibilities of the site coordinators were aligned with the goals of the Vermont MSP, although the nature of the work of each site coordinator varied according to the needs of the site.
- The work of the site coordinators flourished with the development of OGAP, which provided a tool that structured their support of classroom teachers.

### **Teachers with strong content knowledge still needed support to learn how to affect other teachers' classroom instruction.**

The assumption that content expertise was necessary to becoming a mathematics teacher leader was at the foundation of the Vermont MSP. As intended by project leaders, the site coordinator positions were filled by graduates of VMI, as these teachers had developed strong knowledge of mathematics and pedagogy through completing the VMI coursework. A site coordinator agreed that the knowledge obtained through VMI was important to her work in the partnership:

*In [VMI] courses, they tried to help us, not give us a formula for finding out formula for area, but a lot of discovering it...The biggest thing for me is the idea of understanding something conceptually vs. procedurally. I felt I was a good math student before [the VMI courses]. I could calculate, but I didn't necessarily understand what it was talking about. I did not know what the equation of a line was and what it meant. That is what those courses did for me. They took the math and put them in real-life situations and taught it to me conceptually. So, when I look at the Everyday Math program with the teacher, I can help the teacher make connections: "Here is the math you are doing, here is where it is leading, and here is what happens when you teach procedures versus teaching the concept."*

Project leaders noted that teachers with content expertise required the support of Vermont MSP programs in order to impact other teachers' classroom instruction. The Vermont MSP provided roles for site coordinators and other teacher leaders and also professional development to cultivate the skills needed to work directly with classroom teachers. Project leaders learned through their experience in VMI that teacher leaders needed such structures, as well as external

support, to move into leadership positions because teachers may be reluctant or lack the support to advocate for such positions on their own. After conceiving of the notion of using VMI graduates as site coordinators for the Vermont MSP, among the first steps of the partnership were meetings between project leaders and school and district administrators in which new roles for teacher leaders were discussed. The Vermont MSP advocated for VMI graduates as change agents due to their content expertise and sought roles that would position these teachers to influence instruction in other classrooms.

**The responsibilities of site coordinators were aligned to the goals of the Vermont MSP, although the nature of the work of each site coordinator varied according to the needs of the site.**

Project leaders met with school administrators to outline each site coordinator position. In these meetings, project leaders insisted on roles that would help improve mathematics learning for all students, which underscored the need for the site coordinator to work with teachers across the site. The exact number of site coordinator positions and the nature of their work was determined with the input of school administrators and based on the results of an in-depth needs assessment of the school mathematics program. Through this approach project leaders aimed to develop support among local districts and schools not only for mathematics reform, but for using teacher leaders as change agents to enact reform. Project leaders believed strongly that if the work of the site coordinators and other Vermont MSP teacher leaders met school and district needs and resulted in a demonstrated positive effect on student performance in mathematics, districts would be more likely to continue the positions after MSP funding ended. A project leader explained:

*I wouldn't say that the actual model of teacher leadership [in the MSP] was clearly envisioned. The vision was to build leadership capacity broadly, not to have it concentrated in one or two people. What that would actually look like, we knew it needed to be a function of how each school operated. Otherwise it would just be something that went away with funding.*

Results of the needs assessment for each site were used to develop customized work plans for the site coordinators and other teacher leader positions. In addition, providing on-site mentors for site coordinators, as opposed to a one-size-fits-all professional development program, helped ensure that the support the site coordinators received was aligned with the unique needs and circumstances in which they worked.

The project philosophy of shaping the work of teacher leaders around school and district needs allowed for the development of different teacher leadership models in the partner districts, as depicted in these two vignettes of site coordinator roles.

*Site coordinator Joanna Cleary looked across the room of fourth grade students in the math intervention lab at Highland Elementary School. The students were working on solving a warm-up exercise, " $32+14= \_\_+22$ ". Students worked individually and wrote their answers on a paddle, which they held up when they are done. As site coordinator, Cleary oversaw the intervention lab, where she was joined by Sarah Taylor, who filled another Vermont MSP teacher leader position as math specialist in Highland. Cleary and Taylor worked together in*

*the intervention lab every day leading instruction for students in Highland who scored below the “proficiency” level in mathematics on the recent Vermont state achievement test. These students were pulled out of their regular classrooms to receive instruction in the lab.*

*The math intervention lab was launched based on the findings of the Vermont MSP needs assessment for Highland, in order to achieve the priority goal of moving all students who were near proficiency in mathematics into the proficient range. Highland was one of the largest elementary schools in Vermont with over 1,000 students and, in this large school, the intervention lab allowed Cleary and Taylor to work regularly with students from all classrooms. In addition, Cleary and Taylor also had opportunities to work directly with teachers. They led Vermont MSP workshops for their whole school teaching staff once per month, at all-staff meeting times. Cleary and Taylor also spent a portion of each day providing support to teachers in their classrooms, by conducting demonstration lessons or co-teaching. After the fourth grade students returned to their classrooms, Cleary walked down the hall to conduct a demonstration lesson to the students of a third-grade teacher, while Taylor went up to the second floor to help a fifth grade teacher plan lessons for the week.*

Teacher leadership in Highland was influenced by the size of the school and by the needs identified as most pressing by the school staff. Project leaders in the Vermont MSP described the math intervention lab as not the ideal form of practice for Vermont MSP teacher leaders because project leaders believed that teacher leaders would have the greatest sustained impact by working directly with teachers rather than with students. However, the math intervention lab was viewed as appropriate for Highland as the size of the school prevented Cleary and Taylor from otherwise impacting the learning of students in all of the school’s classrooms. The decision in Highland to have multiple teacher leaders was also connected to the size of the school, as the site coordinator alone would have been insufficient to affect mathematics instruction for all students in the school.

The model of teacher leadership in Highland varied from that found in another Vermont MSP school, Westwood Elementary, which is described in this vignette:

*Site coordinator Justine Brown entered the third grade classroom of teacher Matt Jones at Westwood Elementary school. During his preparation time, Jones had asked Brown to meet with him to help incorporate the results of a recent OGAP formative assessment into his lesson plans for the week. Some of his students were struggling with fractions and he wanted Brown’s help to move them forward. As site coordinator in her school, Brown spent her time working regularly with each of the fifteen teachers at Westwood. In addition to analyzing the results of OGAP assessments, Brown conducted demonstration lessons and made observations of classroom teaching at the invitation of teachers. Brown also led intensive, monthly workshops for grade-level teams, each lasting 3-6 hours. Due to the small size of Westwood, the district was able to pay for substitute teachers so that all the staff could eventually attend, with grade level teams rotating through the workshop. In addition to her responsibilities for the Vermont MSP, such as participating in the OGAP cross-site team, Brown spent most of her time working directly with teachers at Westwood on mathematics instruction. After her meeting with Jones, Westwood walked down the hall to a meeting of the fifth-grade teachers to discuss student progress in a unit on estimation.*

At Westwood Elementary, in contrast to Highland, project leaders determined that a single teacher leader position – the site coordinator – was sufficient. This decision was based on the small size of the school, the stability of its administrative leadership, and the well-established curriculum that teachers used. The particular model of teacher leadership in these two schools was dictated by the needs of each school and resulted in different configurations. At the same time, the Vermont MSP teacher leaders at Highland and Westwood had some similarities. All were graduates of VMI, responsible for improving mathematics instruction in their respective buildings, and all spent time working directly with teachers in classrooms and in Vermont MSP workshops.

**The work of site coordinators flourished with the development of OGAP, which provided a tool that structured their support of classroom teachers.**

The expansion of OGAP from a single project carried out by one cross-site team into training for the entire cadre of site coordinators signaled an important shift in the approach of Vermont MSP project leaders. While the needs assessments had provided a general focus of the work of the site coordinators and other teacher leaders, it did not structure the ways in which these teacher leaders provided support to classroom teachers. Project leaders noted that the work of the site coordinators flourished with the expanded use of OGAP across all Vermont MSP schools. The OGAP training and materials provided a tool that focused on something valuable and meaningful to teachers—formative assessments to improve instruction. Site coordinators utilized OGAP to build a collective focus among teachers on improving mathematics instruction.

Many site coordinators told project leaders that OGAP gave them a clear structure for engaging the teachers in their schools around instruction, something they felt had been lacking in the Vermont MSP up to that point. Said the director of the OGAP work:

*There are a lot of initiatives around the country like VMI that focus on developing teacher leadership, and then the teacher leaders who are trained go back to their districts. Some are used, some maybe not; some are sorting tests, some are put into big-time leadership positions, but a lot of them are just going back to the same classroom responsibilities that they had had previously. The teacher leaders told us that this was the first time that they had a concrete, substantive way to interact with the teachers in their schools. One teacher leader told me that when they brought the student work into the grade level meeting, this was the first time that they had anything substantive to talk about.*

OGAP fit within the existing design of the site coordinators, who were all expected to work directly with classroom teachers. OGAP resonated within the Vermont MSP because it aligned with the strengths and goals of the site coordinators across school sites, by providing a way to deeply analyze mathematics instruction and give feedback to classroom teachers.

**The Sustainability of the Vermont MSP Program to Transform Teacher Leaders from Content Experts to Change Agents**

During its five years of funding, the Vermont MSP supported site coordinators and other teacher leaders to impact mathematics instruction as change agents in their schools. Project leaders anticipated that the Vermont MSP would be sustained through the continuation of the mathematics teacher leader positions with similar roles and responsibilities as in Vermont MSP and the expansion of the Vermont MSP teacher leader program into new districts outside of the MSP. After the end of funding, all of the participating districts continued to support teacher leader positions in mathematics, with roles closely resembling the site coordinator positions created in the Vermont MSP. Further, OGAP continued to be used in Vermont MSP schools and expanded into new sites in Vermont and in other states as well.

This section of the case highlights strategies of project leaders that contributed to the sustainability of the Vermont MSP teacher leadership program. This discussion expands on the descriptions of the MSP strategies and key issues identified by the leadership team, by describing strategies of project leaders that affected what was sustained from the teacher leader program. Strategies that contributed to sustainability were identified through the use of a theoretical framework from the Handbook for Enhancing Strategic Leadership in the Math and Science Partnership (Weiss et al., 2004). In the framework, four components were identified as critical to enacting and sustaining change through school reform efforts: 1) designing and implementing interventions, 2) garnering support from key stakeholders, 3) aligning policy and 4) developing capacity and infrastructure to scale up interventions.

The strategies of project leaders that contributed to the sustainability of the Vermont MSP teacher leader program were:

- The investment in building a collaborative partnership between Vermont MSP staff and school administrators paid off in schools' continuing support for teacher leader positions.
- The process for expanding OGAP across the Vermont MSP provided a model for launching OGAP into new sites beyond the partnership.
- Positioning site coordinators within a broader intervention for improving mathematics education built school district support for sustaining teacher leadership.
- Attention to capturing the impact of site coordinators on student learning made the Vermont MSP a model for state-supported teacher leadership programs.

### **The investment in building a collaborative partnership between Vermont MSP staff and school administrators paid off in schools' continuing support for teacher leader positions.**

As the MSP funding period drew to a close, all of the school district partners planned to continue funding the teacher leader positions that had been created during the partnership. School and district ownership of the teacher leader positions was supported through the Vermont MSP approach of designing the teacher leader positions with the involvement of the school partners.

By collaborating in the design of teacher leader positions, school partners were invested in the success of the Vermont MSP teacher leaders. Project leaders requested that districts bear part of the financial costs for supporting the Vermont MSP teacher leaders, as much to signify their investment in the roles as to help pay for the costs. District and school leaders also had a stake in

defining the work of the Vermont MSP teacher leaders, which was developed with their input into the roles and responsibilities of the site coordinator and other teacher leaders.

Project leaders of the Vermont MSP supported school ownership of the Vermont MSP teacher leader positions by aligning the role of the teacher leaders to the particular needs of the schools in which they worked. A portion of the responsibilities assigned to teacher leaders derived from the specific results of the needs assessment based on the responses of school staff. This thorough analysis ensured that teacher leadership in the Vermont MSP was calibrated to address the challenges and build from the strengths of each school site. Candidates hired into the site coordinator positions came from the current teacher staff at each school, which further built the sense of ownership within the school for the position.

The investment required to build the school district's stake in Vermont MSP teacher leaders was substantial. The needs assessment process was extensive and required several meetings between project leaders and school personnel, both to collect data and to collaboratively turn that data into an actionable plan for improving math instruction. Further, the Vermont MSP committed resources to providing on-site mentoring for site coordinators. On-site mentoring was viewed as necessary since the responsibilities of teacher leaders varied among the school sites, due to the customization of teacher leader roles based on the input of school administrators. While project leaders acknowledged the expense of building the school's stake in teacher leaders, the project leaders also saw it as a necessary investment, borne out in the sustained presence of the positions after the end of MSP.

### **The process for expanding OGAP across the Vermont MSP provided a model for launching OGAP into new sites beyond the partnership.**

A successful Vermont MSP strategy was OGAP, which has had a sustained impact beyond the MSP funding period. Since its initial launch during the Vermont MSP, the focus of OGAP expanded into middle grades and to additional topics within mathematics (to include proportional reasoning as well as fractions and multiplicative reasoning). Following the end of MSP, OGAP was implemented in additional schools within Vermont, and also in schools in Alabama and Michigan. Projects were also emerging to develop the use of web-based systems for collecting and using OGAP data in new partnerships.

The model for OGAP developed through the Vermont MSP provided a blueprint for expanding use of OGAP to new sites beyond the schools involved in the original partnership. The model included two phases of training. In the first phase, OGAP staff, which included a subset of the site coordinators, trained other Vermont MSP site coordinators. In the second phase, the site coordinators who completed the training provided similar training and mentor support to other teachers in their schools. As OGAP has been brought to other schools outside of the MSP, this same model has been used, in which teachers familiar with OGAP trained and mentored other teachers in their school.

The Vermont MSP project presented an opportunity for OGAP that ultimately contributed to its sustainability. In the site coordinators, the Vermont MSP provided a network of knowledgeable teacher leaders who could pilot the model for training users of OGAP. The necessary

infrastructure for conducting the training for users of OGAP was already present in the Vermont MSP, which had access to the group of site coordinators for the first phase of training, and the site coordinators had access to teachers in their schools for the second phase.

The success of OGAP was also supported by the recognition of project leaders of the potential of formative assessment to improve student learning and of OGAP as a focus for the work of Vermont MSP teacher leaders. A project leader noted that when the work of the Vermont MSP was launched in 2003, the focus in schools was on summative assessment. By 2005, however, the educational environment had changed such that formative assessment was moving to the forefront. The involvement of the Vermont MSP with OGAP resonated with that interest, particularly the desire to be able to continuously monitor student learning.

### **Positioning site coordinators within a broader intervention for improving mathematics education built school district support for sustaining teacher leadership.**

Project leaders positioned site coordinators (and other Vermont MSP teacher leaders) as change agents by concurrently implementing a series of courses and workshops designed to deepen the mathematics content knowledge of all elementary classroom teachers at each partner school. The Vermont MSP courses supported teacher leadership in two ways. One, the courses provided a clear role and venue for teacher leaders to influence mathematics instruction across their schools. During the courses, site coordinators and other teacher leaders had access to all of the teachers of mathematics in their schools. Two, the courses helped create an environment that emphasized mathematics instruction as key for the teachers in the school. As a result, when Vermont MSP teacher leaders worked directly with teachers in their classrooms, the teacher leaders were able to expand upon lessons learned in the courses, rather than trying to initiate teachers' interest in mathematics.

The mathematics courses and workshops established a demand within schools to continue to support the Vermont MSP teacher leaders. The courses and workshops built the interest and abilities of classroom teachers in mathematics instruction and were seen by project leaders as contributing to the willingness of teachers to meet with site coordinators and other Vermont MSP teacher leader positions. In addition, project leaders anticipated that as classroom teachers became more knowledgeable in mathematics, their conversations with Vermont MSP teacher leaders would be more substantive and hence have a greater impact on their mathematics instruction.

Near the end of the MSP funding period, a new program was created under the auspices of VMI that merged the “teacher leader as content expert” philosophy of the VMI with the “teacher leader as change agent” approach of the Vermont MSP. This program, known as VMI Phase II, was launched in 2006. VMI Phase II incorporated the approach of including teacher leadership as part of a broader intervention and was based on the design of the Vermont MSP. VMI Phase II offered an extensive 80-hour mathematics course experience for teams of classroom teachers. Like the Vermont MSP, the focus of VMI Phase II was on change at the school or district (rather than individual teacher) level.

## **Attention to capturing the impact of site coordinators on student learning made Vermont MSP a model for state-supported teacher leadership programs.**

The Vermont MSP was acknowledged by a state legislator as a possible model for state policy for teacher leadership in Vermont. This legislator noted that the success of the site coordinators drew the attention of the Vermont Department of Education. Of particular interest to the Department was the use of OGAP by the site coordinators and the focus of OGAP on evidence of student learning. The legislator explained that demonstrated impact on student learning that was captured in the Vermont MSP was frequently missing from other teacher leader initiatives in the state. Policymakers' interest in Vermont MSP led to the involvement of site coordinators and other teacher leaders in statewide programs around mathematics education.

While the Vermont Department of Education was not directly involved in implementing the Vermont MSP, the Department recognized the network of strong teacher leaders created by the project and looked for ways to utilize Vermont MSP teacher leaders to improve mathematics teaching and learning across the state. The use of site coordinators by the Department gained momentum as the direction of the project dovetailed with policy directions for the Department. During the MSP funding period, the Department had begun to look more closely at teacher leadership models and programs because of the need to provide more hands-on support to help teachers improve their content and pedagogical knowledge and skills. In addition, state leaders had become interested in professional learning communities and saw potential for teacher leaders to facilitate such communities.

During the MSP, the Department held a statewide Teacher Leadership Summit to think strategically about what would be needed in terms of policy and professional development to support increased use of teacher leaders. A Department official noted that the Vermont MSP was well represented at the summit and provided a model for the role of teacher leaders that the state would support:

*There is certainly a need and some specific strategies of things [from the Vermont MSP] like mentor teachers who have a background in pedagogical approaches to mathematics and pedagogical content knowledge to be able to understand student conceptions in math and how they can use that to inform instruction. That is a very specific need around both the content and supports teachers need, and a teacher leadership model to enhance that.*

Site coordinators and other teacher leaders have been highly visible and utilized in other statewide venues, as well. At the Vermont Council of Teacher of Mathematics Spring 2006 conference, 12 of the 13 teams that presented consisted of Vermont MSP staff and partner school site coordinators and other teacher leaders. In 2006-07, the Vermont Department of Education invited Vermont MSP leaders to participate in a series of institutes for Vermont schools that did not achieve adequate yearly progress. Staff of the Vermont MSP led sessions focused on promising conditions for improving mathematics teaching, learning, and leadership. A Department official commented about the role played by Vermont MSP in their efforts to construct a network of teacher leaders that could provide support in mathematics instruction:

*If you took VMI and the Vermont MSP out of the equation, I can't imagine that it would not pretty dramatically impact those teachers on whom we depend to build local capacity for content and professional development.*

## **Conclusion**

The case of the Vermont MSP demonstrated that in order for teacher leaders to affect school-wide instructional change, content expertise was not enough; they needed additional support and professional development to lead change. Project leaders recruited partner schools from districts which contained VMI graduates, which allowed the Vermont MSP to invest in strategies that leveraged the expertise of these teachers. Through the Vermont MSP, site coordinators and other teacher leaders were positioned to work directly with classroom teachers on mathematics instruction through OGAP training, the launch of district-wide mathematics workshops, and other forms of instructional support jointly determined by Vermont MSP and school leaders. These strategies were aligned with the goal of Vermont MSP to design teacher leadership roles that improved the mathematics education of all students in the school.

Other Vermont MSP strategies were designed to sustain the teacher leadership positions created through the grant. Project leaders garnered the support of school districts by actively including administrators in designing teacher leader positions to align with the strengths and needs of their particular schools. Districts and the Vermont MSP also shared the cost of the teacher leader positions, further promoting ownership by the school partners. The Vermont MSP strategy for moving content experts into change agents resulted in teacher leader positions that continued to lead change after the end of the MSP.

## **References**

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