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VMP Evaluation Findings Related to Changes in Teaching Practice,  
Drawn from Qualitative Focus Group Data

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## Abstract

Building on the needs assessment format used by the Vermont Mathematics Partnership (VMP) in designing its professional development (PD) strategy with participating schools, annual focus groups involving teachers and staff across grade levels, specialization, and PD experiences have been conducted by the evaluators as an integral part of the evaluation. These rich qualitative data sources not only serve to document the participants' views and experiences, but help to make visible the systemic changes taking place as a result of VMP. The gatherings also provide a forum for sharing information and outcomes with participants, and to identify sites where further targeted focus forums or in-depth interviews are warranted.

Our analysis compares transcripts from the earliest needs assessments and focus groups with the gatherings held subsequently. The NVivo software we are using to track the themes found is unique in providing aid for analysis through a "live matrix" table view that allows us to link back to the original source documents – full text transcripts – in order to understand the patterns that reveal a web of influences at work.

By employing a mixed methods approach, the findings from focus groups held to date across sites and tiers of participating VMP schools provide strong concurrent evidence with quantitative sources that as a direct result of VMP PD increases are occurring in teacher:

- confidence in math content and pedagogy
- use of data from formative assessment activities
- depth and breadth of mathematics being taught
- expectations for all students
- application of scientifically-based action research

The institutional impact of these teacher changes on students' learning is reflected in classroom observations as well as in local and state wide assessments of student achievement from data sources including in-school interventions and statewide testing.

## VMP Evaluation Findings Related to Changes in Teaching Practice,

### Drawn from Qualitative Focus Group Data

#### *Project Description*

Established in 2002, the Vermont Mathematics Partnership (VMP) is a targeted MSP jointly funded by the National Science Foundation and the US Department of Education. The essence of the Vermont Mathematics Partnership is to provide opportunities for all Vermont students to succeed in learning rich, rigorous mathematics. The fundamental question, “What will it take to help all of the students in this system succeed in mathematics?” guides every aspect of project planning and implementation - from interactions with individual teachers to partnerships with state and national organizations and institutions. Through its needs assessment process, VMP designs direct work with partner school systems, including classroom coaching and mentoring for teachers. In addition it provides courses for teachers and paraprofessionals with an emphasis on the use of formative assessment data to inform classroom instruction. Action research based student interventions are also supported.

As a result, through their involvement in VMP each participating teacher takes part in a unique blend of professional development (PD) offerings. The evaluation employs a mixed methods approach. Data sources include the following:

- Student performance measures -- state and national tests, local and classroom assessments, and classroom observations.
- Teacher performance on mathematics content inventories and classroom observations
- Classroom observation
- Focus groups
- Administrator interviews
- VMP staff daily and reflective logs
- Professional development teacher survey

### *Methodology*

Qualitative research is an exploration and interpretation of complex data that builds a record of growing understanding over time (Glesne & Peshkin, 1992, Morse & Richards, 2002). Analysis of the focus group data is built from predicted themes purposefully evoked by questions around the stated goals and benchmarks of VMP. Attachment 1 provides an example of early focus group questions developed from the overarching goals of the project, as initial themes of interest. Table 1 shows additional connections between the VMP benchmarks, goals, and objectives, which provide a beginning structure for thematic coding “down” in to the focus group data.

Table 1.

Benchmark	Goal	Objective
II-b Changes in confidence of teachers as teachers of mathematics	1.1	Teachers have a deep understanding of mathematics that allows them to effectively reach all students.
II-d Changes in feedback that teachers receive	1.4	Teacher leaders are effectively utilized in every school, to provide guidance and support to other teachers, and to help lead continuous school improvement.
	3.4	Teachers receive high quality feedback on their teaching
II-f Changes in the depth and breadth of mathematics content taught	1.2	Teachers are aware of why they are teaching the subjects they teach, and how crucial concepts evolve in the curriculum in prior and later grades
II-g Documentation of the application of scientifically based & action research	5.1	Teachers are knowledgeable about current research on mathematics teaching and learning and have opportunities to engage in relevant action research
II-j Analysis of degree to which teachers use data to make instructional decisions	2.3	Mathematicians are available to all partner schools and are engaged with educators in the review, development planning and implementation of content-based professional development.
	3.2	Teachers use assessment data to adapt their teaching to assist students in achieving high levels of performance

Benchmark	Goal	Objective
II-j (continued)	3.3	Teachers routinely examine student work with colleagues to make instructional improvement to address the needs of all students

In addition unprompted themes rise from the data (Glesne & Peshkin, 1992), forming patterns of responses across individuals within a site, and within sites across the project, through the life of the project. (Morse & Richards, 2002) These themes may not have been specifically prompted in the formal project goals, but are also tracked over time. A new theme may be the basis for focus questions prompting specific reflection by participants in future rounds of the evaluation. Attachment 2 demonstrates focus group “prompting” questions that are developed by the evaluation team in order to incorporate lessons learned from earlier rounds with questions derived from project goals and benchmarks.

In addition, new themes emerge in the focus group transcripts which were not specifically predicted by the project goals and benchmarks. These themes have been added to the analysis over time, an example of coding “up” from the data sources.

Table 2.

Action Plan Action Planning Added Comments Admin Role After School Age Appropriate Activities Alignment With Curriculum Being On the Same Page Burn-Out Change in use of math programs Consultants	Culture Dball Inventory Differentiating Evaluation Methods Everyday Math Excitement Feeling Empowered Grade Level Teams Incentives It Was Hard Literacy Math Classroom Time	Math Land Math Language Observation Ongoing Assessment Online Discourse Pacing Instruction Para Educators Parents Portfolios Pre VMP Restructuring Secure Goals
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Through the process of building, piloting, revisiting, and rebuilding the focus group instrument our understanding of the lived experience of VMP participants is evolving. By conducting this exploration within the “black box” of classroom and school level education reform, the VMP evaluation is chronicling lived experiences of VMP school level participants whose teaching practice is in the process of changing. This is helping us to further understand how individuals’ experiences combine to result in systemic institutional changes in teaching and learning, ultimately leading to students’ greater success in mathematics.

#### *Data Collection*

From the beginning, VMP has intentionally engaged in widespread collection of formative, qualitative data. The project leadership conducts annual needs assessments with a broad range of stakeholders including students, parents, teachers, special educators, administrators, board members, para educators, and others, which has driven site-specific variations in the VMP PD model at each participating school. The evaluation team conducts a separate schedule of planned focus groups with each site. Each focus group is made up of teachers and special educators from across the grade levels served. Care is taken to include those with differing degrees of experience with VMP PD, with teaching and with teaching math. In some cases, para-professionals are also included.

Building on the needs assessment format, the audience for VMP PD is diverse. More than 350 teachers and administrators from participating schools have taken part in 30 or more hours of VMP PD since the Summer of 2003. Approximately 150 teachers

have taken part in either focus groups or classroom observations, or both. 100 teachers in the first year, and nearly 300 in the second year completed the annual PD survey distributed each fall. Over 100 para-professionals have also taken part in VMP PD events.

The exact make-up of the focus group is guided by on-site teacher-liaisons at each school. Participation in focus groups specifically, and in evaluation and project activities in general, is tracked for each teacher. Following is an example of participation by teachers in VMP evaluation activities at one site during a school year. The tracking of participation is conducted for participants in all evaluation activities – focus groups (FG), classroom observations (Obs), and surveys – over time and across all sites:

Table 3, School 1.

	PD Survey Fall 04	FG fall 04	Obs fall 04	FG spring 05	Obs spring 05
Kindergarten	x	x		x	
Grade 3	x			x	
Grade 1	x		x	x	
Grade 4	x		x	x	
Grade 3	x	x	x	x	x
Grade 5	x	x		x	
Grade 4	x	x		x	
Special Ed – Grades 4-6	x	x		x	
Grade 1	x	x			
Grade 5	x	x			x
Special Ed thru Grade 3	x	x			
Grade 2	x	x			x

As noted, the focus groups involving teachers and staff across grade levels, specialization, and VMP PD experiences, have been conducted regularly as an integral part of the evaluation. Each focus group is facilitated by VMP evaluation staff and facilitation specialists, and is tape recorded. Rarely, a participant objects to being tape recorded, in which case detailed notes must be used instead of full-text transcripts. The groups take place in the participating schools, lasting for approximately an hour.

In addition to providing a forum for data collection, they can be a time for sharing information and outcomes with participants. For instance, a discussion of what was learned in the previous round of data collection may become a frame for a question in the current round. When teachers at one site reported on the PD survey Likert scale that their confidence in teaching math had decreased, a focus group question posed in response found that they attribute that decrease to it being the first year of teaching with a new math program. The groups also help us to identify schools where further targeted focus forums or in-depth interviews are warranted. For example in a recent round the entire mathematics intervention center staff at one school was brought together in a focus group separate from the classroom teachers, in order to learn more specifically about that staff's beliefs, its strategies, and findings.

Thus, our data is drawn from transcripts of the earliest needs assessments and focus groups and all of the focus groups held subsequently. The NVivo software we are using to track themes is unique in providing aid for analysis through a "live matrix" table view that allows us to link back to the original text source materials in order to reveal patterns in the data. (Morse & Richards, 2002) With this tool, we are better able to discern a web of interconnected influences at work. (Patton, 2005)



### *Evidence through Qualitative Analysis*

We are finding strong evidence from the focus group data that shows progress is being made toward the VMP goals and benchmarks, in addition to other “explanatory” themes which are rising from the data and that further illuminate changes taking place at both the institutional and individual teacher levels. Focus groups held to date confirm that as a direct result of VMP PD increases are occurring in areas both predicted from the benchmarks and goals of the project, and discovered through the qualitative analysis.

#### *Increased confidence in math content and pedagogy.*

Evidence that one teacher’s confidence has increased was captured during a lively focus group discussion of this goal at the end of the school’s second year of participation:

*I’ve only been teaching for three years and I’ve noticed how my attitude has changed about math and how that has helped me communicate to the kids in a different way. I have a lot of kids say that they’ve never liked math before and they like it now. That’s really nice, because I am part of that but it is also part of the culture that the school has created about making math relevant, making it interesting, and I think for a lot of deconstructing these things that for us were just memorized, very flat things, to something that really makes sense for the kids and stepping out of the [mathematics] program has been really important.*

A wealth of themes is expressed in this one statement, including:

- New teacher
- Changed attitude toward math
- Communicates math to students in a different way
- Students who didn’t like math before like it now
- School culture toward math is changing
- Recognition that one is a part of the school culture that is changing math
- Math is now relevant, interesting
- Things that were just memorized have been “deconstructed”
- Math is now a subject that makes sense
- Stepping out of the program

In the qualitative software package NVivo, we can use each theme as a heading that is “coded on” to the text. These thematic headings are not tied to a single document, and so when a theme is recognized again in another focus group, it can be coded on to that data source as well, even if the terms used by the speaker are not identical to those used in the earlier group from which the theme was created. In addition, themes can be searched singly, or in Boolean “and” “or” “not” combinations.

Results can then be displayed in a “live matrix,” which allows for pattern analysis of the data, but in addition is composed of clickable links back to the original coded text. (Morse & Richards, 2002) The live matrix view displays how many times text is found that has been coded, with themes displayed as intersecting heading rows and columns. This helps to make visible the patterns of themes that are aligning, as well as instances where coding is in process by the evaluator.

Table 4 is a data display showing Benchmark II-b coding for the Spring, 2005 focus groups.

Table 4.

<b>Nodes Coded at:</b>	<b>(17 1) /Benchmark s/II-b confidence</b>
<b>Date = Spring 2005</b>	19
<b>School 1</b>	4
<b>School 2</b>	2
<b>School 3</b>	1
<b>School 4</b>	0
<b>School 5</b>	3
<b>School 6</b>	6
<b>School 7</b>	2
<b>School 8</b>	1

This view of the coding shows how many times text is found that has been identified as both the heading row and column theme, making visible themes that are aligning, as well as instances where coding is in process by the evaluator. For instance, the School 4 data had been entered but not coded when this report was run, resulting in no intersections between the Benchmark themes and their focus group files in the matrix view at that time. When viewed in the software, each matrix search intersection is a clickable link *back to the original text* that was coded.

We can explore text from all sources for School 5, Benchmark II-b – “Changes in confidence of teachers as teachers of mathematics” (coded “down” from the goals and benchmarks) – with that for “Changes in use of math program” (coded “up” from the focus group transcript) in the primary source documents by conducting further matrix searching, which reveals that the focus group evidence is triangulating with data from a VMP staff log from the same school, coded with each of the two themes in an entry made in May, 2003:

*In discussing the ""Fractions of a Square"" problem that was taken out of [the math program], one of the teachers commented on the ambiguity in the way the problem was written. She was concerned that the problem did not clearly specify whether they wanted to look at the fraction of the area of a square, or the fraction of the set of "puzzle pieces" used to make up the square. Prior to our last course session, I don't believe that anyone would have had the knowledge to question the way in which this activity was worded. It is exciting to see teachers feeling comfortable enough with the material to be able to question and if necessary make modification to the program materials that they are using.*

The themes of “Changes in confidence of teachers as teachers of mathematics” and “Changes in use of math program” are also found intersecting in data sources from

other schools, and timeframes. For instance, in the comments made by this teacher leader from School 6 in 2006:

The whole formative [OGAP] assessment had significant impact on their teaching of fractions, and although [the teachers] will tell you with a giggle that being involved in the research was a major, a major project, they are very glad to have been a part of it. And I think for them and for me as well the biggest piece is understanding the research, having been exposed to the research and then seeing that our Vermont kids respond in all the ways that the research says they will respond. It might have been better if we hadn't found that out [laughter] but I think that teachers have a much better understanding now of how to teach fractions and they know when they look at their program what is there and what they need to supplement. And I think that is major, that none of these programs are perfect and we really need to know not only the mathematics of the research but we need to know how we can use them in the best way we can.

In this way the live matrix search allows us to simply track the number of times the coding combination has appeared, but also to revisit the coding when questions arise and to rethink and grow our understanding of the data. Questions such as, “Does this intersection of ideas appear more or less often for teachers who are in their third year of participation?” and, “Is it a combination of themes found only at one school, or across the project?” are explored in greater detail once a possible relationship is identified in the matrix view.

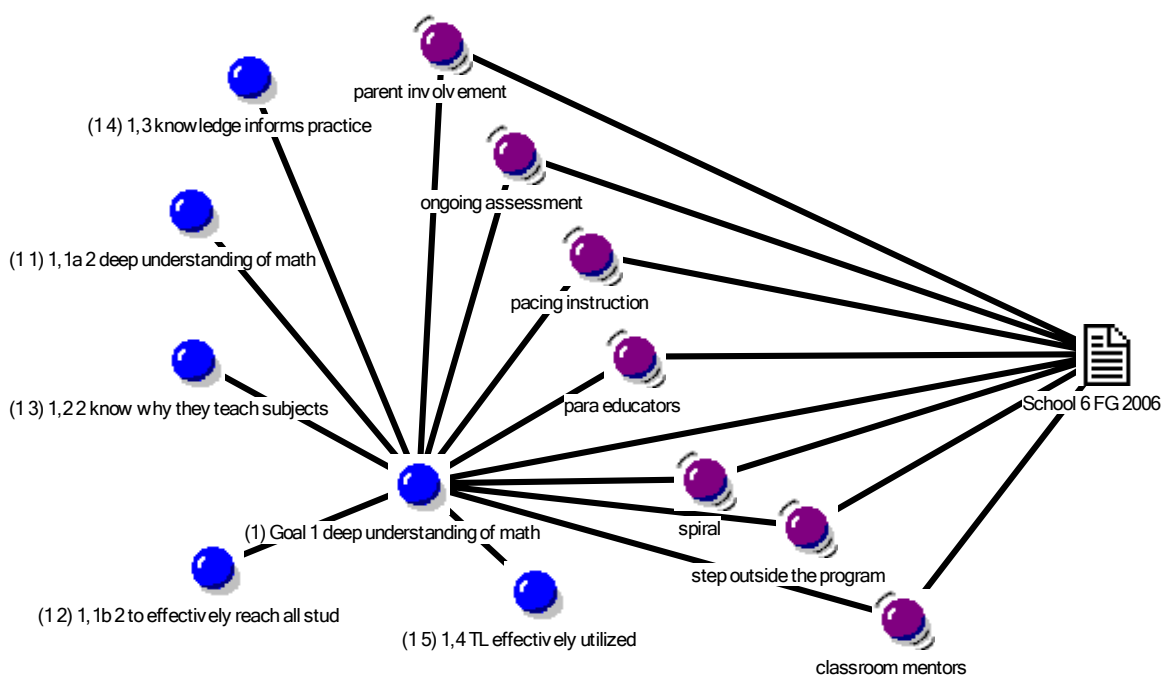
From the clickable matrix links additional questions arise – is it only in the use of fractions that teachers are feeling confident to step out of the math program, or is this feeling reaching other areas of the math curriculum? Additional demographic questions may also be probed -- what grade-levels are the teachers who note this connection between confidence and stepping away from the program? What math program are they using? With use of “attributes” to label each focus group transcript in NVivo 2 (or each

case in NVivo 7), it is a simple step to go back to the search tool to probe these new questions.

A different view of the data can be seen by using the NVivo Model screen.

Diagram 1. depicts a model of the connections to “deep understanding of math (Goal 1) that are also coded with the program objectives (the numbered themes) and additional themes that have been coded up from the data.

Diagram 1.



Any intersections in coding found between the objectives and new themes can also be shown in a model view, building visually the web of connections between themes that have been coded up or down.

#### *Patterns we are Finding Across the Project.*

While the live matrix in itself is a form of data display, we frequently use it as a tool from which to pull data from different focus groups together into a display that demonstrates the lessons being learned from the analysis, such as the

following example drawn from the Year 4 VMP Evaluation Technical Report #6 (2006).

*Use of data from formative assessment activities.*

Participants in each focus group are asked what kinds of assessments they are using. Initially, teachers spoke about state data collection programs they had participated in in the past, and about the aid being provided to them by VMP staff and mathematicians. Now, in years three and four of participating, they are more apt to speak about how they are involved in conducting their own assessments, diagnosing the results and planning strategies to help students learn.

VMP Goal 3.2 – Assess Data to Adapt Teaching	
Fall 2004	Spring 2006
<p>I think [because of] the Vermont Portfolio process for math, because we had [the VMP consultant] &amp; [a math teacher leader] last year. The kids here seem much more prepared for the next year each time because it's being consistently taught across all kindergarten, all first grade, and second, the elementary. So, that separate piece for the portfolio has been beneficial.</p> <p>Since September, that was the first thing we saw was math test scores. Math test scores shoved down our throats for the last 5 years. Every Tuesday afternoon they have been in our face, in chart form.</p> <p>We have the benchmark assessment that is consistent across district by grade level.</p> <p>We use [assessment data] to talk to the parents and inform the parents where their children are at. And we use it to grade progress reports based on the rubrics that were developed to guide instruction. Sometimes for groupings or adverse affect for eligibility for special Ed purposes.</p>	<p>One of the things that we've been working on [in special education] because we have multiple grade levels in our classrooms, and in a small city, [is] what are the essential skills that the kids need to learn and how do we assess what they actually know, and what they still need to know, so we've really been working on a lot of assessment, modifying the [math] program and using it or not using it and how do we best meet the needs of these kids, so when they're ready to go back, making sure that they're ready and on the same level, when they go back to the regular math program.</p>

VMP Goal 3.2 – Assess Data to Adapt Teaching	
Fall 2004	Spring 2006
I would say that in the past we have had a lot of separate workshops, where we have had the [mathematician] come in for a day or for some type of thing and so we are most excited now to have a program that is going to extend over a period of time, so we can ask our questions, we can do some things, and then we can use that resource to come back and see what worked and what didn't work. Because we've had a lot of like taking a week long course or taking something, but then you are kind of on your own and you have your peers for feedback but this is a good opportunity to have a longer period of time where we do something, we can try it out in our classroom, we bring it back to the [mathematician], we bring it back to our co-teachers and have time to really look at it more closely.	The first part [of the PD] was huge and enormous, but I think the benefits we gained from it once we survived it, was that it really brought us together to think about misconceptions that kids have in math, and I think for me, personally, I am teaching fractions a lot differently than I did before. I assume very little. I do a lot more with formative assessment to see if what they are getting is what I am thinking they are understanding. So I think that has brought us [together], even though some of the moments were just so we could survive. It has also built the math language and created a reason for us to get together... and now we are thinking about sharing that more with other grade levels. But I think it has been, other than the study part of it, which was frightening, what we have gained in terms of understanding and how it is benefiting our students is amazing.

*Depth and breadth of mathematics being taught.*

Themes that are aligning with the depth and breadth of math being taught include that of engaging students in conversation about their work. Teachers are modeling the instruction they receive through VMP PD, either by having students demonstrate formally to the whole group, or working together in small groups. The result is that teachers are finding:

After taking my best practices and teaching mathematics, I set some goals this year, allowing a lot more math “thinking aloud” strategies. Everyone solves them differently, that’s fine. Really, everyday as part of a warm up or activity, I always allow my children to explain their thinking. To see how they solved it this way and they solved it that way and got the same answer. I don’t necessarily focus on the answer, but the process of how they got it is so important.

In order to demonstrate that a theme is found frequently, it is also possible to report on how often it has been used in a specific document. For example, the passage above is part of a focus group transcript that has the following references to “depth & breadth.”

Table 5.

Document 46 of 188	10_15_04
Passage 1 of 11	Section 0, Paras 13 to 18, 1145 chars.
Passage 2 of 11	Section 0, Para 22, 447 chars.
Passage 3 of 11	Section 0, Paras 26 to 33, 949 chars.
Passage 4 of 11	Section 0, Para 35, 1154 chars.
Passage 5 of 11	Section 0, Para 37, 450 chars.
Passage 6 of 11	Section 0, Paras 40 to 42, 608 chars.
Passage 7 of 11	Section 0, Paras 48 to 50, 414 chars.
Passage 8 of 11	Section 0, Paras 54 to 56, 457 chars.
Passage 9 of 11	Section 0, Paras 156 to 158, 1749 chars.
Passage 10 of 11	Section 0, Para 164, 374 chars.
Passage 11 of 11	Section 0, Para 175, 69 chars.

The report shows us which paragraphs the theme was found in, and how many characters were coded with it. (Because this document was not coded “by section” there are no figures shown for section coding.) This form of data display goes beyond the “search” feature found in word processing, because the theme does not need to have occurred as a word within the text -- it is coded on top of the text.

However, traditional text searching can also be an effective component of the analysis, with further juxtapositions reported. For instance, how often teachers are using a specific term, such as “differentiation” and how many times they *describe* differentiated instruction, but without using the term. We are finding that the use of specific mathematic and pedagogical terms grows as teachers spend more time in VMP PD.



*Teacher expectations for all students.*

As noted, the Mathematics Intervention Center (grades 2-6) at one VMP participating school is showing very promising results in student performance, while adopting an increasingly inclusive focus. By selecting students with pre-test scores below those who would have been served in its earlier years, and finding that those students perform equally well or better than others on exit exams, the intervention center staff are making important institutional, as well as personal, discoveries about student learning. Quantitative data from the Intervention Center shows statistically significant gains in the scores of intervention students on end-of-year tests, and is also now available in a form that will be compared to the new Vermont state test (NECAP) math score results. This component of the evaluation will continue, with findings shared back to the classroom teachers and Intervention Center staff.

*Further Validation of Findings -- Triangulation of Sources*

In its broadest interpretation, program evaluation is a form of feedback. Authentic assessment of the program under study is best achieved when access to multiple sources of information is available throughout the life of the program. (Weiss, 1998; Stone, 2002) We believe that without access to multiple concurrent data sources over time, an understanding of the programs successes and challenges is incomplete.

*Data source – classroom observations.*

The VMP Classroom Observation Tool is an adaptation of observation instruments developed by the Vermont Institutes, Horizon Research, and Western Michigan University. It has been adapted to reflect the goals of the VMP, and to link to the VMP Equity Framework. The VMP Scale has two parts. Eight questions focus on

teacher behavior and five on student behavior. Each item is rated on a scale of 1 (No Evidence) to 5 (Extensive Evidence). The scale also provides an opportunity for the observer to add comments. Copies are provided upon request to the teachers and their administrators prior to the teachers being observed by evaluation staff.

The 2003-2004 Elementary School Cohort, now in the final year of VMP involvement, experienced significant gains in four of the teacher items: “math content,” “monitoring and adjusting,” “reflection,” and “encouraging students to grapple with content.”

Two areas where we are beginning to see growth are 1) developing the use of higher order thinking and 2) supporting students’ ability to make connections.

*Data source – math content inventories.*

VMP project staff and evaluators are also working with the Learning Mathematics for Teaching (LMT) inventories in order to design pre and post tests for tracking growth in teacher content knowledge. VMP staff and evaluation staff members have been trained in the use of LMT items by Drs. Debra Ball, Heather Hill, and Geoffrey Phelps. Pre-post tests are drawn either from LMT Inventory items, or constructed by VMP staff and consultants, and administered in VMP courses for teachers from participating schools as well as VMP courses for teachers from other sites. Results of the pre-post tests show significant increases in teacher content knowledge when measured by Z-score gain on two-tailed t-tests. Moreover, participating VMP teachers exhibited significantly greater pre-post gains than other teachers who took part in the courses.

The student and institutional impact of teacher-changes detailed in qualitative focus group data analysis is being reflected in classroom observations as well as in

quantitative assessments of student achievement from data sources including in-school interventions and statewide testing. Without the collection and analysis of focus group data over the life of the project, in addition to quantitative sources, the particular lessons learned will not have been as rich and instructive.

### *Conclusion*

Focus groups are allowing us to explore in detail what the change that VMP is bringing looks and feels like for those within a school. It will be important to continue exploration of longitudinal qualitative data in the final year of the evaluation. By holding focus groups in each school and spreading the groups out over the school year, evaluation staff will collect, explore and report final-year qualitative data from each participating school.

Through coding themes “down” from established goals and benchmarks, as well as coding “up” from unique or recurring themes that rise from the data, we are continuing to find patterns in the data to establish that the VMP process for designing in-school PD based on the explicit needs and wishes of the participants, while incorporating strategies based on best practices and VMP research findings, leaves teachers saying they feel empowered as an integral part of the change process taking place in mathematics instruction in their schools. Themes, of confidence in math content and pedagogy, use of data from formative assessments, depth and breadth of mathematics being taught, high expectations for all students, and the application of scientifically-based action research, point to reasons for their change. In the final year of the evaluation we will continue to document the project and participants’ responses to it closely, as a model strategy for enacting change in schools as evidenced by both qualitative, and quantitative, data.

## Attachment 1

Goals and objectives	Focus Forum Questions
<p><b>Goal 1: Teachers deeply understand mathematics and can translate their knowledge into high levels of student learning.</b></p> <p>Objective 1.1 Teachers have a deep understanding of mathematics that allows them to effectively reach all students.</p> <p>Objective 1.2 Teachers are aware of why they are teaching the subjects they teach, and how crucial concepts evolve in the curriculum in prior and later grades</p> <p>Objective 1.3 Teachers are knowledgeable about current research on mathematics teaching and learning and use that knowledge to inform their practice</p> <p>Objective 1.4 Teacher leaders are effectively utilized in every school, to provide guidance and support to other teachers, and to help lead continuous school improvement.</p>	<p>1. What of your participation has had an impact on your <b>understanding</b> of and <b>confidence</b> in mathematics?</p>
<p><b>Goal 2: School support systems are rich with learning opportunities for students and teachers.</b></p> <p>Objective 2.1 Sufficient time and resources are provided in every partner school to ensure that all teachers possess a deep understanding of mathematics.</p> <p>Objective 2.2 Mathematicians are available to all partner schools and are engaged with educators in the review, development planning and implementation of content-based professional development.</p> <p>Objective 2.3 Teachers can effectively differentiate instruction and intervene to create equitable access to learning for all students.</p> <p>Objective 2.4 Achievement gaps are narrowed for all subgroups and all children possess the prerequisite understanding and skills for grade level progression</p>	<p>2. What of your participation has had an impact on your instruction?</p> <p>3. How has this affected students?</p>
<p><b>Goal 3: Partner schools and districts use valid and reliable ongoing assessments and feedback systems to continuously improve mathematics results for all students.</b></p> <p>Objective 3.1 Schools have assessment systems and tools that effectively document student performance</p> <p>Objective 3.2 Teachers use assessment data to adapt their teaching to assist students in achieving high levels of performance</p> <p>Objective 3.3 Teachers routinely examine student work with colleagues to make instructional improvement to address the needs of all students</p> <p>Objective 3.4 Teachers receive high quality feedback on their teaching</p>	<p>4. What of your participation has had an affect on mathematics assessment?</p> <p>5. How has assessment data been used by :</p> <ul style="list-style-type: none"> <li>■ You?</li> <li>■ The students?</li> <li>■ The school?</li> </ul>
<p><b>Goal 4: Mathematicians and educators collaborate to develop high-quality professional development materials and protocols for teachers to build understanding of mathematics content, instructional strategies, equity strategies and educational leadership.</b></p> <p>Objective 4.1 Teacher Leaders have access to high quality professional development materials to support teachers in developing a deep understanding of mathematics</p> <p>Objective 4.2 Schools and districts have access to professional development materials and protocols that enable teachers to provide a strong mathematics education for all students</p> <p>Objective 4.3 Mathematics teacher leaders in schools and districts have a variety of strategies to support and promote effective mathematics education in their schools and districts.</p>	<p>6. What resources, training opportunities, etc have had an impact on your understanding, instruction and assessment?</p> <p>7. What changes have you seen in student performance as a result of the training you have had?</p>
<p><b>Goal 5: Mathematicians and mathematics education faculty support collaborative research efforts among preK-12 educators, contributing to the state and national research base in the teaching and learning of mathematics.</b></p> <p>Objective 5.1 Teachers are knowledgeable about current research on mathematics teaching and learning and have opportunities to engage in relevant action research</p>	<p>8. Share an example of research you have read or conducted that has affected your practice.</p>

## Attachment 2

### 1. Collaboration:

Please describe the ways in which the educators in your school (or math center) work together around math instruction.

### 2. Lesson Planning:

What are your considerations as you prepare a math lesson? What are your considerations as you deliver a math lesson?

*What changes have you seen in student performance as a result of the VMP training you have had? (in math, assessment, lesson planning, etc.)*

### 3. Assessment:

VMP has focused on trying to answer the question of “what will it take to help all students succeed in mathematics.” Please talk about strategies you and educators in your school overall are using to meet the math instructional needs of the full range of your students. How do you know if your students are learning what you have established as learning outcomes?

*Please describe opportunities you have to look at and analyze student work/assessment data.*

*Describe opportunities you have to work directly with other educators (in your school, district, the state) to address issues of math instruction, learning and assessment of learning.*

### 4. Participation in VMP:

How, if at all, have you been changed by your experiences with VMP?

*What of your participation in VMP has had an impact on your understanding of and confidence in mathematics?*

*Do you see any changes in your own skills and knowledge about math or in your math instruction? What do you see is the impact of any changes?*

*For students*

*For teachers*

*For parents*

*For the school*

5. Teacher Leadership:

Describe any experiences you have had taking a leadership role in math instruction (either at your grade level, in a focus area, school-wide, district –wide, etc...)

6. Resources:

What resources (human and material) are available to you at your school (math center) to support your math instruction? How do you use these resources?

7. Research:

Share an example of research you have read or conducted that has affected your practice.

8. Anything we've missed?

Is there anything else you would like to share with us about your participation in VMP?

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