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A Chorus of Voices: Re-Examining Focus Group Data for Evidence of Personal and Institutional Change

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A CHORUS OF VOICES: RE-EXAMINING FOCUS GROUP DATA FOR EVIDENCE OF PERSONAL AND INSTITUTIONAL CHANGE

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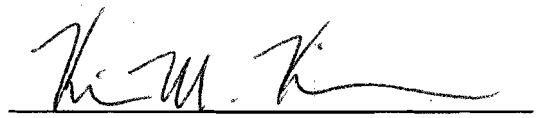
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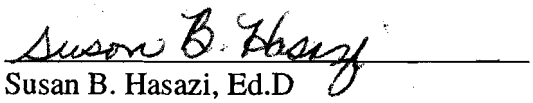
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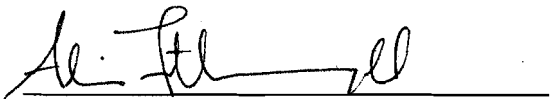
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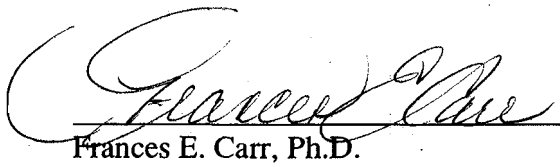
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Abstract

Seven Vermont school districts participated in a five year professional development program sponsored jointly by the National Science Foundation and the United States Department of Education from 2002-2007. Using a robust mixed methods evaluation, teachers and students demonstrate pronounced organizational and academic growth. Analysis of data from focus groups held with teachers over the course of the period from fall 2004-spring 2006 provides strong supporting evidence for the growth.

The purpose of this dissertation is to reanalyze the focus group data to document institutional and longitudinal change at the first person level. With focus groups as the unit of analysis, themes rising from the anonymous participants' *I statements* form the substance for this review.

By revisiting an extensive pre-existing data set with a different method of analysis, this work expands on what is known about how teachers process change on the ground level. The findings reveal how complex individual feelings about one's experiences serve to describe degrees of institutional as well as personal change. New thematic coding confirms the original findings of the program evaluation. More importantly, the findings provide new details and understandings about organizational change and growth previously unobserved in the aggregate reports. By way of a methodological contribution, the research findings suggest and demonstrate an alternative approach to the analysis of focus group data in the aggregate.

Acknowledgments

It is thanks to the Vermont Mathematics Partnership's Principal Investigators, Directors, and Managers, and the Vermont Institute's Evaluation Center staff that this wealth of data, collected as a formative evaluation component whose findings were shared with the projects' funders and leaders during the course of their five year grant, exists and was available for further analysis. Many programs would want to keep only summative findings, basically a tally and report of what was done and by whom, with broad summaries of recognized affects, at the end of a project. The VMP evaluation, by involving and giving "voice" to teachers who took part in the project and its evaluation over the course of the grant, expanded the role of evaluation from mere monitoring, or even monitoring and adjustment. It was an empowering evaluation in which everyone learned (Fetterman & Wandersman, 2005; Joint Committee on Standards for Educational Evaluation, Sanders, American Association of School Administrators, & Joint Committee on Standards for Educational Evaluation, 1994). The VMP is continuing to serve as an instrument through which learning – and change – takes place through support of this study to revisit the focus group data for further lessons learned.

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Dedication

This study is dedicated to my family, all of whom have encouraged me to pursue my dreams, and particularly to my parents, Faye Allen Sweet Rice, the late Arthur Brownell Rice, Dr. Nancy Williams Nolte, the late F. Stuart Nolte, and to my loving husband, James.

I would also like to dedicate the spirit of this work to the tiny Henderson, New York public school which I entered for the first time as a kindergarten student by walking beneath twin carvings placed high on the outside of the building, that read “Learn to Live” and “Live to Learn.”

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Chapter 1 -- Introduction

Seven Vermont school districts participated in The Vermont Mathematics Partnership (VMP), a five year professional development program sponsored jointly by the National Science Foundation and the United States Department of Education from 2002-2007.[1] VMP's program was a "targeted" Math/Science Partnership, meaning that the focus was exclusively on math, not science. Teachers and staff at each of the seven district partner sites participated in professional development activities run or sponsored by the VMP. The exact mixture of courses, workshops, classroom mentoring or other professional development offerings at each of the seven sites depended upon the results of an annual VMP needs assessment and work planning process. A robust mixed methods evaluation found that teachers and students alike demonstrated pronounced organizational and academic growth as a result of their schools' involvement in VMP (Harris & Nolte, 2006). Analysis of data from focus groups held with teachers across the sites over the course of the period beginning in the fall of 2004 and running through the spring of 2006 provided strong supporting evidence for that growth.

The purpose of this dissertation is to reanalyze the focus group data in order to more thoroughly document institutional and longitudinal change at the teacher level through the first person statements of teacher-participants. With focus groups as the unit of analysis, themes rising from the anonymous participants' *I statements* form the substance of cross sectional and longitudinal review.

[1] The Vermont Mathematics Partnership was funded by a grant provided by the US Department of Education (Award Number S366A020002) and the National Science Foundation (Award Number EHR-0227057)

By revisiting an extensive pre-existing data set using a different method of analysis than that employed in the former project evaluation, this work serves to expand on what is known about how teachers perceive and process change on the ground level. The findings of this study reveal how complex individual feelings about one's experiences serve to describe degrees of institutional as well as personal change. New thematic coding confirms the original findings of the program evaluation. More importantly, the new findings provide additional details and understandings about organizational change and growth previously unobserved in the aggregate reports. By way of a methodological contribution, the research findings suggest and demonstrate an alternative approach to the analysis of focus group data in the aggregate.

Background/Overview

The VMP focus group data was collected and reported on during formative external evaluation of this unique school reform effort, with findings suggesting that the VMP introduced practices of stakeholder input through needs assessments, math intervention for teachers, staff, and students alike, and action research institutionalized in the classroom as formative assessment, are having positive effects in the partner schools. Additional impact of VMP as a whole is beyond the scope of this dissertation.

Statement of the Research Problem

In the formative external evaluation prior to this new study, themes identified in the focus group data were purposefully sought as they related to the VMP's specific goals and objectives (see Appendix A). Analysis resulting from that very "top-down" methodological design found the themes related to VMP goals rose most often in the focus groups held toward the end of the project. In the current study, this data set has

been revisited in order to discover what more can be learned from the lived experiences of the teachers who were engaged in the program as it relates to their personal and their institutions' change. Through this reanalysis I have explored the diverse perspectives expressed in the source data by re-coding for themes which rise from the participating teachers' personal *I statements* which they made during each of the sessions (Glesne & Peshkin, 1992; Nagel, 1996). By engaging in a more purely qualitative coding strategy, this new analysis of the focus group data adds to our understanding of how the VMP experience impacts the lives of teachers, their professional practice, and their students' achievements; while leading to institutional changes (Creswell, 2003).

Data Collection Process

Beginning in the spring of 2004, focus groups were conducted twice a year by evaluation staff with VMP school level participants at each of the seven VMP partner districts. In the winter of 2005 a National Science Foundation (NSF) Research and Evaluation Technical Assistance (RETA) Consultant conducted a site visit, and acting as a "critical friend" to the external evaluators provided a critique of the evaluation plan (F. Lawrenz, personal communication, February 2005). In it, she recommended that the VMP evaluation focus group data collection take place annually, instead of bi-annually, during the remaining years of the evaluation, and that concentration be placed on specific sites of interest in the last year. The external evaluators took her advice and, as a result, focus groups were held during the 2005-2006 school year only in the spring, and at only three of the seven districts. The three sites were selected for further study with the consensus of evaluation and program staff. There was interest in learning more about the specific strategies used at those districts through findings from various other data sources

including VMP needs assessments, schools' action planning processes, VMP evaluation teacher surveys, and VMP staff's logs. Thus Sites 1, 5, and 7 were chosen for focus groups in the spring of 2006 because they were engaged in very different professional development models, each of which is based on the VMP leaders' program designs resulting from school level stakeholder input.

As a result of this change in practice for collecting focus group data, groups were held less frequently across the project in the later years, and some sites are represented more often than others. This is important to understand for the current analysis plan because of the themes which rise from the focus groups for the project as a whole, some sites are better represented than others by virtue of their differing frequencies and levels of participation in the data collection process. Table 1 explores some of these uneven features of the data set. Overall, it shows that sites 1, 3, 5 and 6 contributed most of the full-text data on which this analysis is based.

Table 1. Totals of VMP Focus Groups, Participants, and Character Text Counts[2]

File	N Focus Groups 2004-2006	N Participants	N MSW* Characters by Site
Site 1	5	29	196,086
Site 2	3	20	114,695
Site 3	4	27	170,264
Site 4	2	9	79,955
Site 5	3	24	135,011
Site 6	5	24	211,805
Site 7	4	27	110,805
totals	**26**	**160**	**1,018,621**

*Microsoft Word

[2] Further demographic data for the specific schools selected from the seven VMP partner districts are shown in Appendix B.

Within each partner district, particular schools of interest were selected for more intensive VMP professional development activities. Schools were selected either because they had a greater number of Vermont Mathematics Initiative (VMI) teacher leaders on staff or because of the school's history of involvement in mathematics specific professional development with other institutions of higher education. VMI teacher leaders are math teachers who are in the process of earning, or who have completed, a specific masters degree program in math teacher leadership. Thus the VMP program leaders gauged their partner schools' "readiness" for the new whole-school mathematics professional development model, which they brought directly to the classrooms, by a school's long-standing partnership with an institution of higher education. Their sampling criteria for choosing partner schools impacts the current findings in that the schools studied were purposefully chosen because of their demonstrated commitment to providing professional development opportunities through Institutions of Higher Education (IHE) partnerships and of building and supporting classroom teachers' growth as teacher leaders. Because of this, findings from this reexamination of the VMP focus group data cannot be said to apply to any other set of schools, in particular those which are not in a similar state of "readiness" for the program. However, further study with schools chosen by randomized sampling holds potential as a follow up study, possibly as a control.

As noted previously, formative analysis of the focus group data as a component of the external evaluation was built from known themes intentionally evoked by focus group questions written from the stated goals of the VMP project (see Appendix A). However, this thematic structure was not entirely rigid. A new theme that was recognized in the

data but did not link back to the project goals could be the basis for later focus questions and participants' reflection on those rising themes prompted in future rounds of the evaluation. In revisiting the original transcripts, while the process for identifying themes rising from the data set is substantially different from that used in the earlier evaluation, the process of thematic labeling or coding is essentially the same. As in the evaluation, thematic headings will not be tied to a single document, so that when a theme is recognized again in a different focus group transcript a heading that has been identified can be coded onto that data source as well, even when the terms used by the speaker are not identical to those used in the original group from which the theme was created. In addition, multiple themes can be coded onto one section of text, leading to a deep, constructivistic, analysis (Richards, 2005). It is in this way that context units of thematic coding are developed, built from the use of teachers' rich full text description of a particular time and place, to reveal each speaker's underlying thoughts and feelings as they lived through a time of rapid change (Glesne & Peshkin, 1992; Richards; Stewart & Shamdasani, 1990).

Findings are organized by an overview of the data built from an NVivo2 "live matrix," which allows for overall pattern analysis or data display, but in addition is composed of clickable links back to the original thematically coded text (Galvan, 2006; Morse & Richards, 2002). The live matrix view displays how many times text is found that has been coded, identifying overlapping themes displayed as intersecting heading rows and columns. This view of the data makes visible patterns of themes that are aligning across the years and the VMP partner sites, as well as instances where coding is in process or absent. It also allows for further close thematic investigation of the full text

transcripts which underpin the matrix in order for further meaning to be constructed within the context, time, and place of each statement (Miles & Huberman, 1994; Patton, 2002; Richards, 2005).

Research Questions

From this reexamination of the focus group data, by coding the teacher-participants' *I statements* and displaying results in the NVivo live matrix view, each speakers' personal moments of change and growth, their "ah-ha" moments of insight about students' and teachers' learning, are revealed. From these statements, patterns of experiences described over time serve to document a story of institutional change through individuals' experiences. Essentially this creates a picture of group change as told in the participants' first person narratives, making visible disparate struggles and paths taken at the different sites as teachers and their students moved "through" changes in teacher-knowledge and practice which combine to form a pattern across the three years of data examined for this study (James, 1996; Patton, 2002).

The notion that an organism, be it human or institutional, is not in a steady state of "being" but in a constant state of change, while at the same time not capable of being fully reflective about its current environment or reactions to that environment, is an idea also addressed by Senge (1990, p. 23), who states we all have a "learning horizon" which is difficult to see beyond. In this study the story of change is experienced by students, teachers, and schools, and expressed in the voices of those who lived through it by exploration of teachers' voice as found in their *I statements* of longitudinal focus group transcripts.

With this reasoning for revisiting the VMP focus group transcripts in mind, the research questions are:

1. What can we learn about VMP's impact over time on students and teachers, as told in the teachers' own words?
2. What can we learn about the school reform effort brought by VMP, from the teachers' perspective?

Sub Questions

Four sub questions to ask of the data have been drawn from the literature review and from my experience and "hunches" in working with the data set as a component of the larger formative mixed-methods VMP evaluation:

1. How do time and place impact the teachers' experiences with the reform efforts of VMP?
2. Are recognizable principles of the Equity Framework attributed by teachers as leading to changes in their practice?
3. Are recognizable stages of individual or institutional change present in the data?
4. How effective is this form of focus group analysis in answering the research questions?

Definition of Terms

The Teacher Participants' "Subjective I": When referring to the teacher or participant voice, I am drawing from the concept of a *subjective I,* in that, "The voice of subjectivity takes an I, the first-person singular, the attestation that a particular person was in a particular place for a particular purpose" (Glesne & Peshkin, 1992, p. 101). The

author and researcher Peshkin identified six "*subjective I's*" in his own thinking about two studies he had conducted, one of a fundamentalist Christian school (Glesne & Peshkin; Peshkin, 1986) and another of an imperfectly integrated multi-racial high school and community (Peshkin, 1991). From his viewpoint as the researcher, the different *subjective I's* Peshkin recognized in himself were:

1. Ethnic-maintenance I – others do what I value
2. Community-maintenance I – community is being maintained through activities of which I approve
3. E-pluribus-unum I – mingling of groups signals diversity
4. Justice-seeking I – a defensive self, for instance when hearing participants' stories of mistreatment
5. Pedagogical-meliorist I – also a defensive self, appearing when students and teachers are observed in "meaningless engagement"
6. Nonresearch-human I – treatment upon entering, may develop empathy for those under study. (Glesne & Peshkin, 1992, pp. 104-105)

However, the *subjective I's* of primary interest in this study are the participants' and not the researcher's; they are found in the full text transcripts of teachers' discussions which took place during the focus groups. As such, some of Peshkin's "*I's*" may be found, but I would expect others to emerge from the focus groups and from my own understanding of the speakers' concerns.

Handling Textual Coding: From participating teachers' *I statements* I have coded for themes which reveal their subjective, or personal, experience or understanding of the

changes that VMP is bringing, or seeks to bring, to the partner schools. This method involves first identifying participants' *I statements* by full-text searching for specific text patterns across the full data set. The *I statements* of interest in this study are those chosen to reveal the participants' subjective thoughts and feelings: "I am," "I think," and "I feel." While other *I statements* certainly appear within the data set, these were selected in the order shown above because of the rich, personal, stories which rise from occurrences of the three particular speaking and text patterns. Additional coding run tries from patterns such as "I wish," "I try," and "I don't" did not result in as great a sub-set of full text passages to consider for further coding.

Table 2. *I Statements* Identified in the VMP Focus Group Data from Full-Text Searches

	am	think	feel	totals
Site 1	35	149	45	229
Site 2	26	95	57	178
Site 3	52	115	45	212
Site 4	24	71	17	112
Site 5	30	122	35	187
Site 6	37	177	86	300
Site 7	36	112	34	182
				0
Fall 04	63	285	123	471
Spring 04	11	148	59	218
Spring 05	138	329	102	569
Spring 06	27	79	34	140
totals	479	1682	637	2798

Table 2 shows the counts of the number of *I statements* identified for further coding through this method of culling the data set by full-text searching. Each passage was then revisited within the document in which it was found. When a speaker's

meaning could not be understood from the context of the sentence in which their *I statement* occurred, then the surrounding paragraph or if necessary paragraphs were also re-examined until their meaning was made plain enough for me to draw further conclusions from.

Additional themes which rose from the data by examining the teacher-participants' *I statements* appear across schools and years, as well as occasionally being unique, ad hoc, or just "good ideas" that arise and are discussed during only one specific group. As described previously to aid in the handling of this thematic data, the qualitative software NVivo2 was used to sort and reflect upon the themes identified (Bazeley & Richards, 2000; Richards, 2005). In addition, thematic recognition and definition is also tracked using a table inspired by Miles and Huberman's Qualitative Analysis Documentation Form (1994, p. 283).

Study Limitations and Delimitations

In order to protect the right to privacy of those who took part in the focus groups, in keeping with ethical practices of focus group analysis and program evaluation, the full-text transcripts used as the basis for this analysis were stripped of all participants' personal identification other than the title of the person speaking (Joint Committee on Standards for Educational Evaluation et al., 1994). For example, only the speaker's grade level or one's position as a special educator may be found from the data set. Participants were told at the time the data was collected for the VMP external evaluation that they might be identified by site and title, but never by name, in reports written from the focus group transcripts and the handling of the data for this new study is in keeping with those assurances.

Need or Significance

By revisiting the focus group data that was collected over the course of the five-year VMP grant, using another more nearly qualitative methodology, findings from the original evaluation of the project were confirmed and elaborated upon. In addition, by use of a new coding strategy for the analysis, built from the specific *I statements* made by focus group participants, the teachers' individual voices were combined as in a chorus to speak of their individual experiences about the changes that they have experienced on the "ground level" during school reform. As the changes in classroom practice brought or supported by VMP took hold for individuals, the teachers' combined stories emerged to form patterns of adoption across their institutions over time.

Organizational Change and Growth

As a program evaluator, I measure change. I see on a daily basis the results of change, both positive and negative, hearing the resistance people have at the beginning of a project and later often their successes with and accolades for the change processes of a successful program. I hear confusion and discouragement from those involved in programs that just are not working for one reason or another. As an evaluator, I help program directors to find out what is and is not working, and document what change feels like to participants over a program's life. It is because of my position on the ground level, with those going through school reform efforts, that I am interested in exploring a method to tell the story of school change through individuals' experiences.

Potential Significance/Contribution of Research

By revisiting this rich data source, I am giving it the attention which it deserves so as not to let this opportunity for seeking a compelling and instructive "story of change"

be lost just because the focus group findings having been reported as "one component in a larger package of procedures," as Morrison in *The Search for a Method* cautions often happens when focus group data is collected as one of many components of a multi-method research plan (1998, p. 218).

Morrison (1998) chronicles confusion and "rediscovery" of focus group methodology through the writings of David Morgan, author of two Sage Publications handbooks dealing with the "how to" of focus groups (pp. 2-3). Morgan first wrote in 1984 that focus groups were a technique developed from commercial market research. Four years later he states, more nearly correct in Morrison's view, that the method arose from academic sociological research (Morgan, 1988; Morgan & Spanish, 1984, p. 254). The re-writing of history is usually prompted by some shift in attitude toward the subject matter, and Morrison goes on to note that this change in Morgan's own analysis of the roots from which focus groups developed, "offers an insight into the development of focus groups as a now accepted research tool of the social sciences, in that in common with the establishment of any field, a point is reached when historical excavations of its beginnings takes place" (p. 3).

Morrison (1998) himself attributes the focus group methodology as having arisen from what he calls "the setting" for a mixed methods approach by researchers Lazersfeld (quantitative) and Merton (qualitative) at Columbia University during their professorships there in the 1940's, and the movement of the focus group method into the realm of marketing research as being the result of the entrepreneurial leanings of its earliest academic practitioners.

Regardless of its roots, the focus group methodology holds potential for producing a rich data source of first-person information, particularly when recordings or full text transcriptions are available for analysis. The financial benefit of essentially holding "interviews" with more than one person at a time is often cited as an attraction of the method (Langer, 2001; Stewart & Shamdasani, 1990). But more importantly to this proposed analysis, the *dynamics* of a facilitated group situation can produce a different, deeper level of data than might result from one-on-one interviews held separately. This is the result of a social process found in the facilitated group setting (Stewart & Shamdasani, p. 10).

With the addition of qualitative research software, identifying and coding for multiple themes within full-text transcripts of focus groups has become if not easier then at the least a more compact operation. Complex data files can easily be carried by the researcher for exploration in many different formats and settings, whereas in the past text that was color coded or snipped and separated into relevant headings was not so easily manipulated for exploration of either content or theory (Bazeley & Richards, 2000; Richards, 2005).

Expressing Teacher Voice

It has been pointed out that teachers' "voice" is not often heard in school reform. Berliner (2006) states this is perhaps based on the supposition that something must be done by "outsiders" in order for the "broken" school system to be "fixed." I believe that the *subjective I* of teacher voice present in the VMP focus group transcripts is a unique and important feature of this methodology. By understanding the teachers' characterization of their individual experiences while they were taking part in the

program, we listened in as they reflected on the change occurring in their teaching and speculated on how it was impacting their students' opportunities to learn. This "snapshot" of reform at the teacher level is frozen in time during each of the VMP partner schools' focus groups, forming the written equivalent of a pictorial family album of gatherings that have taken place over many years. Experiences and opinions change, participants come and go, as the group moves through time. Participants' opinions may be validated, or their suspicions reified, by others present. Likewise, tensions between participants came out with contested view-points represented. The dynamics of group interaction brought out further *I statements* as participants paused to think, and then responded to what others had said.

Contribution to Theory

Equity Framework

During the proposed analysis of existing data I will be attuned to the presence of The Equity Framework (see Appendix C) which, while a guiding principle of the VMP's work has not previously been a unit of analysis in the evaluation of its focus group data. The Equity Framework, if identifiable within the focus group data, may act as a central theory for consideration (Creswell, 2003, p. 134).

Teacher Training/Professional Development

It has been shown that adult education programs are most engaging when designed as problem-based learning activities of personal importance to the participants (Vella, 2002). VMP leaders conducted a needs assessment with each partner school at the beginning of every year, in order to design a unique form of PD within each school. As a result, each partner school receives its own "flavor" of VMP professional

development which might mean offering courses, providing mentors, enabling grade level or subject level meetings, or some other strategy. While this makes generalizability from the outcomes difficult (Creswell, 2003), the systemic change taking place due to VMP's work may in large part be a result of the needs assessments fitting professional development to the *specific, perceived* needs of each partner site. Thus potentially confirming that all change is personal, even at the institutional level.

Change Theory

Roger's (1971) innovation adoption model may provide insight into organizational change that is experienced as personal change. His five adopter types – innovator, leader, early majority, late majority, and resister – are often interpreted as set personalities, but more importantly are stages through which participants may travel in either direction. With four years of concurrent focus group data to draw from, this study provides evidence of personal change-in-progress as described by teachers whose institutions were traveling through stages of change as well.

Contribution to Evaluation Practice

Focus Groups as a Single Data Source

As noted, the focus group data selected for analysis was conducted as a component of formative external evaluation of the VMP. I bear in mind Morrison's view, that focus group methodology by itself is not an adequate measure of "the audience" (Morrison, 1998, p. 256). Because this study is one of revisiting a data set which has been part of a much larger mixed-methods evaluation, the current analysis does not seek to be a stand-alone methodology for evaluating a project, but rather a tool for better understanding a change process as it was implemented and experienced by the

teacher-participants. My findings may serve to guide future researchers in developing further questions to ask of their data, but not as an argument for conducting single-method analyses.

The Researcher's Subjective I

While working on the "ground level" in my capacity as an external evaluator of the VMP program's work, I was present during nearly all of the focus groups held as a component of the formative project reporting process. As I compiled summative reports from the focus group data collected during each reporting cycle, I formed the belief that the first person teacher voice found in the full text transcripts of the VMP focus groups was an important feature of the data set, and by revisiting the teachers' characterization of their experiences while they were taking part in the program, I felt there was an opportunity not only to summarize themes across sites over time, but to actually "listen in" as the teachers/participants reflected on changes that were occurring in their teaching and their students' learning as a result of their VMP experiences. Ellis (2004) describes feeling a similar tension, saying about her auto-biographical/ethnographic work *Final Negotiations* that she was striving for having, "written a story that *showed* rather than *told.*" She characterizes that research method as writing from an "ethnographic I" perspective (p. 335).

Just as the participants who were engaged in the VMP's professional development, I too experience the world subjectively from my own "time and place" of experience, knowledge and comprehension (Glesne & Peshkin, 1992). Ideologically, I am a constructivist, believing that knowledge is personal and iterative. As such, reliance on longitudinal focus group data as a basis for this study is appealing to me – I expect to

be able to "hear" change happen in the teachers' descriptions of their own beliefs and behaviors by revisiting data reduced from conducting the *I statement* text searches in NVivo for consideration of participants' subjective descriptions of the impact that VMP had in their lives and schools (Glesne & Peshkin; Patton, 2002; Richards, 2005).

I personally helped to collect this data and initially had access to it as the basis for further analysis through my position on the VMP program's evaluation team. In this respect, I am potentially biased toward seeing positive findings. My closeness to the project is tempered somewhat because while in some ways I am internal to the VMP, in others I am external. Unlike the internal VMP evaluator, I worked on other program evaluations unrelated to their project. Also, as a team, we consulted with Dr. Frances Lawrenz, an evaluator who is truly external to VMP, but whose participation in its study is funded through their sponsors. In spite of these connections to the project and its funders, I strived for objectivity in this analysis.

In order to document as well as to share with readers the results of this coding, I have tracked my process and conclusions drawn from it using an adaptation of the Qualitative Analysis Documentation Form suggested by Miles and Huberman (1994, p. 283) (see Appendix D). I have also kept a log of my own evolving answer to a question that Patton (2002) suggests will aid one in developing "reflexivity" while conducting a qualitative analysis – "How do I know what I know?" about the participants and their organizations through their *I statements* (p. 495). It is a result of this question and the dual reliability components of tracking and logging about the study that I developed a Cronbach's Alpha measurement approach for relating the various themes rising from the data to one another through correlation analysis. Alphas are calculated for each of the 54

themes which rose from re-coding each “I am,” “I think,” and “I feel” statement in the focus group text, with findings suggesting a strong correlation between clusters of coding (see Appendix E). This analysis helped to further the exploratory model of change proposed from the findings.

Chapter 2 – Literature and "Hunches"

The Multiple I Approach

In addition to the *subjective I* approach described earlier, investigation of first person narrative data for what it can reveal about participants' self-knowledge, and their institutional roles, is supported by the work of educator and researcher Greta Nagel. Nagel (1996) developed the "multiple I-search case" approach while directing pre-service teachers. Her germinal work revolved around case studies of "problem" students. Nagel's student teachers, by interviewing teachers and students and engaging in personal reflection through journaling, revisit first-person *I statements* from their own, and others', viewpoints. She makes the analogy of the student teachers' use of this "I-search case method" as providing them with a process by which they can "walk in another's moccasins" through reflection on both their own and the others' strong and weak points (p. 127). Similarly, it is a "projected" subjectivity, one that the researcher derives from the reading of and reflection on data collected, that is at the core of the *I statement* coding strategy from which my analysis of focus group data is built from.

However, what is lacking in the literature of subjective, multiple, or ethnographic *I statements* is discussion about pairing this sort of strategy with technology. The VMP teachers' words during the focus groups express their personal thoughts about the reforms which are taking place around them, while also defining the point in time within which their institutions reflect the impact of the reforms made through teachers' classroom strategies, their students' performance, or administrators' involvement. Using NVivo2, the focus group data is initially culled by conducting full-text searches for specific *I statements* selected to reveal the teacher-participants' thoughts and feelings about the

changes taking place in and around them. A theme may be large and general, such as "team" which denotes when the teacher-participants describe instances of students, teachers, or schools working together for a common end. Or, as with the theme "my concern," it may be a personal statement of the teachers' concerns, even their fears, as expressed in a 1st person *I statement*. Full description of all 54 themes identified is shown in Appendix F.

NVivo allows the researcher to keep the full-text of all themes identified instantly accessible for further analysis through the "live matrix" view. The live matrix takes the form of a table constructed from intersecting rows and columns each labeled for a unique theme that has been identified. Themes are coded in NVivo by the researcher highlighting the full text and defining a label for that section of text. A text passage found at an intersection on the matrix has been coded for both the theme labeled by the row heading and that labeled by the column heading. In Table 3 a simple live matrix view is shown of intersecting themes "my concern" and "team." The numbers in the matrix represent the number of passages that are coded for both the row heading and the column heading. Therefore, "my concern" is a theme for which 107 passages have been coded, 13 of which have also been coded for the theme "team." In this case, each passage is a distinct sentence, paragraph, or group of paragraphs. For comparison, the themes "I am," "I think," and "I feel" are also shown. These themes were derived from full-text searches, each instance represents only the text "I am," "I think," or "I feel." Because of this unique method for theme identification, there are no intersections found between "I am" and "I think" or "I feel," whereas there are 36 intersections found between "I am" and "my concern."

Table 3. Matrix View of Intersecting Themes

	My concern	**Team**	**I am**	**I think**	**I feel**
My concern	107	13	36	152	84
Team	13	145	50	177	79
I am	36	50	240	0	0
I think	152	177	0	842	0
I feel	84	79	0	0	318

Employing the "live" abilities of the live matrix in NVivo, it is then possible to click into one of the cells and pull up full-text that shares the themes of the row and the column in which the cell is found. For instance, portions from two of the 13 full text passages which share the themes "my concern" and "team" are:

> [Site 6, spring 2004] [2nd Grade Teacher] -- I will be honest and say that what I'm thinking, what I'm hearing from people before VMP, there was less pressure. Whether it's self imposed, or we're imagining it. Even the timing. And it's with Everyday Math. It's the program. I think a lot of people are feeling pressure to get through the program. To stay on track. The pacing. To stay on pace.

This paragraph was coded for "team" because within the context of the strategy described, for teachers to stay on a calendar that required they finish the math program together required teamwork. It was coded for "my concern" because this aspect of teamwork was couched as a concern for the 2nd grade teacher who was speaking.

> [Site 7, spring 2005] [3rd Grade Teacher] -- I think one of the things at the 3rd grade level, I'm so sorry 4th grade, we kind of forgo doing a lot of problem solving with the kids this year, and we don't feel that the [school's math] program is all that strong in the area of problem solving. So looking at ways to incorporate, I don't know if it would be professional development, but ways to incorporate problem solving into what we are already doing without it taking any more time. We spend a lot of time now, and the time we spend now, which is important, you need to know that it is coming away from other areas. And those areas will again someday need to be addressed. They are not being addressed this year.

In this example, the paragraph was coded both for "team" and "my concern" because the 3rd grade teacher who was speaking is concerned that professional development needs to address problem solving, while understanding that the lack of focus on problem solving is having an impact across the grade levels at their school. The speaker went on to express an additional concern about the amount of time that math instruction took, and said that some other subjects were being neglected because of the school's current focus on math. This 2nd concern was coded for "team" because of the expressed cross-disciplinary concern. It could also be coded for additional themes, such as "use of time."

By culling the data through *I statement* full text searching, passages in which the participants described their inner most thoughts and responses to VMP professional development were sought. While the process of culling was not itself inductive, 54 further themes were inductively identified from revisiting passages in which each *I statement* appeared. From live matrixes generated of those 54 themes, I explored the patterns of intersection between themes while also developing interpretations of clusters of themes in order to consider the teacher participants' experience in terms of the impact those experiences have had on their schools (Creswell, 2003; Lincoln & Guba, 1985).

Themes Drawn From the Literature

It is an important distinction to note that the source for each of the potential themes noted in Table 4 was not an inductive, but a deductive, process.

Table 4. Potential Themes Rise from the Data and/or Suggest Further Literature Review

Group and Institutional Themes that May Rise from the Data	Source of the Theme	
	Literature Review	A "Hunch"
The MSP's 5 Key Features	x	
Time as a Factor in School Reform		x
Emergent Leadership		x
Transformative/Emancipatory Experiences		x
Teacher "With-it-ness" (or wisdom, in the moment)	x	
Impact of the Site Specific "Flavors" of VMP PD	x	
The Equity Framework	x	

Prior to any inductive coding from the *I statement* culling, and in addition to potential themes previously discussed which were drawn from The Equity Framework, or evoked by linking focus group interview questions to the VMP's stated benchmarks, goals and objectives, potential themes were identified which arose from the early

literature review. An overview follows of the themes which constituted early "hunches" about what would be found by revisiting the focus group data.

Math Science Partnership (MSP)

The MSP is a grant program offered through the National Science Foundation as a component of the No Child Left Behind Act (United States Congress, House, Committee on Education and the Workforce, 2001). MSPs represent a school reform effort developed to improve students' math and science knowledge. VMP is one of two "targeted" mathematics-only MSP grants that were awarded jointly by the NSF and the United States Department of Education. As such, themes in the data consistent with the MSP's focus on five key features of school reform: Partnership-Driven, Teacher Quality, Quantity and Diversity, Challenging Courses and Curricula, Evidence-Based Design, and Institutional Change and Sustainability, were expected to be present (Five Key Features, 2004).

Time as an Indicator

Not only length of time in an intervention but also time between instruction and the focus groups was identified as having had an impact on the teachers' descriptions of their experiences with VMP professional development. In exploring the longitudinal focus group data themes associated with "time" were expected to emerge in many different discussions.

Transformative/Emancipating Learning

As noted, the focus group data for this study was collected over four years as part of the VMP evaluation. By design, new themes identified in one formative data collection cycle were revisited by adding probing questions to elicit those themes during

later focus groups. In this way, the groups were transformative and emancipating settings as topics for discussion were drawn from and added to by the participants themselves during the course of the data collection activities (Creswell, 2003, p. 139). I looked out for any of these themes which originated within a specific group and later became topics of discussion at later times or additional sites.

Teacher "With-it-ness

This theme denotes a teacher's ability "to perceive events before they happen" (Kounin, 1970). With-it-ness is first defined in Kounin's seminal work *Discipline and Group Management in Classrooms* as having to do with a teacher's ability to maintain order and discipline. While his work in measuring and correlating teachers' with-it-ness to student performance has been replicated by some and disproved by others, the concept of with-it-ness continues to draw interest from professional developers and educational researchers, who see this as a skill with plausible benefits for both teachers and students (Irving & Martin, 1982; Lindberg & Swick, 2002).

The theme of with-it-ness is used in the current study in the sense that one expresses wisdom in the moment, a definition that is hinted at by Kounin (1970): "It is not adequate to measure what a teacher knows in order to obtain a score for the degree of her with-it-ness. It is necessary to measure what she communicates she knows" (p. 81). For the purpose of this study, I looked for with-it-ness only as it was expressed through the teachers' *I statements* culled from the full-text focus group data and as an indication of their understanding of reform efforts taking place around mathematics education in their school, or any topics of discussion in which those reforms were made "visible" through the teachers' intuitive or seemingly prescient words. One would expect to find

more examples of this dimension present in the data from the later focus groups rather than the earlier gatherings.

Emergent Leadership

VMP focus group participant-teachers were chosen by teacher leaders within the school who were paid to varying degrees through the grant. The degree to which the teacher leaders were paid was another example of the site specific strategies implemented at the different VMP partner districts and is beyond the scope of this study. But because the teachers who participated in the focus groups were selected by their teacher leaders, it was natural that some participants felt predisposed to report favorably on the work of the teacher leaders. In some cases, although not often, the teacher leaders themselves were a part of a focus group, thus becoming an "emergent leader" voice within the data (Stewart & Shamdasani, 1990, p. 80). I was aware of this having been the case at only two of the sites, but made note of any emergent voice of leadership rising from any site.

Purposefully Revisiting the Full Text Focus Group Data

The individualized design for VMP professional development offered at each partner site lent itself particularly well to a longitudinal case study approach (Ruspini, 2002). The research questions were intentionally aligned with the very human attributes of the focus group data so that the teachers' perspectives as expressed through their words were stressed in order to build this analysis from teacher voice. *I statements* were used as a culling strategy within the full-text focus group data in order to identify specific sections of text in which the greatest potential for finding teachers' inner most thoughts and feelings, about the changes they were living through as a result of VMP professional

development in their schools, can be found. With this in mind, the research questions are:

1. What can we learn about VMP's impact over time on students and teachers, as told in the teachers' own words?
2. What can we learn about the school reform effort brought by VMP, from the teachers' perspective?

Sub questions:

1. How do time and place impact the teachers' experiences with the reform efforts of VMP?
2. Are recognizable principles of the Equity Framework attributed by teachers as leading to change?
3. Are recognizable stages of individual or institutional change present in the data?
4. How effective is this form of focus group analysis in answering the research questions?

Qualitative research is well established as a valid method for describing the lived experience of participants engaged in change initiatives and for developing an understanding of the supports and pressures – both contextual and systemic – which guide their choices (Creswell, 2003; Glesne & Peshkin, 1992; Miles & Huberman, 1994; Patton, 2002). This exploration of focus group data revealed not only unique "ah-ha" moments of personal change as expressed by participants, but also the patterns, if present, of perceptions and lived experiences of change – be they personal, classroom, systemic –

that took place as a result of the seven different school districts' participation in the VMP grant.

Some researchers feel that generalizability is not an appropriate outcome from qualitative methods, which often involve small numbers or single cases specific to a given time and place (Guba & Lincoln, 1981), while others believe that cross-case, qualitative analysis will lead to greater understanding of a particular phenomenon within a specific context (Gladwell, 2000; Glaser & Strauss, 1967; Miles & Huberman, 1994). By revisiting the VMP focus group data there was the opportunity to learn from a large data source of 1st person teacher "voice" about the impact that their experiences of VMP professional development had on the teachers themselves, their students, and schools, as reported over a period of time. Within this data set, insights into the teachers' experiences working in Vermont, working in their region of the state, at their grade level, and so on, also rose from the data. Generalizability beyond the context of these particular schools may be suggested by the findings, but was not an intended goal of this study.

Gladwell (2000), in his review of "epidemics" both viral and social, notes that "epidemics are sensitive to the conditions and circumstances of the times and places in which they occur." He goes on to suggest that in some instances "the impetus to engage in a certain kind of behavior is not coming from a certain kind of person but from a feature of the environment" (p. 142). Thus an ethnographic, longitudinal, case study approach is reasonable in order to study the context for change brought by VMP and its impact on teachers' stated beliefs and behaviors.

Quantitative Methods

Primarily, quantitative methods have been used in this study in order to describe the attributes of data sets and investigate relationships between thematic clusters. While the purpose for revisiting the data was to provide a more qualitative analysis of the data source by identifying themes that are independent of the stated VMP goals and objectives, elements of quantitative analysis were used to elucidate the findings. Specifically, I ran a set of procedures designed to assess the independence and reliability of the identified themes. Using the 54 themes, I calculated Cronbach's Alpha coefficients for each theme. The findings indicated that clusters of themes were highly correlated to each other, serving to further validate the conclusions drawn by identifying them within the text.

Chapter 3 – Methodology

Introduction

The purpose of this dissertation was to examine institutional and longitudinal change as understood and expressed by teachers. With focus groups as the unit of analysis, themes rising from the anonymous participants' *I statements* form the substance for cross sectional and longitudinal review of data collected between the spring of 2004 and the spring of 2006.

In prior analyses and as part of a larger mixed method external project evaluation, themes were identified in the text primarily based on the articulated VMP program goals (see Appendix F). While some additional themes did "rise" from the data in that first analysis, they were not specifically sought after nor explored to any substantive degree. By revisiting this extensive pre-existing data set using a different and enhanced qualitative method of theme identification, this current study expanded on what was known about how teachers process organizational and pedagogical change. The findings of this study revealed how complex individual feelings about one's experiences served to describe degrees of institutional as well as personal change. New thematic coding confirms the original findings of the program evaluation, while providing additional details about the impact that cumulative experience has on organizational change and growth.

Restatement of the Research Questions from Chapter 1

1. What can we learn about VMP's impact over time on students and teachers, as told in the teachers' own words?

2. What can we learn about the school reform effort brought by VMP, from the teachers' perspective?

Sub questions:

1. How do time and place impact the teachers' experiences with the reform efforts of VMP?
2. Are recognizable principles of the Equity Framework attributed by teachers as leading to change?
3. Are recognizable stages of individual or institutional change present in the data?
4. How effective is this form of focus group analysis in answering the research questions?

The Specific Methodology Employed

Focus groups were held annually, and in some cases bi-annually, in all seven districts that took part in the VMP project. The districts were chosen to participate by VMP's Directors either because of math teachers' participation in the VMI[3], or because the district was deemed to be "ready" for VMP because of a history of other forms of collaboration with other higher education partners. One of the reasons for developing the VMP project was to help math teacher leaders and districts work together to create exceptional professional development in the schools. As such, the schools involved were a purposeful sample composed of seven districts, made up of 16 schools, where VMI participants and graduates teach. The sample was not representative of all schools in the state of Vermont.

[3] A Masters Degree program designed to encourage math teacher leadership in the schools

Data Collection

The evaluation team composed open-ended focus group questions drawn from the VMP goals and from themes which rose during prior forums held with the 16 schools studied. I was one of the field evaluators who went into the schools to collect the focus group data, and analyzed the transcripts looking for themes which were specifically related to VMP goals and benchmarks, for reports submitted to the funders and the project leaders as a part of a contractual, formative, evaluation process.

For this current study I went back through the approximately 1,000 pages of full-text focus group transcriptions which had been stripped of all previous coding, and conducted a new analysis without access or reference to the earlier, VMP goal specific, thematic scheme that was used during the formative reporting cycle between 2004 and 2006.[4] In returning to the original source documents I intentionally looked at this material, already familiar to me, afresh. By applying a new lens akin to the *subjective I* search of Peshkin's (1986; 1991; 1992), and the multiple-case *I statement* search of Nagel's (1996) work, I looked for themes which would rise spontaneously from the data and the literature review.

Participant Selection Description and Rationale

Focus group participants were chosen by local "site liaisons" who were teacher leaders within their schools, most of whom were in positions subsidized by the VMP grant. While these site coordinators made the final selections of who would take part in the focus groups, they were provided by the evaluation team with general guidelines for choosing participants in order to put together a group of teachers representing a broad

[4] Estimate of 1,000 pages is conservative, made by assuming 1,100 characters per double spaced page

range of teaching styles, differing comfort levels with mathematics content, various degrees of math teaching experience, and representing grade-levels across the school. Special educators and in some cases para-educators who also engaged in VMP professional development were sometimes included, depending on whether they had been involved in the forms of VMP professional development designed by the VMP leaders for each site based on the project's needs assessment process. Participation in the focus groups by administrators was discouraged, in order to provide for a "level" pool of participants, which has been shown by Langer (2001) and others to be important in helping participants to feel that the groups are a safe place in which to express their honest opinions.

Demographics of the sample described. Twenty-six teacher focus groups, each with between 8 to 12 participants, were held within seven partner VMP school districts over the past four years as a component of a much larger, mixed-methods VMP evaluation. Other components of the larger evaluation included bi-annual classroom observations, annual surveys of participants, administrator interviews, and teacher and student test score analysis. Analysis of the focus group data had primarily taken the form of longitudinal thematic coding for evidence of the project's goals and objectives (see Appendix A). Findings drawn from that information was then shared in formative reports to the project's leaders and in summative year-end reports to the funders.

Specific Qualitative Design

Individual and team. The focus group data collection was conducted between the spring of 2004 and spring of 2006 by the Vermont Institutes Evaluation Center, of which I am a member. As a member of the external evaluation team, I was part of the data

collection and analysis process for both quantitative and qualitative reporting to stakeholders. The additional datasets, while extensively used to corroborate findings articulated in the larger VMP evaluation, were not reanalyzed for this study.

I statements. My interest in reviewing this large pre-existing data set by focusing on participants' *I statements* was inspired by the description of Peshkin's reflections about his own subjectivity toward participants and events which he was studying. His work with the *subjective I* is found in the germinal publication *Becoming Qualitative Researchers* as well as in the original studies which it quotes (Glesne & Peshkin, 1992; Peshkin, 1986; 1991).

I first began working with text-search as a method for further, more detailed, coding of full-text data sources while exploring NVivo2 qualitative software. I became proficient in using Nvivo2, so much so that I was chosen by its Australian designers Drs. Lyn and Tom Richards to work with them as an expert user and trainer for their 2005 and 2006 United States *Train the Trainer* workshop sessions offered for students and researchers.[5] I spoke with Dr. Lyn Richards in 2005 about my interest in and use of the full text search component to initially cull large data sets for further thematic coding. She strongly encouraged me to continue this exploration of identifying text for further coding by employing the search feature of Nvivo2 software (personal communication, Richards, 2005). Earlier this year, I read Dr. Greta Nagel's (1996) essay *Creating the Multiple-I search Case Method* and recognized it as a similar form of analysis to the *I statement* searches and coding that I had been using. She likewise encouraged me to persist in exploring this methodology (personal communication, Nagel, 2007).

[5] Athens, GA, April 2005; Madison, WI, April 2006

The choice of "I am," "I think," and "I feel" as statements to search for was informed by a classroom activity of Dr. Judith Aiken's which she led in the *Teacher Evaluation* class that I was a part of during the spring of 2001. Through an exercise to explore our personal subjectivity, Dr. Aiken asked each student to reflect on their own practice by writing from prompts such as, "I am," "I believe," "I feel," etc. This exercise impressed me because of the many contrasting subjectivities resulting from the *I statement* prompts which resulted from my classmates' reflections, as well as my own.

The Multiple I Approach

Dr. Nagel (1996) developed her "multiple I-search case" approach while directing pre-service teachers in conducting case studies from first-person *I statements* of their own, and others', viewpoints. She makes the analogy of using this "I-search case method" as providing student teachers an opportunity to "walk in another's' moccasins," by considering both their own and others' strong and weak points (p. 127).

My use of *I statements* for locating passages of interest and for further coding led me to project subjectivity onto the speakers; the participants' subjectivity was inferred from their transcripts and was not an exercise which they were asked to actively engage in. I am not exploring the text for specific instances of inequity, as were Nagel's students. However, those instances may still rise and be recognized from within the data.

The Live Matrix

It was the Richards' Nvivo2 software which introduced me to the live matrix for displaying qualitative thematic coding. The live matrix provides incentive to the qualitative researcher to continue coding their data beyond what Patton (2002) calls the "point of redundancy" when themes begin to repeat across subjects or sites. That is

traditionally the point when theory would begin to be explored by the qualitative research. However, by continuing to code electronically with NVivo for recurring and new themes past the point of redundancy, patterns emerged in the live matrix view which were previously invisible when researchers coded "flat themes" on paper with pencil.

Table 5, by using text size to demonstrate the patterns which Nvivo2 makes visible with color, shows the shifting pattern made visible from the number of characters devoted to discussion of various aspects of the VMP's Goal 1. We found that in the spring of 2004, more than half of the full-text coded for recognition of Goal 1 attributes addressed the topic of teachers' deeper "understanding of math" content as a result of their participation in VMP professional development. In the spring of 2006, after two additional years of VMP activities having taken place in their schools, the topics for discussion were found to have shifted. At the later date a nearly equal number of characters as coded "understanding of math" were identified coding the Goal 1 objective of "effective utilization of teacher leaders," and even more found coding the teachers' discussions of "how to effectively reach all students" (Nolte & Harris, 2006).

Table 5. NVivo – Live, Clickable, Matrix Data Display – Exploration of Patterns

Matrix Nodes – Character Count	Goal 1a – Teachers have a deep understanding of math	Goal 1b – Teachers know why they teach subjects	Goal 1c – Knowledge informs practice	Goal 1d – Teacher Leaders are effectively utilized…	Goal 1e – ...to effectively reach all students	Totals
Date = Spring 2004	36,362	9,109	1,126	151	18,691	65,439
Date = Spring 2006	14,203	11,163	11,975	13,175	21,854	72,370

From this initial exploration of the data, I decided that a more "telling" method to display in the live matrix format would be that of the number of instances of coding rather than the number of characters. I believe that in this case counting instances, which may be a single sentence or a number of paragraphs, provides a measure of how many times a particular theme rises from the data better than simply tallying the number of characters devoted to the theme.

Validating with Cronbach's Alpha. When considering the question "How do I know what I know?" in connection with findings from re-coding the VMP focus group data for *I statements* used by participants, I knew that it was not going to be possible to conduct any further member checking with focus groups at the partner schools. The grant which had funded VMP's work was over. So how might I say with certainty that the new themes I had identified were robust and present across the project? It occurred to me that for mixed-methodological validation of my qualitative thematic coding, running Cronbach's Alpha calculations might be an appropriate quantitative measure. Initial tests of the coded themes for groupings which registered a Cronbach's Alpha of .9 or better showed plausible connections between the themes. Going back into the live matrix view of Nvivo2 to check for actual alignment between groups of themes further confirmed the connections made visible by the Cronbach's Alpha measurements (Appendix G).

The facilitator's role. In an argument for engaging outside researchers to conduct focus groups, Kitzinger and Barbour (1999) write that, "An external facilitator's degree of detachment from local political relations can reduce subjectivity in participants' responses and complex obligations felt by the community towards the researcher. Moreover, inquiry from an outsider emphasizes that disclosure of personal experiences is

in order to explore a general issue" (p. 96). All of the facilitators who led the VMP evaluation focus groups were outsiders in that they were not employed by the schools but by an external evaluation center. However, the evaluation center itself is a division of the project's fiscal agency, Vermont Institutes, and so not entirely removed from the program. Each focus group lasted between 45 to 90 minutes and was facilitated by two evaluators, one who led the group through five to eight semi-structured open-ended questions drawn from the goals and benchmarks, and the other who took notes and kept time. These roles were filled alternately during each "round" of focus groups with the seven schools; four of the evaluators, including myself, being Vermont Institutes Evaluations Center staff and two outside consultants. As noted, none of the facilitators were personally identified in the focus group transcripts.

A facilitators' role in eliciting subjective responses from focus group participants, mediated by the degree to which they were perceived as "neutral" by the group, was addressed by Puchta and Potter (2004) in the form of facilitators' "oh" statements to mark "receipt of knowledge" without directing participants to a "right" answer (p. 43). These authors note that while using an "oh" statement may indicate lack of knowledge about a situation on the facilitator's part, it may also show understanding when the participant has cleared up a source of confusion. I took note of any "oh statements" made by evaluators that were found in the transcripts and drew further conclusions about how the facilitators' "neutralist" stance was being projected and possibly affected the overall group discussion (Puchta & Potter, p. 43).

Coding Method Described in Detail

Culling of the large data set. Initial full text searching revealed the *I statement* patterns across sites and years shown by Tables 6 and 7. The most often found *I statement* occurring in this data set was found to be "I think," followed by "I feel" and "I am."

A greater number of focus groups were held across the project in the fall of 2004 and the spring of 2005, and the data was found to be more frequent and comparable between those two time frames. As noted earlier, focus groups conducted in the spring of 2006 were held at sites chosen specifically for various programs of interest, which would not necessarily represent similar or comparable professional development strategies.

Full text searching for *I statements* revealed that the transcripts from that last round of data collection were not as like the others, and different even from the spring 2004 data which resulted from approximately the same number of focus groups.

The most frequently found occurrences of each *I statement* over the years of the study are shown in larger text in Table 6. Likewise, the two most frequently found occurrences across the seven sites of the study are shown in large text in Table 7.

Table 6. Patterns across Years from *I Statement* Coding

Groups	N Groups	am	think	feel	totals
Fall 04	10	63	285	**123**	**471**
Spring 04	4	11	148	59	**218**
Spring 05	9	**138**	**329**	102	**569**
Spring 06	3	27	79	34	**140**
totals	**26**	**239**	**841**	**318**	**1398**

Table 7. Patterns Across Sites from *I Statement* Coding

	N Groups	am	think	feel	totals
Site 1	5	35	**149**	45	**229**
Site 2	3	26	95	**57**	**178**
Site 3	4	**52**	115	45	**212**
Site 4	2	24	71	17	**112**
Site 5	3	30	122	35	**187**
Site 6	5	**37**	**177**	**86**	**300**
Site 7	4	36	112	34	**182**
totals	**26**	**240**	**841**	**319**	**1400**

Interestingly, data from Site 6 is shown to contain the most frequent, or second most frequent, occurrence for each form of *I statement*.[6] This pattern of the teachers/participants speaking more frequently in the first person is an anomaly of the Site 6 data, perhaps having to do with the particular culture around the way that teachers express themselves at that site. As a result, approximately 20% of the total *I statements* found across the study were made by the participants at Site 6.

Constructing core ideas. The *I statement* culling strategy resulted in roughly 1400 "finds" of instances in the text when participants had used the phrase "I am," "I think," or "I feel." Each instance was then examined in the context within which the statement was made, and themes which rose from this examination were coded onto the text for further analysis later in the live matrix view of NVivo. An instance of a theme could consist of a sentence, a paragraph, or more, depending upon how much of the text surrounding the *I statement* was recognizably addressing the same theme. Multiple themes were coded over the same section of text, as deemed appropriate.

[6] Because these results are based on full text searching, a check of the data reveals that the facilitators' use of *I statements* is not out of proportion to that of the teachers' for Site 6 as compared across the rest of the participating sites.

The Researcher's Subjectivity

To analyze each *I statement* made by teachers taking part in the VMP focus groups I have drawn on my knowledge of the sites, teachers, and different forms of professional development which the VMP leaders designed for each of their partner districts. As such, the coding structure is based on my interpretation of the "*subjective I*" found in the unique time and place of each focus group transcript. I tried to set aside any prejudices I might bring to describing the themes which I identified in the data (Stewart & Shamdasani, 1990). In addition to withholding judgments, I sought explanations for puzzling results by sharing my coding structure periodically with my doctoral committee.

Design Specifics

Unit of analysis. This focus group data, as the name implies, was treated with the group as the unit of analysis. The *I statements* made by participants in each group will not and indeed cannot be traced back to specific individuals. Therefore it is through patterns in *I statements* made over time that I followed reported group thinking or practice, while not following any one individual's journey. This use of focus group data was in keeping with evaluation standards for identifying "both common and unique local patterns of interaction" (Joint Committee on Standards for Educational Evaluation et al., 1994, p. 150).

The analysis is also supported by literature about focus group methodology, which confirmed that groups drawn together to "share some common identity and goals, as well as some common 'concrete situation'" (Stewart & Shamdasani, 1990, p. 10), while cautioning that in analysis "the pattern of responses found in one focus group does not necessarily infer that such a pattern will be found overall when the totality of

responses are examined" (Morrison, 1998, p. 218) can provide qualitative investigators a snapshot of a "group's" state of mind at a given time.

Inductive coding plan. As a starting point for this study, the full-text transcripts were coded inductively for themes rising from nearly 1,400 first person *I statements* culled from focus group transcripts. These transcripts had been typed from recordings of teachers speaking about their experiences as a result of their schools' partnership in the VMP. To apply a theme that one recognized in the data using NVivo software, one highlighted that section of the full text and labeled it with a name, for instance "teacher leadership" when the participants were addressing their thoughts and feelings about, or roles as, teacher leaders.[7] From that point on, unless the label "teacher leadership" was deleted from the list of themes available to code from, when that theme was recognized in a new text passage, the label "teacher leader" was applied. Each section of coded text was then considered on its own, or in relation to the themes that coded it as displayed in a live matrix view.

Themes were identified, named, and applied by the researcher throughout the coding process, both at the time they were first recognized and later upon further reflection of the teachers/participants' discussion. The label or name of a theme was language pulled directly from the text where it first appeared; for instance the theme "bait and switch" was named directly from the text. A theme was also named using different language than the teachers/participants would have used in their focus group discussions,

[7] Note: The theme "teacher leader" includes discussions of all authority figures in the partnership who possess higher math-content knowledge than the classroom teachers themselves. This could include the VMP math mentors, mathematicians from institutions of higher education, or local teacher leaders. The theme is labeled "teacher leader" because this is the way the teachers participating in the focus groups referred to these individuals, it is not necessarily the role they were placed in the classroom to fill.

such as the theme "with-it-ness" which described a teachers' expression of wisdom, or savvy, about the reforms taking place in their school.

Site(s) Selection Description and Rationale

Sample population. VMP leaders originally selected the specific districts to work with based on their determination of the sites' readiness for change and specific need for reform of math instruction, as expressed by stakeholders during an early needs assessment process. As has been noted, seven sites make up the district level of the partnership, ranging from urban elementary to rural middle and high schools. It is further known from evaluation surveys that the majority of participating teachers were in grades k-6, and that they were in their 3rd or 4th year of involvement in VMP professional development (Harris & Nolte, 2006).

Data Analysis Procedures and Presentation of Findings

Table 8 provides some sense of the scope of this large full-text data source by showing character counts run in Microsoft Word, which tally the total number of letters and numbers found in each document. It also lists the number of participants, and character counts in total from each site.

Table 8. Scope of VMP Focus Group Data Available for This Analysis

File	N	N participants by Site	MSW Characters	N Characters by Site
Site 1.1 5-04	4		35540	
Site 1.2 11-04	8		52316	
Site 1.3.1 5-05	7		29050	
Site 1.3.2 5-05b	7		30117	
Site 1.4 5-06	3		49063	
		29		196086
Site 2.1 4-04	8		50346	
Site 2.2 10-04	6		27303	
Site 2.3 5-05	6		37046	
		20		114695
Site 3.1 5-04	8		70045	
Site 3.2.1 10-04	5		9287	
Site 3.2.2 10-04b	4		29436	
Site 3.3 5-05	10		61496	
		27		170264
Site 4.1 10-04	6		45531	
Site 4.2 5-05	3		34424	
		9		79955
Site 5.1 10-04	9		56229	
Site 5.2 5-05	8		54745	
Site 5.3 5-06	7		24037	
		24		135011
Site 6.1 6-04	8		48026	
Site 6.2.1 10-04	4		39148	
Site 6.2.2 10-04	4		46469	
Site 6.3.1 5-05	4		39204	
Site 6.3.2 5-05	4		38958	
		24		211805
Site 7.1.1 10-04	7		25134	
Site 7.1.2 10-04b	6		23092	
Site 7.2 5-05	6		34233	
Site 7.3 5-06	8		28346	
		27		110805
totals	**160**	**160**	**1018621**	**1018621**

Italicized cells in the table indicate focus groups held in the spring of 2004 and in the spring of 2006. As such, those two points in time represented the earliest and the latest groups which were considered in this analysis. They are pointed out because not all sites took part in the evaluation focus groups during those two time periods, whereas during the fall of 2004 and the spring of 2005 groups were held across all VMP sites.

The Data Set

Design and format of the VMP evaluation focus groups was loosely based on the Brown University Laboratory's protocol, authored by a VMP lead evaluator (Orsburn, 2000). Participants in the focus groups were selected in order to include classroom teachers at every grade level, special educators, para-educators, and instructional assistants. They were chosen to participate in evaluation events by VMP site coordinators at each of the schools. Members of the groups were invited based on a series of characteristics, including: grade level of teaching assignment, years of teaching experience, comfort levels with math, and differing amounts of interaction and participation in VMP. This design was used purposefully to document the views and experiences of a wide variety of participants at each school.

The suggested size of each focus group was between eight and 12 people; however groups could be somewhat smaller or larger depending on the local situation. One hundred sixty teacher-spaces in the focus groups were filled from the 16 VMP partner schools. Some individuals took part in either focus groups or individual interviews more than once, and so the total number of teachers involved in the focus groups can be said to be something less than 160. How much less is difficult to say for the purposes of this study. Participants were promised anonymity and the names of those

participating are not available for this analysis. It is my estimate that approximately half of the focus group participants represented in this data set had taken part in more than one focus group over the life of the grant.[8]

The exact participant make-up of each focus group was chosen by on-site teacher leaders in the schools. Each group was facilitated by VMP evaluation staff or evaluation consultants, and tape recorded. The groups took place within the participating schools, usually in one of the participant's classrooms but occasionally in a separate conference room, a library, or another location. Each group lasted for approximately one hour. Transcripts were typed, full-text, from tape recordings of the groups. Participants were always given the option of declining to be taped, but no one did so.

In addition to providing a forum for data collection, focus groups can be a time for sharing information and outcomes with participants. That particular dynamic was not explored in the original evaluation reports, and is coded under the theme "evaluator's role" in this study. The groups also aided in identifying schools where further, targeted focus groups or in-depth interviews were deemed to be warranted as a component of the larger external evaluation. In the 2006 round, for example, the entire mathematics intervention center staff at one of the partner schools was brought together for a focus group held separately from the classroom teachers, in order to learn more specifically about that staff's beliefs, strategies, and findings. The impact that this decision to target specific programs for focus groups had on the current analysis and findings has been addressed earlier.

[8] I base this estimate on the number of total teachers available to participate across the entire project (300), and the small size of some of the schools involved.

Sources of the methodology. My interest in technology goes back to the earliest reel to reel tape recorders sold for "home" use. I was given such a device at the age of 11 or 12, and after tiring of recording myself and my favorite television programs, turned the microphone on my family and their holiday gatherings. The tapes I made then, as a participant observer of my family's "real life," captured sonic snapshots included group dynamics, local history, and humor as well as gossip and some bad behavior. But the over arching lesson that I learned from those early experiments was that I could hear more, and "learned" more, about what the speakers had to say each time I listened to the tape.

Likewise, by supporting a structure for repeated readings and coding of full text data sources, NVivo software allowed the researcher to investigate at once both a large and a small picture emerging from one's coding of the data. A central feature of the software is creation of the live matrix from individual coded themes, and its links directly back to the data sources, the underlying documents, for further study. By employing a multiple *I statement* strategy for revisiting the more than one million individual alphanumeric characters that made up the VMP focus group data set, one was revisiting the texts repeatedly as each full text search for instances of participants' statements of "I am," "I think," and "I feel" within the documents is explored for its surrounding context, and coding.

The Role of the Researcher

I was present and involved in the data collection during each of the focus groups analyzed both for this study and the original VMP evaluation. My role as a field evaluator during the focus groups was to listen, take notes, and run the tape recorder for

the full text transcripts. Generally a second evaluator acted as the facilitator, asking most of the questions and "running" the groups. Approximately one third of the time I was the facilitator, in which case another evaluator would take notes, run the tape recorder, and so on. However, in most instances the facilitator's role was that of one of the three other evaluators who visited the schools with me during the course of the VMP grant. In some cases I transcribed the tapes but in most instances that work was done by others.

It was because of my involvement on this "ground level" of the VMP data collection that I felt there was more to be learned from the rich data source of focus group transcripts. Without remembering individuals' names or exact statements, I remembered clearly instances of teachers' "ah-ha" moments of discovery having been expressed during the focus groups, and felt it was important to revisit the material specifically for those episodes of rich personal, subjective, teacher statements.

Ethical Considerations

An important ethical code for researchers is "to protect the privacy of the participants and to convey this protection to all individuals involved in a study" (Creswell, 2003, p. 65). The data used and generated during the course of this study was in digital media. Working files were kept only on password protected computers, and copies of the digital information will be kept only so long as the study is in progress. They will be thoroughly erased and any draft printouts will be shredded after defense of this dissertation.

Confidentiality of any personally identifiable data sources was strictly maintained during the course this study (Creswell, 2003; Glesne & Peshkin, 1992). The transcripts were stripped of all personally identifiable information about the participating teachers

other than their grade level(s) or area of specialization. Likewise the seven school districts where the groups were held are identified only as "site 1," "site 2," and so on. The focus group data had already been transcribed from tape as a regular practice during the earlier, external VMP evaluation. Those tapes are in the hands of the lead VMP evaluator and are not accessible for the purpose of this study.

Validity

A first validity check for proportionality of coding across the seven VMP partner school districts was run after the inductive coding from *I statement* searches was completed. Figure 1 shows that no one site appears to overly bias the findings because the count of coded documents and character counts were found to be proportional across multiple measures, including numbers of participants (N=160), alphanumeric characters coded (N>1,000,000), and passages identified by thematic coding (N=11,773).

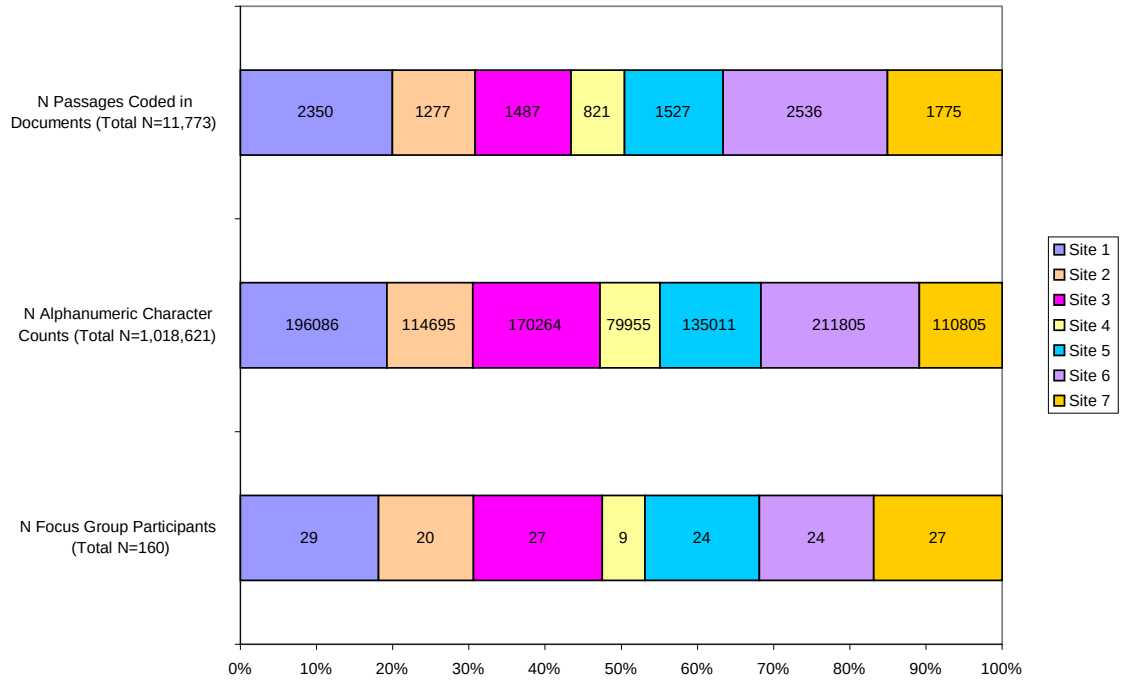

Figure 1. Counts by site in the spring 2004-spring 2006 VMP focus group data

Validity of the findings is further triangulated by exploration of identifiable themes with NVivo 2 software's live matrix view which aids in identifying passages of text that had been coded for more than one theme. As a final check for validity, analysis of Cronbach's Alpha was conducted, to further confirm relationships between the 54 identified themes.

Chapter 4 – Results of Findings

For each of the research questions, the findings are presented from both the inductive, *I statement*, coding and the more deductive review of the literature.

Research Question 1. What can we learn about VMP's impact over time on students and teachers, as told in the teachers' own words?

Language chosen for labeling themes in this study is intentionally "natural" so that when themes overlapped across passages, the NVivo live matrix view helped to tell the "stories" of juxtapositions made apparent by the thematic labeling. It was found that the themes of "team," "better for me," and "validation" had the most passages in common with the theme "put into practice." While not all four themes coded every passage in common with each other, an example of a passage which was coded for all of these themes found a discussion of collaborative classroom observations taking place, and was part of a focus group that took place in the spring of 2005:

> [1st speaker] We can't stress enough how helpful it is to have that time to go in and see how the other ones are teaching.
>
> [2nd speaker] Well, we get ideas and it also reinforces what we do. Yeah, we are doing that.
>
> [1st speaker] And it has been a huge leap for me to see what is going on in the [other grade levels].

A brief description of the meaning from which each theme arose is presented in the last column of Table 9. The number of passages assigned to each theme, as well as the number of passages each has in common with "put into practice." The first

occurrence column shows the date when a theme was recognized for the first time. At that time the theme was created, its label assigned, and the passage coded. The label was then coded onto subsequent passages if that theme was recognized again.

Table 9. Themes Aligning with "Put into Practice"

Theme	# of Passages	# Passages in Common w/ Put into Practice	First Occurrence	Meaning
put Into practice	101	n/a	25-Aug	Descriptions of methods, influences, and results of their having adjusted their teaching styles during the grant period
better for me	130	35	20-Jul	Comments about training or practices which improve the speaker's life
discovery point	89	31	20-Jul	The "ah-ha" moments, when teachers reach greater understanding about math content, their students or their teaching
team	145	28	20-Jul	Instances of students, teachers, or schools working together for a common end
contagion chain	90	26	22-Aug	When the speakers "ping" ideas off each other, toward understanding or recognition of a situation
validation	112	22	12-Aug	Feeling validated, that one's work is important and one's efforts are acknowledged
safety	77	18	12-Aug	The speaker says they feel safe, or their words indicate that they or another group feels safe
lowest students	70	14	20-Jul	Students who are not meeting the standards
kids teaching kids	35	12	20-Jul	Instances when students share their thinking

Theme	# of Passages	# Passages in Common w/ Put into Practice	First Occurrence	Meaning
my concern	107	9	22-Aug	When the speaker volunteers comments about their fears, their concerns
tension	42	7	18-Sep	When one person's comment directly opposes another's
left out	43	4	20-Jul	When the speaker feels left out, or recognizes that a specific group is being left out of the process
little change	24	3	20-Jul	Events or practices which have not been influenced by VMP
where does it come from	12	3	11-Sep	Questions of support, training, knowledge
reported conversation	25	2	12-Aug	Teachers quote each other, their students, parents, or administrators

Fifteen themes are identified in between 2 to 35 passages each that had coding in common with "put into practice." The earliest themes recognized, those of "left out," "kids teaching kids," "lowest students," "team," "better for me," and "discovery point," were more often labeled directly from the teachers' own natural language used during the focus groups, whereas later themes such as, "tension," "safety," and "put into practice" itself were identified and coded for conditions or dynamics recognized by this author. Earlier themes were grouped together under the latter, in this way initial coding structures were focused and summarized, revealing patterns from the qualitative focus group data as recommended by qualitative researchers J. and H.L. Lofland (1995) and others (Morse & Richards, 2002; Stewart & Shamdasani, 1990). Through this process a "web of

interconnected influences" could be made visible, and explored in greater detail (Patton, 2005).

The theme of "teacher leadership" for example, can be explored in relation to overlapping themes of "my concern" and "team" in the live matrix view.

Table 10 has been split into three components with identical column headings in order to make visible the relationships found by coding themes identified out of the context of participants' *I statements*. Larger text is used to further bring out the patterns in the data. Measured by counting the number of passages recognized and coded as addressing the topic, approximately 15% of the time when participants spoke about their concerns they also included discussion of teacher leadership themes. The site found to have the most passages that addressed teacher leadership was Site 6 and the discussion of teacher leadership occurred roughly to the same degree during the spring 2004 and spring 2005 focus groups.

But then, by clicking on and "opening" the cell that indicates there were 15 passages coded for both the themes "my concern" and "teacher leadership," one can revisit for further exploration the underlying text from which the matrix was built. By doing so, the 1st person teacher voice of the *subjective I* was allowed to emerge from the summative NVivo coding patterns.

Table 10. Number of Passages Coding 3 Themes, across Sites and Years

	Teacher Leader	**My Concern**	**Team**
Teacher Leader	94	15	29
My Concern	15	107	13
Team	29	13	145
Site 1	16	12	22
Site 2	10	6	25
Site 3	15	25	24
Site 4	7	7	4
Site 5	12	16	24
Site 6	24	18	25
Site 7	10	23	21
Spring 2004	31	38	44
Fall 2004	17	21	25
Spring 2005	33	40	54
Spring 2006	13	8	22

Identification of "contagion chains" in the text. The following passage found at the matrix intersection of "my concern" and "teacher leader" revealed classroom teachers' concerns during a point in the project when their school was engaged in adopting a new, spiraling curriculum:

[Grade 3] And that is an awful feeling. I need to tell you that. It is just an awful feeling as a teacher. If I had a unit, and it hasn't gone well for whatever reason, I stop and do extra work. Here I don't. I felt really guilty on Friday. They bombed a homework sheet I gave them the day before. I had to go over the homework sheet with the whole class. That took 25 minutes of my math lesson, which means I didn't finish. So I am kind of like what is the point here? Is it more important for me to review with these kids things they really didn't get. And it was on fractions, and they were supposed to have a lot of exposure, and my kids really haven't, and I felt that was more important than [going on]. But then again, it is putting me farther and farther behind, and this pacing, I think has become more important to us than understanding, and for me, I am having a hard time letting that go. I am hoping they understand what they are doing.

[Grade 5] And every time we go to a meeting, we hear from [teacher leader], who we love, "don't worry about it, keep going, they are going to get it." And it is very difficult to hear now. Now, I don't want to hear this. Because that is getting very frustrating,

"Maybe we'll get there, maybe in a few years we'll understand it better." Right now it is really hard to see them not get it and go on.

This passage is an example of inductive coding from *I statement* searches conducted within the original context. While the original *I statement* searches would have pulled up the 1st speaker's narrative in the full text, because of their use of "I think" and "I am" statements, note that the 2nd speaker's narrative was included in the coding of this passage because the context of the discussion was continued by the next speaker.

This type of passage demonstrated one of the stated benefits of focus group methodology – that of providing a setting where participants shared their opinions and feelings which were brought to mind by the opinions and feelings of others – becoming essentially a set of multiple interviews held within the same space (Langer, 2001). A theme was later identified and used to describe these "run on" passages, which may consist of a few sentences or a page or more of text, and which may include the narrative statements made by one or many teachers. The name I had used for this form of thematically clustered exchange between participants was "contagion chain," a label which I had chosen in homage to Kounin's discussion of a similar theme (1970, p. 80).

The passage about spiraling curriculum was revealing because the teachers' concern was about the *message* that their teacher leader was bringing, by encouraging them to trust the curriculum. It was not a concern about the teacher leader position per se.

Another example of a concern that was coded for the "teacher leader" theme can be found at a different site:

> With just one person for as many schools as there are, it must be hard, and I'm sure [teacher leader] is trying to do the best job that [they] can, but [they] can't be in several places at one time, and I think that's really hard, you know when you try to schedule a meeting… and it could be next month or the following before [there is] another shot to get to you, so… it's hard, really difficult.

In this passage, the teacher speaking expressed a concern not about a difference of opinion with the message the teacher leader was bringing, but about the limited time and resulting perception of lack of access that the teacher felt was allotted them by the teacher leader.

Checks against deductive coding, as further validation. Findings from inductive coding of themes rising from the *I statement* passages were also checked through triangulation within this longitudinal cross-site study by comparing thematic coding patterns across the partner sites. Longitudinal, project-wide change was of particular interest at this time, when VMP was in the final months of the project, in order to help answer specific research questions of its own as derived from project benchmarks.

Table 11. VMP Benchmarks to Measure Change

Benchmark	Description
III-a	Measure the incidence and nature of teacher collaboration: within grade levels, across grade levels, across schools and across participating districts
III-b	Measure the degree to which schools and districts develop and disseminate research and best practices
III-c	Measure changes in the ways in which principals, curriculum leaders, and teachers work collaboratively on the implementation of mathematics curriculum, instruction and assessment

As I coded for themes rising from the context of teachers' *I statements* found in the focus group data, I periodically reflected on the degree to which application of Section III of the Benchmarks, written by the VMP's Primary Investigators at the beginning of the grant period, appeared to have relevance to the findings.

The coding reflected a phenomenon found across sites and years of VMP; that of overlap and confirmation across and between themes rising from the data. The "team" theme contained evidence of both teacher and administrator collaborations, and degrees of collaboration which the teachers identified as being more, or less, helpful in their adoption of new classroom practices. Discussion of degrees to which research and best practices were disseminated was found across themes, such as those labeled "research questions," "what works," and "better for me."

The practice of classroom teachers reading, applying, and in some cases replicating research conducted by others was brought to all VMP partner schools as a component of each of the 69 courses run, from a catalog of 38 course titles, that VMP either designed in-house or supported through partnerships with institutions of higher education. Additional opportunities for research came from the teachers' participation in the Ongoing Assessment Project (OGAP), a VMP initiative which introduced hands-on formative classroom assessment. Application of findings from research, in the form of best practices for teaching and learning, were also brought to the classroom by VMP staff member mentor/teachers who modeled practices for, and team taught with, classroom teachers in the partner schools. These three strategies for disseminating research and best practices had a great impact on the teacher participants' daily lives. Their 1st person descriptions of experiences with research related in detail many of the concerns they had

about the process, as well as lessons learned as a result of exposure to new practices being introduced to them.

Table 12 shows patterns revealed in the live matrix view of these three themes through use of different fonts. It is seen that "what works" and "better for me" share 42 passages of coding. At Site 6 the most instances of the "better for me" and "research questions" themes are found, while Site 1 teachers' discussions were coded for the "what works" theme more often than the other sites. Spring 2005 data contains the greatest number of all three coding passages, which is in agreement with an intuitive explanation that best practices in teaching and classroom teachers' engagement in research would have been phased in over the life of this five year grant.

Table 12. Number of Passages Coding 3 Themes, across Sites and Years

	Better for Me	**Research Questions**	**What Works**
Better for Me	130	5	42
Research Questions	5	28	2
What Works	42	2	169
Site 1	16	3	39
Site 2	25	3	27
Site 3	25	0	12
Site 4	11	3	18
Site 5	13	4	28
Site 6	30	10	34
Site 7	10	5	11

Spring 04	41	10	60
Fall 04	24	4	30
Spring 05	52	12	64
Spring 06	13	2	15

VMP courses disseminate research. Two *I statement* passages which were representative of teachers' discussions about the courses found that while the teachers might begin to speak about their experiences with VMP courses by expressing frustrations with the format, or seeming to have no memory of the particulars, they went on to discuss how the content of the courses peeked their interest to learn more, particularly about how to help students who struggle with math content.

> [Site 1, 2005] I never mentioned that I got to participate in an online course last year. That was really interesting doing something like that. It made me realize that I don't want to do anything like that again. I just found that type of learning style was not me. All I know is that it was like a PBS website. And every time I accessed the class, I can't remember even the title of the class now, but it had to do with teaching students with special needs. I really got a lot of information from other people about how they tried to tackle that, because it is so difficult. It is not like teaching reading. It is just really difficult to have a scope and sequence that is going to fix

some of these issues for kids. But the reason I got to participate on the online class is that we had the grant. So for me, I had some articles and got interested in some of the information that they were able to share.

[Site 6, 2005] I took the courses, one of the courses, during the school year. I didn't take any of the summer courses. It was a math content course. And I also worked with the liaison and the VMP staff member. I had read a book. And I worked with them, on I can't remember the name of the book, *Share and Divide* or something, and I worked with them to put together a way where we could do weekly assessments on kids so we would have that assessment knowledge to then further the teaching of the next week. So they came in and worked with my kids on Friday and I did some individual testing of kids to see if they really understood the concepts. And that was really helpful at the end of the year, just to, we probably did it for two months and I would have continued the program if we could have possibly done that. But it was nice to get the opportunity to try that out to see how it would work. It definitely gave more information on where you wanted to go with

certain kids. It was more individual than a group test where you get a general feel for how the class is doing but may not get the in-depth knowledge of what each kid knows.

Each of these teachers, from different sites and focus groups, stated they were continuing to consider and apply some of the big picture lessons learned from their experiences with VMP courses. Each had gone beyond describing what might seem a limited impact from having participated in the courses, to reflect more deeply on personal benefits that they had derived, and questions they hoped to continue to pursue, in their classroom practice. Among the big ideas that teachers took away from the courses was an appreciation for learning and teaching through mixed methods of explanation and inquiry.

[Site 6, 2004] It was very nice about the course, to see how other people saw different content areas and you could bring that back to your kids and have five or six different ways instead of just one.

Awareness of the "best practice" of differentiated instruction was found to have been transmitted via the teachers' participation in VMP courses, in which the instructors modeled multiple ways of teaching by exploring their own and participating teachers' multiple ways of learning.

OGAP work with ongoing assessment. OGAP introduced classroom teachers to formative assessment of students' work with fractions, and was a very large part of the

VMP experience for those teachers who took part.[9] An OGAP case study, which appeared in the Year 4 VMP evaluation, found that students whose classroom teachers participated in OGAP increased their math scores significantly on the pre-post test administered as a component of the OGAP action research in their classrooms.

> [Site 6, 2005] I am also at the point where OGAP, the research requires a lot of you as teachers. And this is not a really good time of the year to start training in OGAP and looking at a program, I personally feel, with school coming to an end. With all kinds of things coming up… with the portfolios and so forth. I've only been in OGAP for two weeks and I already feel like I am behind. I went to a conference, I talked to, who did I talk to this morning, the VMP staff member, I talked to [them] about that and about the fact that I don't think I can continue with it because it is the requirements of gathering the information. I know it is more for the teacher to take a look at teaching and how they are doing teaching wise, but I just don't feel that, um, I see what the others are doing and gathering more information from other things and collecting it. I just don't think this is a really good time of the year to be doing that. So I am not sure I can continue with it. There is a lot of data collecting.

[9] Sixty-three teachers participated in OGAP over the life of the VMP.

[Site 5, 2006] [1st speaker] I used [OGAP] last year and it was a nightmare, and I used it this year and it was really helpful. The materials are great, you just pull them out.

[2nd speaker] It was the study piece that was huge, but this year is so much more meaningful.

[1st speaker] Plus, our trainer was learning as we were learning, so we were all feeling like we were going to be in another place. But the value of the program is wonderful.

The classroom pre-post testing was a part of the "research requirements" that the teachers speaking above describe. Coding for themes rising from the teachers' *I statements* revealed that at these two sites, teachers felt the collection of student data for the OGAP study was an enormous piece of work in terms of their learning curve as well as time commitment. That said, the second passage found that a year after the school's participation in OGAP, and so with a bit of distance from the memories of data collection activities, teachers were comfortable with the process of formative assessment and incorporating parts of OGAP which they felt were most applicable to their students' perceived needs. The impact that teachers' participation in OGAP had on their students' classroom pre- post tests, as well as state assessment scores, is a topic for which further study is planned by VMP.

As such, the best practices of formative classroom assessment and teachers' engagement in research were found to have been transmitted via the OGAP experience.

Mentor/teachers. The teachers speaking in the following passage described their introduction to differentiated instruction through the presence of a VMP mentor-teacher modeling different techniques for differentiating in the teachers' classrooms, while also providing time for the teachers to try them out with their own students.

> [Site 6, 2005] [1st speaker] I would like to do more of what I did last year with the liaison and VMP staff member with the assessment piece. Where they come in and do a math activity with the kids in my class and I have time to just really work one-on-one or one with a small group with my kids to figure. I wish that could happen more often. Actually, I wish that could be a part of our daily, weekly schedule… It was two people in the room doing math. It was just more exposure to people doing math. Doing it a little bit differently but really working on the same concepts. They were both there sometimes, I don't know if they both stayed. Yes, they did, they both stayed the whole time.
>
> [2nd speaker] So it was kind of nice for you to be able to work on the same concept with different levels of understanding.

Clues as to *why* the teachers found classroom mentors' presence to be so important was noticed as well:

> [Site 6, 2004] I really enjoyed the VMP liaison coming in. She came in a few times and did some portfolio work with the kids. Came in recently and had herself filmed while she was doing another one, which was great to watch. I love to watch how someone else teaches math and she just had some really easy ways for the kids to get right into the portfolio writing so I really appreciated that. And then she came in one day and observed me and I really enjoyed the feedback that I got from her.
>
> [Site 1, 2005] I think that we have so little contact with other teachers during the day, you know, everyone's schedule is crazy, I think because we have so little contact that way, that when they do come into our classroom it is so valuable… Sometimes the kids just need a change of face. But I think it is just so valuable and I would love to have them more.

While the practice of adapting teaching to students' different ways of understanding was a lesson that these teachers expressed having learned was important, full text review across the years of VMP revealed that many teachers began, and were still, unsure how to best implement their new understanding in a single-teacher classroom.

[Site 1, 2004] I have a student who I asked how many fingers do you have because we were trying to add. And I was saying what is 3 + 5, and she was saying 82. Like she had no clue about numbers. And she counted with her fingers and said 'I have 5 fingers.' And I said, yes you have 5 on each hand. How many do you have with both of them together? 'I have 5 fingers.' Today I asked her and she still doesn't get it. What do I do with her?

[Site 3, 2004] I am really opposed to the smart kid, not smart kid working together because I find that the worst possible grouping. Because the smart kid doesn't know why he knows it, he just knows it. So he usually ends up calling the slower kid dumb. 'Well you're dumb if you don't know why'. And then it's just ugly.

[Site 6, 2005] We are ok with the kid who has got it and the kid above it and can extend them. But those children who are just hanging on by a thread. And we just don't know what to do with them yet. We need help there.

[Site 7, 2005] I know there has been quite a bit of discussion, now that we are three quarters of the way into it this year, and I don't know if this is the right place to, but if you knew me a little bit

better, but there has been some discussion around, what do we do, how do we adequately address the kids that are not doing as well as we hoped they would be doing… so it may be professional development. I don't know. I don't know what is available to us there. We are very concerned about the homogeneous grouping of those kids who could just use a little more time.

[Site 7, 2006] I think it's still very challenging to meet the needs of the underachieving student because the [math] program that we're using targets middle to high kids the best, and the big challenge is how to make sure we meet the needs of those grey area kids who are not identified, because they are the kids with no support, and I'm all that they have.

Teachers engaged in independent research. The following passage found a teacher expressing the "sustainability" question about research conducted in the classroom.

[Site 2, 2005] I've actually been doing some research in my classroom … it is really interesting stuff. And I wish there was somebody who could help me, it is a good research project, I just don't know enough about putting it all together and how to structure and analyze it so it would be more formal. Because I feel

like I am sitting here saying I'm doing all this research, this is what I found and it works and this is how I know it works, but I can't really share it anywhere else.

Once teachers were engaged in collecting formative data about their teaching and their students' learning, they wanted to know how to record and disseminate their findings. Given the learning curve for teachers to become involved in classroom research, from initial exposure to the research of others through courses, participation in data collection through OGAP, seeing and trying best practices modeled by mentor-teachers, and in some cases developing action research projects in their classrooms, the five year VMP grant horizon was concluding just as participating teachers were starting to design and engage in their own studies.

It takes time for teachers to incorporate new practices into their beliefs and teaching practice. While most of the participating (30 hours or more of VMP professional development during a year) teachers had read the research of others as a part of the course work brought to their schools by the grant and engaged in team teaching with mentors modeling techniques with real students, most of the "ground level" classroom teachers had not yet begun to design research of their own. The few who had done so were not yet feeling proficient. However, growing knowledge of and comfort with using best practices brought by VMP was apparent in the way teachers thought about the need to engage further with their students who struggle with math.

The Math Science Partnership's five key features. Table 13 summarizes natural language themes found rising from the teacher participants' *I statement* identified passages that aligned well with the MSP program's Five Key Features.

Table 13. Themes from *I Statement* Coding Aligning with the MSP Five Key Elements

5 Key Elements	**Themes from the *I Statement* Coding**			
Partnership Driven	**Support from Admin** Examples of support being provided by the administration	**Team** Instances of students, teachers, or schools working together for a common end	**Teacher Leader** An authority figure with higher math-content knowledge – the VMP math mentors or mathematicians, or local teacher leaders	**Where Does it Come From** Questions of support, training, knowledge
Teacher Quality, Quantity & Diversity	**Change in Practice** Speaker is changing their practice	**Demonstrating Learning** Examples of new knowledge being applied	**Better for Me** Comments about training or practices which improve the speaker's life	**My Concern** When the speaker volunteers comments about their fears, their concerns
Challenging Courses & Curricula	**Depth of Knowledge** Teachers discuss their own or their students' content knowledge increasing			
Evidence-Based Design	**Assessment** Formative or summative assessment	**Reflect** The speaker engages in reflection		
Institutional Change & Sustainability	**Policies Changing** Teachers note that policies have changed or are changing	**I Wish** Speaker articulates their wishes for the future		

Of all the themes identified in Table 13, those which rose most often from the focus group data are shown as row headings in the live matrix views represented by Tables 14 and 15. Through the use of natural language labels, the story of how VMP

teacher participants' experiences were related to the Five Key Elements of the MSP can be summarized by the thematic coding.

Table 14. Passages Coded for Themes Aligning with the MSP Five Key Elements across Sites

Themes	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Totals
assessment	3	2	2	1	6	5	4	23
better for me	22	25	24	4	24	25	21	145
changing practice	16	10	15	7	12	24	10	94
demonstrating learning	1	1	0	1	6	0	3	12
depth of knowledge	33	32	42	8	17	30	27	189
my concern	28	14	10	4	12	26	11	105
policies changing	16	25	25	11	13	30	10	130
reflect	12	6	25	7	16	18	23	107
teacher leader	15	19	17	9	14	19	23	116
team	27	18	20	10	18	44	19	156
Totals	173	152	180	62	138	221	151	

Table 15. Passages Coded for Themes Aligning with the MSP Five Key Elements across Years

Themes	Spring 2004	Fall 2004	Spring 2005	Spring 2006	Totals
assessment	3	11	7	2	23
better for me	25	44	54	22	145
changing practice	17	31	33	13	94
demonstrating learning	1	4	6	1	12
depth of knowledge	30	62	76	21	189
my concern	16	36	41	12	105
policies changing	24	41	52	13	130
reflect	21	38	40	8	107
teacher leader	13	44	47	12	116
team	25	59	56	16	156
Totals	175	370	412	120	

Further investigation of the full-text underlying the coding revealed powerful 1st person description of challenging, rewarding, personal and institutional growth.

> [Site 6, Fall 2004] I think that we can become pretty entrenched as teachers and stuck in our habits. And I think that it's really a credit to the teachers here, and also the people that come to work with them, that people have been so open to making changes, and sharing, and doing this kind of work. It's really been nice. It shows that the people coming in are good at what they are doing. I think it really shows some positive things about our teachers too. It's a wonderful opportunity for us.
>
> [Site 1, Spring 2006] Well, the availability of professional development has been, I think, phenomenal ever since we have gotten this grant. And I've pretty much taken everything that has been offered. There's a lot of teachers who have, and for me personally that's opened a ton of doors, given me more ideas and more knowledge... I've come to appreciate assessment, not dread it as much as I used to in the classroom. You know, I see the value of it now too, if you really take the time to use it.

[Site 7, Spring 2006] I think I am better prepared this year to hunt for evidence in the kid's daily work of what they know, targeting say math blocks, whatever and how all the students did and how they are all doing that day, and I think I'm more strategic that way, instead of pulling out a quiz, I might just look at their work a lot more, more than I used to.

[Site 7, Spring 2006] I think that the meetings have also encouraged collaboration overall, I mean I feel like because we have a meeting and somebody says something about ok, geometry is tough to teach, people are just coming to my room and saying ok, I did this with my kids on geometry and this might help you on lesson 4.2, I think we see just a lot of that overall, now… it's really nice because there are so many ideas flowing.

Summary of Findings for Research Question 1

Question 1: What can we learn about VMP's impact over time on students and teachers, as told in the teachers' own words?

Finding 1: Teachers reported positive impact on their teaching practice and their students' learning by having had collegial "teamwork" modeled in the classroom, both in the form of teacher observations and formative assessment. Wide scale teacher observation, either by teacher leaders or by other classroom teachers, was for the most

part a new practice brought by VMP. Teachers found the opportunity to watch each other teach, including time to plan together beforehand and provide feedback to each other after, to be valuable, particularly as an introduction to multiple methods of teaching. Likewise, formative assessment was a new practice for most teachers, one which they found important in helping them to further consider what their students know, and how to better present it so that everyone can learn.

Finding 2: Teacher leaders at the local level contributed to building the "team" approach to teaching math. While exploring how to best support math teaching and learning on a school-wide, and in some cases a district-wide scale, the teacher leaders engaged in within-grade and across-grade level meetings, refining curriculum, and providing individual support to teachers and students. While classroom teachers did not always initially embrace processes which the teacher leaders introduced, they were supportive of the teacher leaders themselves and their dedication to improve math teaching and learning.

Finding 3: The practice of disseminating research within the project, through the three-prong methods of running courses, modeling best practices in the classroom and involving teachers in research projects such as the OGAP Fractions Study had significantly increased the degree to which classroom teachers were aware of, and used, research findings to guide their teaching practice. While in the process of learning teachers may have felt that their immersion in research was "over the top," but upon reflection, they said they recognized many benefits that knowledge and use of formative assessment had brought to their teaching and their students' learning.

Finding 4: Through reading the research and engaging in courses, classroom teachers had developed a keen understanding of the need to differentiate instruction in order to teach all students. However, they still had many concerns about how best to do this, particularly in a solo teaching situation.

Research Question 2. What can we learn about the school reform effort brought by VMP, from the teachers' perspective?

A robust mixed methods evaluation conducted in the spring of 2007 found that teachers and students alike had demonstrated pronounced organizational and academic growth as a result of their schools' involvement in VMP (Harris & Nolte, 2006). By revisiting the focus group data, new understanding has emerged regarding how the teachers actually felt about the reforms taking place in their own practice and in their schools, what their concerns were during the course of the five year VMP project and the impact that VMP had on their own and their students' lives.

How reform felt. Coding of the *I statement* themes was done inductively; as themes were recognized, they were labeled. If recognized again, the label was attached to further passages of text and when new themes were recognized, they were labeled and reused as appropriate. Multiple themes can overlap across any one passage. In order to check the validity of this coding structure, which was conducted by the solo author of this study without the benefit of a team with which to calibrate findings, Cronbach's Alpha was calculated to check and identify correlations across the 54 recognized themes. When analyzing the results of this calculation, an alpha of .8 or higher indicated a highly significant correlation.

In exploring how teachers experienced the reforms brought by VMP, the rising theme of "put into practice" was correlated to .900 significance on Cronbach's Alpha as compared with the additional rising themes of "little change," "where does it come from," "validation," "better for me," "team," "tension," "left out," "my concern," "lowest students," "contagion chain," "safety," "reported conversation," "kids teaching kids," and "discovery point." Table 16 presents the number of passages coded with two of these themes, as well as the definition of each represented in the natural language labeling.

Table 16. Two Themes which Intersect with "Put into Practice"

Theme	**# of Passages**	**# Passages in Common w/Put into Practice**	**1st Occurrence**	**Last Occurrence**	**Meaning**
put into practice	101	n/a	25-Aug	8-Oct	Descriptions of methods, influences, and results of their having adjusted their teaching styles during the grant period
better for me	130	35	20-Jul	8-Oct	Comments about training or practices which improve the speaker's life

Dates are provided in order to make visible the researcher's "thinking" behind the coding patterns. For instance, "kids teaching kids," "little change," "left out," "discovery point," "better for me," and "team" rose from the earliest rounds of coding. While "where does it come from." And the notions of "put into practice" and "tension" are newer themes, identified by reconsidering the full text and earlier themes.

Where do the themes coincide and what does this tell us about how teachers feel about the changes brought to their practice by VMP?

Looking back at the 35 full text passages in Table 16 coded at the intersection of themes "put into practice" and "better for me," a story of change was told in the teachers' own words. In this instance, about the practice of classroom observations:

> [Site 1, 5/05, 1st speaker] Well I know, especially by having the VMP staff member in the room doing the observation, and we have been observing one another, I definitely feel more confident going to another teacher and either looking for other resources or looking for examples. I've changed some of my daily structure in my classroom, too. After this year I am really taking the time to sit back and reflect when an observation was made or something and I've been able to make some changes.
>
> [Evaluator] Did you find, those of you who have taught prior to VMP, did you find the use of classroom observation has changed at all with that? I think, I remember in the early notes that some observations were already taking place before VMP. I am just wondering if the types of things you are learning has changed.
>
> [Group] Not in math, no.

[2nd speaker] Just in general the principal. But [math specialists] never came in to do anything either. Well just once to demonstrate something.

[3rd speaker] I agree. We can't stress enough how helpful it is to have that time to go in and see how the other ones are teaching.

[2nd speaker] Well, we get ideas and it also reinforces what we do. Yeah, we are doing that.

[3rd speaker] And it has been a huge leap for me to see what is going on in the [upper] grades.

The dialogue above revealed an important finding about both how and why teachers felt it was important to observe their colleagues classrooms. Interestingly, a summary statement for the external evaluation might have said, "Teachers are now observing each other teach;" however, revisiting this focus group text from Site 1 in year three of the VMP program at their school, Spring 2005, revealed *why* the teachers felt it was so important to visit each other's classrooms. Specifically and prior to the VMP initiative, principals and math specialists often did not visit the math lessons at the majority of the partner sites, so teachers had few models to regularly compare themselves against or to learn new practices from. Now that the teachers were able to comfortably visit each other's classes, they exchanged ideas about how to teach, and gained insights into what the other grade levels were doing and how that may relate to what they were doing in their own classrooms. Additionally, the educators above actually corrected the

formative evaluators' impression that much of this kind of activity had been taking place prior to VMP, and acknowledged the value of having VMP staff members as well as fellow teachers make regular classroom observations. The teachers said that since this practice was introduced, they had become more reflective about their performance, and their students' learning.

The practice of observing not only other teachers but also one's own students as they are engaged in instruction by another teacher was noted as an important catalyst for changing one's practice. A teacher from Site 5 in the spring 2006 focus group shared that, "It gives you an opportunity to see your children from an outsider's perspective and you see their needs through someone else's eyes, which helps me a lot, when it is not you in the middle of it. When you are watching a kid and you think, 'oh, I see what the problem is.' So that is helpful too, to observe other teachers."

At another site, this practice across the partnership of having VMP staff members in the classroom with the teachers and their students is described in further detail:

> [Site 2, 5/04, 1st speaker] I think having [the VMP educator] come into the room has been the most valuable for me. She comes in and does a lesson once a week and we talk about it before hand. She comes in and you know what she's doing and you see how it actually can work.
>
> [2nd speaker] And [teacher leader] does that too, they bring materials in the room and they leave them there for you, they bring

their knowledge, they do the actual demonstration and they get you off the floor with actually doing it yourself and you don't feel like 'I can't do that because I don't have the materials.'

[3rd speaker] For me I agree that the personal piece for me is the most important but it hasn't been so much the demonstration as it is the collaboration and reflection that has gone on.

These statements revealed the importance that both collegial presence as well as instructional materials had on stimulating change. Here, VMP staff and local teacher leaders introduced and modeled a variety of teaching practices in the other teachers' classrooms; they also brought with them the materials that were required in order to successfully demonstrate a technique for instruction, so that the teachers whose rooms were visited were left feeling like they not only had the knowledge but also the materials necessary to incorporate those demonstrations into their own practices.

Educators also highlighted the importance that para-educators and special education staff had upon their professional development. Another example of change in practice taking place at Site 2 in the spring of 2004 was the inclusion of para-educators in the VMP professional development offerings, described in detail in the full text focus group transcripts:

[Site 2, Spring 04, 1st speaker] The training and support and inclusion of the paraprofessionals has been fantastic because I feel like I have partners in the classroom for math and we can talk

about what was the teaching strategy and the content and we are much more on the same page.

[Group] It is good for the kids. That is a huge piece. That wasn't even on the chart and it should be.

[2nd speaker] That actually has made my job easier as a supervisor so that on my weekly consultations with paraprofessionals [it] has been easier.

[Evaluator] What is the para's meeting structure?

[2nd speaker] They have different meetings than the teachers. They meet every other week on a rotating basis and there are two different groups of eight to ten per group. [The teacher leader] and [the VMP educator] and I sit down and plan out the different pieces and then I do some others. The model is 8:15 am to 9:00 am training every week with the same unit taught to the two different groups.

[3rd speaker] Several paras took the opportunity to take that Math as a Second Language course at such a great rate on their own.

Thus not only do we learn the generalization that para professionals had been involved in the VMP professional development offerings, but that their involvement had included weekly group meetings to discuss teaching strategies, and that they had been

provided access to math content courses at a discounted cost. In response to these activities, the teachers were in agreement that their own practice was changing. They now felt like para professionals were "partners in the classroom," and that this was better for teachers as well as for students.

Note also that the 2nd speaker in the above passage was involved in training para professionals. It may be that this was a teacher leader taking part in the focus group, or a special educator who was involved in the training. While most focus groups consisted primarily of classroom teachers, teacher leaders, para professionals, and special educators were also sought for inclusion in the groups at sites where VMP was working with them. None of the speakers in the focus group transcripts were administrators, as it was decided that their presence could inhibit the discussion.

At Site 5 in the spring of 2006 a participant self-identified as a special educator and went on to provide a "lived" description of what exactly VMP had contributed to changing practice:

> I am going to have to excuse myself and go to Math Recovery, but I think one of the things that has helped me being part of VMP is that it has opened up opportunities that I might not have sought out before. I was an English major with a minor in Latin at [college] and a reading specialist when I did my master's work, and I never sought out any math classes. I think that this is something where I got training in math that I never would have done before and it

made me look to see what else is out there, so that is why I am involved in the math recovery, to look at the very beginning of how I help kindergarteners and first and second graders really understand the basic foundation of numbers, so I don't think I would have been willing to quickly volunteer for this job if I hadn't been involved in this because it was something I didn't consider that I was very good at or had any talent that I should be looking at this area for myself. But it really has opened up my interest so that I work to become better at it and find out what my children need. And in that, I need to go.

The speaker's words brought to life the experience in a way that broad, summary statements about special educators' overall involvement in the VMP project would fail to do. For example, a formative finding specifically about special educators in the VMP project was stated that, "Teachers and special educators working side by side with a mathematician have built their own understanding of, and a plan addressing, the math content required by their students within and across grades" (unpublished technical report, 2006) The more refined *subjective I* statements identified how the individual lived experiences of special educators had actually contributed to the development of other colleagues.

By revisiting the full text focus group text and recoding for rising themes, one learned that special educators who had not majored in math or had much past experience

teaching it were now feeling confident with the subject matter and empowered to pursue it as a personal interest as well as a teaching tool for their students. This particular speaker's experience was an echo of comments made by a special educator at Site 6 in the fall of 2004:

> I just feel intellectually stimulated, like a piece of brain has just like unclogged. I can really feel it. There have been little pieces of 'oh yeah, I remember how to do that.' And, also a little deeper understanding because… it was pretty rote when I was in school. What really hit me, the big understanding, was when we were doing fractions, multiplying and dividing fractions, and I just had forgotten how to do it and couldn't do it on the pre-assessment. And doing it as a rote skill, 'oh yeah, I remember the rule now.' And when they had us visually build it, and I'm a visual learner, that was huge for me. I was like 'wow,' now I get why, when you multiply a fraction you get a smaller number and when you divide a fraction you get a bigger number. It was just a big deal, it was huge. And problem solving and using algebra again and using geometry again. And I really realized how much I had changed my thinking and it made me a more aware thinker.

Increased math confidence was a specific goal of the VMP project, for teachers and students alike. In this speaker's text we hear evidence for why VMP was so successful in raising participants' math confidence. A key strategy employed by the VMP initiative involved the introduction of multiple methods for conducting mathematic exercises or instructional differentiation. But far from simply stating that differentiation of instruction had improved participants' math confidence, this speaker's 1st person narrative demonstrated vividly how that felt, the "wow" moment of recognition. Not only did they state, "I remember this [rule]," but after observing a different, visual, method for obtaining the same result, "now I get why." The speaker had recounted the VMP practice of modeling differentiated instruction for teachers in a real-life learning situation where the teachers were themselves the learners.

Another aspect of the VMP project which teachers said they had put into practice and found to be "better" for them was that of holding regular grade level or multi-level meetings. These activities were discussed by participants as promoting collegiality in the form of curricular planning and formative assessments, and are coded for the theme "teams."

> [Site 6, 10/04, 1st speaker] We all complain about having the 8:00 a.m. meetings. But it's sort of like exercise, you don't want to exercise, but after you do you feel real good. And they are the same way, after you leave one of the meetings you feel like, "oh that was so valuable. It was a good discussion." I definitely would like them to continue. I think they keep us on track and they keep us sort of

staying together in discussions and making sure that our kids have similar experiences.

[2nd speaker] I think that we can become pretty entrenched as teachers and stuck in our habits. And I think that it's really a credit to the teachers here, and also the people that come to work with them, that people have been so open to making changes, and sharing, and doing this kind of work. It's really been nice. It shows that the people coming in are good at what they are doing. I think it really shows some positive things about our teachers too. It's a wonderful opportunity for us.

[3rd speaker] There isn't any way that [you can] stay 'stuck' in math in this school any more!

The first speaker in this passage of text made a statement that is coded for "team" as well as "with-it-ness," the theme for "wisdom" discussed in Chapter 2 – in which the teacher noted that while people were not always excited about getting up early to attend math meetings, once they were there, and later upon further reflection, teachers felt the meetings were very important for them in putting into practice the classroom experiences that they were being introduced to and wanted to provide their students.

This teacher's use of the word "experiences" instead of "instruction," or "lessons" was somewhat unique in all of the focus group data set. One interpretation of this difference was the idea that students were not viewed passively by this teacher, but rather

as a living, reacting community of learners. While this study does not reveal strong evidence that participating educators grew to view their students as something more than passive learners, this may be an artifact of the coding strategy that focused on *I statements* of teachers specifically, and not statements such as "my students" or "students feel" that would reasonably better tease out this shade of meaning.

As noted in Table 17, the theme "team" appears across sites and years of the project, and appears to be one of the fundamental themes of institutional change that rose from the focus group data. Passages coded for both "team" and "put into practice" follow.

Table 17. The Intersection of Team with "Put into Practice"

Theme	# of Passages	# Passages in Common w/Put into Practice	1st Occurrence	Last Occurrence	Meaning
team	145	28	20-Jul	8-Oct	Instances of students, teachers, or schools working together for a common end

> [Site 1, 5/05 Evaluator] There is a question that comes up occasionally when we are writing reports. And I was wondering what your feeling is on this. It asks, what percentage of the people who have an opportunity to take part in the project <u>are</u> taking part in the project? Do you have sort of a ground level sense of what the

percentage is, 90 percent, is it 99 percent. Maybe a workshop or an online course or some touch of VMP?

[1st speaker] Well, if you go down the hall and think of the teachers, well everybody has done something. I mean you can't do it all.

[2nd speaker] And the other courses are grade specific so it might apply to you and not us.

[1st speaker] I think at one time everyone has been involved in something. There are only a few teachers I can think of that haven't accessed, probably.

[2nd speaker] If you think about two teachers out of all the 3rd and 4th grade teachers who are participating. I mean, one is getting her masters [in another discipline].

[Evaluator] But that is interesting. You know, the 99 percent figure.

[1st speaker] And the ones that I can think of, like there are a couple that are going to retire, and they are done. They are kind of riding the wave out. Or there are others who are just starting and they are trying to find their way.

Teachers at this site reported that nearly everyone was participating in some form in the VMP experience, while explaining the non-participating teachers' behavior was

either because they had other subject interests, were very new to teaching, or near retirement.

The growth of teams was also contextualized by the sites or the school buildings themselves. One educator stated, "It probably came out, through all of this, that when I speak with colleagues from other school districts or friends that I graduated with, I just feel so incredibly lucky that we have this experience. It does look very different in other buildings, even in our own district. It has been such a great experience." The passage demonstrated the idea of the "team" as being a specific school building was taking hold at this site. It also may be that the speaker was a newer teacher, because they were still in close contact with classmates from college and had not chosen to stay away from the VMP training as some of the newer teachers at partner Site 1 were reported by their colleagues to have done. The theory that Site 2 considered their team to be defined geographically by the building was confirmed again later in the spring 2005 group during a discussion about the levels for school-wide meetings, grade level or cross-grade level:

> [1st speaker, special educator] I think it is important to think about what someone said about specific grade level clusters. I think it is really, 'what is our desired outcome.' If it is something like [a specific] procedure, then we need to have representation across the grades. So I guess it is being clear about what is the intention of the things we are getting. Because I really enjoyed having contact with folks who are K-5. I would, as someone who doesn't work at one

specific grade level, give all of our workshops [that way], if all of our future workshops were at one grade level it would be difficult to decide the place where I would go.

[2nd speaker] And I think as a school that it is important that we can have those professional and intellectual conversations with people across the board.

Over time the notion of team broadened to include specific site participants within and across the VMP partner sites. During the early years of the partnership, in the spring of 2004, the notion of "team" included the math teachers, and also the VMP consultant, but not necessarily other teachers in the building or other grade levels in the district. Perhaps illustratively, the following cross-grade level speakers did not take part in the same focus groups:

[Site 3, Spring 04, Speaker, 1st focus group] So many acronyms are tossed around for us, VMP, VMI, GLEs, GCEs, NCLB, VT standards, local assessments, portfolios, tests, journals. We are sitting as a team, with and without [the VMP consultant], looking at problems, making answer keys and rubrics for journals. That feels really great to have going on. We always have to get through the anger before we get to the portfolios. The other piece hasn't

been done yet. We aren't on teams here, we have teams but [math teachers] meet separately.

[Site 3, Spring 04, Speaker, 2nd focus group] I would say for me, I don't honestly think about the [higher grade levels] too much. At [my] grade I am still focused on my little part of the world. But I have noticed more of a connection, in some aspects, of just trying to relate what I need to do to them. I think it is going to be better.

After a year and a half in the VMP program, teachers at this site were beginning to think more like members of a cross grade-level team. They were thinking about how students' preparation in prior grades would impact their instructional strategies; they had seemingly overcome some resistance to the practice of working from common calendars and were implementing common assessments as well. The focus group transcripts told their story through a lively and informative discussion about some of the specific benefits and problems they were experiencing while trying to hold to a common calendar:

[Site 3, Spring 05, 1st Speaker] Regarding the common assessment though, what I would like to see is a little bit of lightening up on the expectations, that in the first year of teaching a new curriculum jump right to everything being all the same among all of us. Like with the [recent unit], I think we did the best we could to get it, but it wasn't exactly the same. Sometimes I knew a couple days ahead

but by the time I caught up with what you were on you had already given your test and mine was already written. But we were pretty close. And next year it is going to be better. We are going to have those few conversations that we missed, but not really beating each other up about the same exact test right from the get-go and the same exact pattern. It is going to take us a year of teaching this class to figure out what is what and where I spent two extra days on something that is a waste of time and you did it differently and we'll get there.

[2nd Speaker] But that is going to vary on the students. It is a 7 day unit, if you get, the way the computer is, if you get a group of kids who could theoretically be all advanced students. And you are not going to spend 7 days on that unit. And I could get a computer printout of kids that all ended up with a 73 average in the previous course and need additional work on that same unit. You may finish it in five days and I may need 8 or 9. Again, there has to be that flex because not only are we different but we get different packages of students. And you can get a really phenomenal group of kids as

much as you can get one that the aspirin bottle is empty by the end of the week. So you can't hold us to that.

[1st Speaker] We are making huge strides and we are going in the right direction, and I think we did a very good job with the [unit]. I think we would do better than I thought we were going to do, but we are doing better than I think many… in this school by far, to be on the same page when you have multiple teachers teaching a course.

Teams as learning communities. By the spring of 2006, cross grade-level teams were functioning at Site 5, where teachers spoke of working closely in teams to review student work and support each other in finding answers to questions about why students were struggling with content. A teacher leader was mentioned as a resource, but not necessarily as a team leader. The classroom teachers and special educators appeared to take ownership of the process and worked collaboratively across grade levels to analyze student work as well as their own practice. This work was apparently done after school with worksheets drawn up specifically from their mathematics program:

[Site 5, Spring 06, 1st speaker, special educator] And I really think the model of sharing student work and actually doing it total group and doing it at grade level and feeling safe about it.

[Evaluator] So talk a little bit more, you've talked about looking at student work together. How do you do that?

[2nd speaker] What we mostly do is we compare all our tasks. Those reviews are called 'checking progress.' We get together after school and we have a sheet in Everyday Math which helps to outline the problem or success areas and go to those areas and look at it and if her kids did really well and mine didn't, what she did that I didn't. And then too, I will bounce ideas off [the teacher leader].

[3rd speaker] [the teacher leader] is here at all hours of the night.

[2nd speaker] In the past I just sort of plowed ahead, and I think that I have been able to see improvement for the kids.

[3rd speaker] Things are much more intentional.

[1st speaker, special educator] And the articles again that were shared with us on developmental levels and problems, I think it helped us open up and say that is what my kid is doing.

[2nd speaker] We have this one student that we are working with that on one of the tasks she was at an emerging level. But just being able to look at things and not feeling like 'Oh my God.'

Once again, as at Site 2, the introduction of materials was seen as a specific supporting factor for changing teaching practice; however in this case the materials were research articles shared by the teacher leader and not in-class manipulatives or other materials that students would use. The teachers were becoming more reflective about their practice as it related to the performance of their students, but also as a team and a learning community.

In order to further examine the teachers' concerns, as expressed during the focus groups over the five year period, the theme "my concern" is mapped in Table 18. This theme is identified when a teacher volunteered information about their fears or their concerns.

Table 18. Themes Aligning with "My Concern"

Theme	# of Passages	# Passages in Common w/My Concern	1st Occurrence	Last Occurrence	Meaning
my concern	107	n/a	22-Aug	8-Oct	When the speaker volunteers comments about their fears, their concerns
gaps in learning	59	28	11-Aug	8-Oct	Gaps between what a student or teacher knows and what other students or teachers know
better for me	130	18	20-Jul	8-Oct	Comments about training or practices which improve the speaker's life
contagion chain	90	16	22-Aug	8-Oct	When the speakers "ping" ideas off each other, toward understanding or recognition of a situation
policies changing	58	15	20-Jul	8-Oct	Teachers note that policies have changed or are changing
with-it-ness	93	15	20-Jul	8-Oct	Teachers speak with wisdom about a past, present, or future situation
team	145	13	20-Jul	8-Oct	Instances of students, teachers, or schools working together for a common end
validation	112	13	12-Aug	8-Oct	Feeling validated, that one's work is important and one's

Theme	# of Passages	# Passages in Common w/My Concern	1st Occurrence	Last Occurrence	Meaning
					efforts are acknowledged
put into practice	101	9	25-Aug	8-Oct	Descriptions of methods, influences, and results of their having adjusted their teaching styles during the grant period
little change	24	8	20-Jul	2-Oct	Events or practices which have not been influenced by VMP
reported conversation	25	6	12-Aug	2-Oct	Teachers quote each other, their students, parents, or administrators
safety	77	6	12-Aug	8-Oct	The speaker says they feel safe, or their words indicate that they or another group feels safe
humor	30	5	22-Aug	8-Oct	Teachers tell their stories with humor, includes irony, and self deprecation

Themes found to have Cronbach's Alphas with significant correlations to the theme "my concern" are listed. Most of these themes were also highly correlated with the "put into practice" theme, discussed earlier, and were distinguished by grey shading used in Table 18.

One of the themes most highly correlated (alpha .966) with "my concern," was that of "gaps in learning," representing passages in which teachers discussed their recognition of gaps between what a student or teacher knows, and what other students or teachers know. A total of 28 of 59 coded passages overlapped, meaning that when teachers mentioned a concern of theirs, nearly 50% of the time it involved a concern about gaps in learning. Teachers taking part in the focus groups described how they were making some gains in closing gaps for students, how they felt about that progress, and their thoughts and strategies for closing gaps in the future. In addition, their desire for additional information about how to close gaps grew the more they learned, and they

continued through spring 2006 to ponder what they could do to help students fill the gaps that were left. Through their *I statements* it can be seen that this was an area that remained of great concern to teachers throughout their districts' participation in VMP.

In 2004, general concerns expressed by teachers reflected their earliest experiences with various approaches, based on the needs assessment process, which VMP was beginning to implement in the different districts. One site[10], for example, was provided with support for a proposed program that provided math support for students outside of the classroom, and which in its earliest incarnation, teachers spoke of as being somewhat flawed:

> [Spring 04, 1st speaker] I don't know if… the way we are doing it now, is very beneficial for [the older kids]. I mean yes, get the kids while they are younger, but I say don't let the other ones sink and drown because they didn't happen to be in 2nd grade when we realized [it] worked better for the younger kids. So that is kind of a conflict for me.
>
> [2nd speaker] I feel like… they were taking the kind of the middle kids, the ones who were really low. Most of those on IEPs, or a lot of ours were just too low so never got taken. So I don't feel like any gap, maybe the gap has been closed from the high group to the middle group, but the low ones have still remained just as low.

[10] The study number of this site (1-7) is not identified here, as doing so would provide too strong a "key" from which the district might be identified

In the spring of 2005, teachers continued to express concern about their students who were "too low" for math support, yet not eligible for special education services either:

> [Spring 05, 1st speaker] The message is the needs are far greater than what we can supply assistance for. I mean, we do 8 week sessions… and there are kids who need that assistance all year.
>
> [2nd Speaker] And you would hope that the kids who are already too low would already be getting other things. But they aren't because there are too many of them.
>
> [3rd Speaker] And when I say that the kids are too low, these are students who aren't eligible for special education. These are the ones who fall through the cracks, those middle kids.

However, by spring 2006, a teacher leader reported that math services had been made available for those students who were characterized as "the low ones" and substantial gains were thought by this group to have been made through a combination of school wide and classroom support strategies:

> [Spring 06, Teacher Leader] You know we didn't [used to serve] those kids who were the lowest of the low. If they weren't IEP kids and they were the lowest of the low, they didn't necessarily get services. In many situations now, we actually back all the way

down to zero [correct answers on a pre test for content knowledge] and we take them after we take the kids who are closer to getting it. So we give them a little bit more time for the classroom teacher to do a little bit more in classroom... And then we will pick those kids up, and in some grade levels we get better, or equally good or better performance from the lowest kids by the time we take them… and we'll see whether they retain it. So those lower kids, while they made equal or better gains, will they retain it in the long run?

As a research component of interest for future VMP study, work was continuing across the project into the question of closing gaps in understanding for students who participated in math services outside of the classroom, a model which had been replicated, with additional local refinements added, from one participating district to another.

From the earliest VMP evaluation focus groups, teachers across the seven participating districts had many questions about where their students "should be" academically, often expressing through *I statements* the need for having strategies to better identify and fill students' gaps in math content knowledge:

[Site 3, Fall 04] I would be curious to know, is it like this everywhere? What is a typical 6th grader? If they were to come to me and I would say the average 6th grader, you are walking in my

door the first day of school in August. What would you really expect them to know to do? That's what I would be curious to know. Is it really me just thinking that they are that low and that unprepared? Or is it, 'this is where they are suppose to be?' I would be very curious to know.

[Site 4, Spring 04] As I sat in 3rd grade, having taught 2nd grade, and knew that geometry and shapes were something we did, they left me knowing the shapes. And I walked into 3rd grade midway through the year. [VMP consultant] pulled out a shape and the kids all looked at it like they had never seen it before. So, I don't know how you get that kind of stuff into long term memory. And I think that's the issue because I know things are being taught. But I am also hearing 'they still can't subtract in 5th and 3rd grade.' When they left me they were subtracting. They had a clear understanding. Where did it go wrong? Or, where did it not keep going? That's a frustration that I have, sitting at a primary level thing. I think, wait a minute, we did weeks of shapes. We did shapes all year. Then I walk in and I see those kids who I know, 'cause they were with me,

knew that. I think, 'Oh my gosh, they don't know this. Where did it go?' So I think it's a frustration all the way along.

[Site 5, Spring 04, 1st speaker] I think the other piece is really the students that are really having a really hard time with Everyday Math when do I decide that this is the program that I should try to struggle and struggle and keep them in and then what are my alternatives? Should I really pull them out? We are always going back and forth on that. Then we feel that we are in the program and we should really stay there. Then you get kids that it just seems like it is more and more overwhelming for them.

[Evaluator] Do the kids go back ever after they have been pulled out?

[1st speaker] That's what we struggle with. Right now I have one that we are trying to put back in and it is tough to try to put them back in. I'm not sure I am confident when I know finally to make that decision, whether a child should be pulled out or should be kept in the program.

[Site 6, Fall 04] One thing with assessment is I wonder how much they are retaining over time. They seem to have it at one point,

maybe when you have just finished the unit. But if I go back to that same thing, it spirals back 3 months later. The same kids are looking at me like we never did this. And I can go back and see that they were secure 3 months ago, and now they are clueless. I guess at the younger grades, 1st and 2nd, they are getting this [and it] is really new. They have had it by the time you get them in 3rd. They have seen it once through, but they are bombarded with a lot, and I just don't feel like they retain a lot of it really well over time. They may retain some understanding about numbers and the way they work, but they don't retain all the little individual type things in Everyday Math.

At Site 7, as was the case at several of the partner districts, a new math program was being instituted at the same time that VMP began work. Teachers' concerns were found to be not only about the gaps in learning that individual students had, but about institution-wide gaps between what their students had learned with the old program and what they would be expected to have experienced in the new one:

[Site 7, Fall 04, 1st speaker] When we were doing in our kindergarten group, our pacing calendar, it kept coming up, what about kids that are not ready to go on? We keep saying in November we are going on. They are not all at the same place.

[Group Comments] It is a spiral.

[1st speaker] Well I know, but they can drop right through the middle of the spiral.

By the end of the year, teachers at Site 7 were persevering but still struggling with the new curriculum, and some were beginning to think and talk about the impact that having made the switch to a spiraling curriculum could have on their students, and institution, over time:

[Site 7, Spring 05, 1st speaker] I'm cutting off language arts or I'm cutting off social studies to try to get it all in. So next year when we incorporate problem solving, sorry 4th grade, we are going to do a lot of, 'how to do it in that timeframe,' 'how to get it all done in an hour and 15 minutes' would be a great course, that could be the title. Because I don't know how to get it all done in that amount of time.

[2nd speaker] In 4th grade, we can get it done, but kids aren't understanding what we are talking about. We can get to the next lesson ok, but we are not comfortable saying don't worry that you can't do that honey, because you are going to see it again. It is really hard for us to do that.

[1st speaker] It is hard for them.

[2nd speaker] Absolutely. They want to know how to do something. They want to understand.

[3rd speaker] It goes really fast. In the 6th grade it is going to be nice seeing the kids come up. There are things we have addressed in 6th grade they are going to see in 7th and 8th, but not having that continuum with the same program, there are going to be some large gaps there, I feel. And some kids, we have taken our time, we, my student teacher and I are way ahead, but how much are the kids going to retain over the summer and be able to apply. And secondly, to what [you were] saying, we are forgoing the science and social studies to try to get all the math in. Trying to get it all in is tough.

A year later, teachers at this site were still questioning the impact that the spiraling curriculum had on their most needy students, while some were beginning to make a point of supporting the spiral, saying that they needed to believe in order for it to work; the teachers themselves had to believe in it and try it:

[Site 7, Spring 06, 1st speaker] There are 2 students that come to mind in the classroom that I work in that they feel like, 'well, you're moving on and we don't get it,' so it gives them that lost

feeling, even though they don't realize it's going to come around again, and you know maybe they'll get it a little better next time, but.

[2nd speaker] Yeah, I've had kids verbalize that feeling.

[1st speaker] They're discouraged.

[2nd speaker] Yeah…

[3rd speaker] I think that we have to learn to trust the spiral. I mean, just from a 1st grade perspective, what we are doing in 1st grade just amazes me what the kids can do. And I have to keep reminding myself that they don't get it if they aren't quite secure on the skills that are developing. I just have to trust it. And I think that because we have really taken this huge initiative, because it is going to be sustained, I think that once they get to the later grades, hopefully, they will be much more able to do these things than they are now.

Also in the spring of 2006, a teacher related that their own lack of confidence in the spiraling approach was making it harder to adopt the curriculum:

[Site 7, Spring 06] Well, certainly what's different for me is the spiral approach, because I'm more old school, it's been hard for me because I kind of like to stay with something, until I feel that they

have reached a certain mastery, so it's been difficult for me to accept that it's all going to catch up to them.

A year earlier, some of the teachers at Site 5 had come to the same conclusion that teachers needed to "trust" the spiral:

[Site 5, Spring 05] Some of us struggled too with Everyday Math being a spiral. And some of us that have taught math for awhile were really struggling with the mastery concept. (agreement from the group) That we needed to master everything or at least feel like we were on the upside of mastering everything before we went on. So we are really looking at now that we need to trust [the] spiral more, which is sometimes hard to do because you want to feel like they really have a good understanding.

But by the spring of 2006, teachers at Site 5 had decided that trusting the spiral alone would not help all students to learn, and so with VMP support had developed additional local strategies to support it:

[Site 5, Spring 06] Speaking of great resources, we have [a para-educator] here who has her BA in mathematics who has worked with our students in special ed and is so important that our math in the upper grades is scheduled around her availability so that people don't all start math at the same time in the day, so students

with special needs can have the supports for half of the one hour block. And that allows the kids to stay in the spiral with the exception of maybe 3 or 4 or 5 students. What will happen is the teacher will make a presentation and [para educator] is there to support.

In the spring of 2005, a teacher from partner Site 6 really summed up how VMP had promoted teachers' confidence in recognizing skills that were important to reinforce outside of the spiral.

[Site 6, Spring 2005, 1st speaker] 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 Everyday Math program has been really important. The VMP math program has been really important in order for us to do that and feel confident about it. Programs are programs and curriculums are curriculums, but do they meet the needs of [the students]? So at least in terms of confidence I feel like I can step outside of this, whereas when I first got here, I was

clinging to it like it was the only thing I had, it was the only thing I knew…

[2nd speaker] I definitely see changes. The one book that I read about letting kids believe that they are mathematicians, they actually come up and share their thoughts and share their math ideas. And everything is valued, it is not a right or wrong. I think that that is probably the biggest difference. It is like, "what are your ideas," and not "what answer did you get?" And that to me is, my kids feel comfortable now, going up to the overhead projector. We were doing something on [unclear] and fractions yesterday. It was a videotape lesson from the VMP staff member's class, and they all insisted at the end of that, because not all of them were able to go up and share their math ideas, that "we want to do this." And my bulb went out in the overhead and they were so upset. So I borrowed an overhead and brought it in, but they were just insistent that they were going to share the discovery that they made using [unclear] and fractions. And they got it. They were like little teachers, and we all clapped and they finished their presentations

and other kids would raise their hands and they would have this back and forth discourse about math. It was wonderful. It was really exciting to see it. I think that, more than anything is a real difference.

[Evaluator] So a real difference is the excitement, and enthusiasm?

[2nd speaker] And confidence. Before, you always had the ones who have their hands up all the time and they know everything. Well, they think they do. And some do. And others who are just so timid, because they are always afraid 'is my idea going to be valued or am I going to get the wrong answer so then I'll look like a fool.' Now, I just find that more and more kids are raising their hands, and more and more kids are not right or wrong, it is your idea. And then we can think about that, can we show it a different way, would it work if we applied it a different way. So all of that is invaluable to have kids discussing.

Summary of Findings for Research Question 2

Question 2: What can we learn about the school reform effort brought by VMP, from the teachers' perspective?

Finding 1: Prior to the VMP initiative, principals and math specialists did not often visit the math classes in the majority of the partner sites; classroom teachers had

few models to regularly compare themselves against or to learn new practices from. Toward the end of the grant, when the teachers said they were able to comfortably visit each other's classes, they exchanged ideas about how to teach, and gained insights into what the other grade levels were doing and how that related to what they were doing in their own classrooms. Teachers also said that since this practice was introduced, they had become more reflective about their performance, and their students' learning, by seeing their classroom through mentors' and colleagues' points of view.

Finding 2: Not only collegial presence, but demonstrations of and access to materials that supported math instruction was important. Teachers reported they felt empowered, that they *could* enact the changes they had seen modeled by VMP staff and teacher leaders as a result.

Finding 3: Inclusion of special educators and para educators in the VMP professional development plans, drawn from needs assessments conducted at each of the seven partner districts. Classroom teachers felt that they were partners in the classroom, special educators felt better able to share instructional methods across ability and grade levels, and para educators felt they were performing a more valuable role in the classroom. As a result, teachers and students were better supported within and across grade levels.

Finding 4. Individual teachers' experience combined and became institutionalized with adoption of VMP teaching practices. By engaging whole-schools, and in some cases whole-districts, in purposeful professional development designed through the needs assessment process, the "wow" moments of teacher insight happening

en mass across classrooms and grade levels combined to promote and enact institutional change.

Finding 5: Teachers were introduced to collegial teamwork at different levels throughout the grant period. Often beginning with team teaching experiences as a result of the VMP staff members, local teacher leaders, or IHE partner mathematicians in the classroom. Within-grade-level meetings may be settings where common calendars and assessment practices were promoted, and cross grade-level meetings where discussion of student work as well as teaching practices took place. Showing promise for sustainability, by the final years of the VMP sites showed evidence of collegial teamwork as a normal part of classroom teachers' professional experience and was a process that they increasingly took ownership of.

Finding 6: Teacher leaders in the VMP partner schools were tasked with educating classroom teachers to participate in, and modeling processes leading to the establishment of, a research based, collegial, safe learning community. While the term "learning community" did not appear specifically in any of the VMP goals or benchmarks, its establishment was definitely an outcome of the program. Toward this end, math teacher leaders in the schools were recognized by classroom teachers as having contributed their time and talent, in abundance.

Finding 7: The more that classroom teachers learned about how to recognize and help students close gaps in learning, the more they wanted to know about how to recognize and close gaps within and across other subjects and grade levels. This focus on improving student performance through teachers' desire to improve their practice was a defining condition found in VMP partner schools. Teachers embraced this practice of

identifying and closing gaps in learning, both their own and their students, through engaging in research-based VMP professional development, which modeled strategies for teaching in supportive and safe learning environments.

Finding 8: Teachers found some approaches supported through VMP were at odds with the fundamental ways in which they understood their students' learning processes. The spiraling curricular approach, not brought by VMP but addressed by the project as a result of needs assessments, was counterintuitive to many classroom teachers. They did not initially "trust the spiral" and were therefore resistant to sticking with the approach. While some partner sites chose locally to support a "pure" spiral, discouraging inclusion of supporting materials outside of the specific math program that was selected by their school, others were aided by VMP staff and IHE mathematicians in identifying specific skills deemed of greatest importance for future learning and determining which of those their students truly should be secure in before moving on. This later approach left teachers feeling better supported than the pure spiral. However, those teachers whose schools chose the pure spiral approach also found VMP supported the curriculum, if not by bringing in outside materials than by providing more support staff in the classroom during math.

Sub Question 1: How time and place impact the teachers' experiences with the reform efforts of VMP.

Sub Question 1 is discussed in terms of the VMP Benchmarks III-a, b, and c, dealing with institutional change. Nineteen themes which rose from the *I statement* coding were felt to have some potential to address this area of the Benchmarks, and are identified by checkmarks in Table 19.

Table 19. VMP Benchmarks to Measure Change

Benchmark	Description	Explanatory Themes
III-a	Measure the incidence and nature of teacher collaboration: within grade levels, across grade levels, across schools and across participating districts	✓ Assessment ✓ Discovery Point ✓ Little Change ✓ Materials ✓ Model Teaching ✓ Need Admin Support ✓ Planning ✓ Policies Changing ✓ Policies Fractured ✓ Pride ✓ Research Questions ✓ Safety ✓ Support from Admin ✓ Take the Risk ✓ Teacher Leader ✓ Teams ✓ Uncertainty ✓ What Works
III-b	Measure the degree to which schools and districts develop and disseminate research and best practices	
III-c	Measure changes in the ways in which principals, curriculum leaders, and teachers work collaboratively on the implementation of mathematics curriculum, instruction and assessment	

Thematic comparisons across time. In order to gauge how time and place had played a role in the reforms brought to VMP partners, NVivo matrixes of these 19 "explanatory" themes were compared across the seven sites of the partnership, as well as across the four data collection cycles of the VMP evaluation. Table 20 provides the results of the matrix analysis across dates, shown by number of passages coded.

Table 20. Number of Passages Coded in Common, across Themes and Dates

	Date = Spring 04	Date = Fall 04	Date = Spring 05	Date = Spring 06	Totals
assessment	25	59	56	16	156
changing practice	30	62	76	21	189
discovery point	13	39	26	11	89
little change	5	7	9	3	24
materials	17	35	42	10	104
model teaching	24	35	36	5	100
need admin support	3	3	10	1	17
planning	12	18	31	11	72
policies changing	15	19	19	5	58
policies fractured	4	8	4	3	19
Pride	3	9	16	3	31
research questions	4	10	12	2	28
Safety	14	30	24	9	77
support from admin	3	11	7	2	23
take the risk	4	4	7	2	17
teacher leader	17	31	33	13	94
Team	25	44	54	22	145
uncertainty	21	51	50	8	130
what works	30	60	64	15	169
Totals	269	535	576	162	1542

In order to further identify differences between the patterns of coding across these 19 themes over the four data collection ranges, an ordinal numbering system replaced the raw counts of passages coded in Table 21. However, while defined by an ordinal scale, there is not an assumption of equal distance between each theme (Boulmetis & Dutwin, 2005, p. 102). The scale of 1 to 19 captures the simple rank order of these themes, from most frequently found (1) to least (19). Shading of themes from light to dark, in clusters of 5's, further distinguishes the pattern.

Table 21. Themes in Ordinal List, across Dates

	Date = Spring 04	Date = Fall 04	Date = Spring 05	Date = Spring 06
Team	3	5	4	1
changing practice	2	1	1	2
assessment	4	3	3	3
what works	1	2	2	4
teacher leader	7	9	8	5
planning	12	12	9	6
discovery point	11	6	10	7
materials	8	8	6	8
Safety	10	10	11	9
uncertainty	6	4	5	10
model teaching	5	7	7	11
policies changing	9	11	12	12
Pride	18	15	13	13
little change	13	17	16	14
policies fractured	16	16	19	15
research questions	15	14	14	16
take the risk	14	18	17	17
support from admin	17	13	18	18
need admin support	19	19	15	19

In Table 21 the 19 themes felt to hold potential for distinguishing institutional changes experienced by teachers as a result of VMP are now identified by their ordinal labels, from most frequently to least frequently found in the spring 2006 focus group data set.[11] Through this view of the data, the themes "team," "changing practice," "assessment," and "what works" are found most often across the four data collection points. The themes "model teaching," and "uncertainty," which were among the top five most often found themes in previous time periods, dropped in frequency during the spring 2006 focus group discussions. In their place, the themes "teacher leader," and "planning"

[11] An ordinal technique for comparing findings across years is used here because of differences in longitudinal distribution of thematic coding, which is a result of unequal distribution of the data across time periods, see Appendix I.

have risen in frequency during the final data collection cycle. In addition, the theme "discovery point," defined as, "the 'ah-ha' moments, when teachers reached greater understanding about math content, their students or their teaching" has risen to the sixth most frequently coded theme in the last cycle. While it may be a result of the slightly different focus group site selection process that took place in the final round, this shift in the frequency of themes coded may also reflect the change and maturation of VMP practices.

Looking beyond the natural language used to name themes, further, richer description of institutional change over time can be drawn by mapping the definitions of each theme, in order of frequency, across the four data collection cycles. In Table 22 the shading of ordinal themes ranking from 1 to 19 is again compared across the four data collection cycles, but by use of the thematic definitions instead of their labels:

Table 22. Themes in Ordinal List 1 to 19, across Dates

Spring 04	Fall 04	Spring 05	Spring 06
1 Promising practices	1 Speaker is changing their practice	1 Speaker is changing their practice	1 Instances of students, teachers, or schools working together for a common end
2 Speaker is changing their practice	2 Promising practices	2 Promising practices	2 Speaker is changing their practice
3 Instances of students, teachers, or schools working together for a common end	3 Formative or summative assessment	3 Formative or summative assessment	3 Formative or summative assessment
4 Formative or summative assessment	4 Uncertainty about support, practice, methods, students' learning	4 Instances of students, teachers, or schools working together for a common end	4 Promising practices
5 Watching another teach	5 Instances of students, teachers, or schools working together for a common end	5 Uncertainty about support, practice, methods, students' learning	5 An authority figure with higher math-content knowledge – the VMP math mentors or mathematicians, or local teacher leaders
6 Uncertainty about support, practice, methods, students' learning	6 The "ah-ha" moments, when teachers reach greater understanding about	6 Curriculum, math program, manipulatives	6 Engaged in looking
7 An authority figure with higher math-		7 Watching another	

Spring 04	Fall 04	Spring 05	Spring 06
content knowledge – the VMP math mentors or mathematicians, or local teacher leaders	math content, their students or their teaching	teach	ahead
8 Curriculum, math program, manipulatives	7 Watching another teach	8 An authority figure with higher math-content knowledge – the VMP math mentors or mathematicians, or local teacher leaders	7 The "ah-ha" moments, when teachers reach greater understanding about math content, their students or their teaching
9 Teachers note that policies have changed or are changing	8 Curriculum, math program, manipulatives	9 Engaged in looking ahead	8 Curriculum, math program, manipulatives
10 The speaker says they feel safe, or their words indicate that they or another group feels safe	9 An authority figure with higher math-content knowledge – the VMP math mentors or mathematicians, or local teacher leaders	10 The "ah-ha" moments, when teachers reach greater understanding about math content, their students or their teaching	9 The speaker says they feel safe, or their words indicate that they or another group feels safe
11 The "ah-ha" moments, when teachers reach greater understanding about math content, their students or their teaching	10 The speaker says they feel safe, or their words indicate that they or another group feels safe	11 The speaker says they feel safe, or their words indicate that they or another group feels safe	10 Uncertainty about support, practice, methods, students' learning
12 Engaged in looking ahead	11 Teachers note that policies have changed or are changing	12 Teachers note that policies have changed or are changing	11 Watching another teach
13 Events or practices which have not been influenced by VMP	12 Engaged in looking ahead	13 The speaker shows pride for their work, their students' work, their school's accomplishments	12 Teachers note that policies have changed or are changing
14 Examples of risk taking – may be recognized by the speaker or not	13 Examples of support being provided by the administration	14 The speaker identifies questions they are interested in	13 The speaker shows pride for their work, their students' work, their school's accomplishments
15 The speaker identifies questions they are interested in	14 The speaker identifies questions they are interested in	15 The speaker perceives a lack of administrative support	14 Events or practices which have not been influenced by VMP
16 Some policies appear to the speaker to be at odds with others	15 The speaker shows pride for their work, their students' work, their school's accomplishments	16 Events or practices which have not been influenced by VMP	15 Some policies appear to the speaker to be at odds with others
17 Examples of support being provided by the administration	16 Some policies appear to the speaker to be at odds with others	17 Examples of risk taking – may be recognized by the speaker or not	16 The speaker identifies questions they are interested in
18 The speaker shows pride for their work, their students' work, their school's accomplishments	17 Events or practices which have not been influenced by VMP	18 Examples of support being provided by the administration	17 Examples of risk taking – may be recognized by the speaker or not
19 The speaker perceives a lack of administrative support	18 Examples of risk taking – may be recognized by the speaker or not	19 Some policies appear to the speaker to be at odds with others	18 Examples of support being provided by the administration
	19 The speaker perceives a lack of administrative support		19 The speaker perceives a lack of administrative support

This view of the data provides further details about the changes which were discussed by focus group participants across time. In the final year, spring 2006, colleagues said they were working together more frequently than they did during the other three time periods. They also had more to say about authority figures' involvement in the classroom, be that figure a teacher leader, a VMP consultant, or a mathematician. Teachers spoke about their engagement in looking ahead more frequently as well, and more "ah-ha" moments were described. The teachers also said more about the pride that they felt in their own, their students', or their school's accomplishments. In addition, in the final year of this analysis, the teachers were once again speaking about events or practices that they saw as being unrelated to VMP, a theme which was seen in a similar ordinal position during the first data collection cycle two years earlier but which had dropped in subsequent years. A theme found to have dropped in position during the final year was that of "uncertainty." Evidence from the full suggests this was because teachers felt more confident about mathematics, the reasons they teach math, and their abilities to teach it. Or perhaps, as the following contagion chain suggests, they were now more comfortable with uncertainty:

> [facilitator] You have increased confidence in your own math?
>
> [5th grade teacher] – I think I had the confidence in math in most areas but I'm pushing them.
>
> [3-4th grade teacher] I think having the supports has encouraged me to try things I haven't tried before. It's like working with a net

> going to [the math specialist] who can say 'have you tried' or to ask 'what happened, why did this happen?'[12]

Another theme that had decreased over time was that of teachers watching one another teach. Perhaps because this "model teaching" strategy was an early "stand alone" professional development activity, and was later replaced or encompassed by the concepts of team building and teacher leadership:

> Sometimes when the VMP staff member is in there she does take over the class, and as a teacher you get to sit there and watch her do it. Or when Math Mentor comes in, it is like, wow, can I watch some of your techniques. Just to have that piece and that interaction with an adult to show you the ropes or whatever you need at that point.[13]

Finding 9. While further exploration of these patterns is beyond the scope of this study, it is possible to say that the method for culling a large source of full-text data by conducting *I statement* searches, from which further themes rose upon exploratory qualitative coding in NVivo, had aided in distinguishing patterns of similarities as well as differences across sites and through time. Exploration of these patterns had aided in recognizing the impact of VMP across the partnership. While the dissemination of research (Benchmark III-b.) was not among the most frequently found themes for these time periods, neither was it among the least frequently found. The analysis of the themes

[12] Coded at the theme "changing practice"
[13] Coded at the theme "discovery point"

of changing practice, model teaching, teacher leader, and particularly team and assessment, aided in understanding how participation in VMP built a culture for collaborative teaching and learning across the partnership (Benchmarks III-a and III-c).

Interestingly, some themes which were identified as having potential for greatly illuminating the VMP impact across sites and time were not particularly helpful at this level of exploration, clustering in the "less frequent" category across sites and times. Those themes included both "need admin support," recognized frequently only in the data from Sites 3 and 4, and the time period spring of 2005; and "support from admin" recognized most frequently at Site 5 and across the project during the spring of 2004.

Sub Question 2: Recognizable principles of the Equity Framework attributed by teachers as leading to change.

The equity framework. The VMP participating teachers' lived experience of school reform was also defined by their involvement in behaviors and skills associated with the Equity Framework[14]. While teachers were not explicitly aware of the Equity Framework, it had great influence as the five guiding principles of the Vermont Mathematics Partnership.

VMP's leadership intentionally built their project goals from the Equity Framework (see Appendix C). The evaluation focus group interview questions were likewise built from the Goals and Objectives (see Appendix A). As such, themes related to school reform which were addressed recognizably in terms of the Equity Framework would be expected to, and did, rise from the data. The natural language labels of those

[14] Developed collaboratively by Vermont Mathematics Partnership Project Principle Investigators and Directors, with, Dr. Rachel Lotan, Stanford University, and others.

themes are listed in the last column of Table 23 and are shown against the components of the framework.

Once again looking at the labels of the themes as a shorthand "picture" drawn by analysis against the four points in time of the focus group data collection, and the seven sites which took part in VMP, patterns within and across the project emerged.

Tables 24 and 25 begin to tell the story of how recognizable components of the Equity Framework are distributed.

In Table 24 there is agreement found across the four data collection cycles that "changing practice," "what works," and "assessment" are among the most often coded themes. "Better for me" is found among the most frequently coded themes across each point in time, except during the fall 2004 data collection cycle, when it is replaced by "depth of knowledge." "My concern" and "policies changing" are found more frequently in the spring of 2004 than at later times, and in what might be called a mirror image of that concern over policy change, in the last data collection cycle made during the spring of 2006, "toward sustainability" is recognized as a greater component of the data than it had been in the earlier rounds. The concern expressed for "lowest students" and their "gaps in learning" was found most frequently at the beginning and end of the project.

Table 23. Themes Aligning with the Equity Framework (see also Appendix C)

Creating an Equitable Classroom: Meeting the diverse needs of students in the mathematics classroom		***Themes Felt to Align with the Framework***
Classroom Organization	• *Classroom norms for participation and collaboration are established so that all students are able to fully participate*	Demonstrating Learning Safety Take the Risk
Language Demands	• *Intentionally anticipating and addressing expressive and receptive language challenges* • *Effective literacy strategies are incorporated into mathematics instruction*	Lowest Students Gaps in Learning My Concern
Instructional Strategies that Equalize Participation	• *Instructional practices are selected with the following question in mind: "Does this practice activate, alleviate or exacerbate status differences?"*	With-it-ness
Complexity of the Curriculum	• *Important mathematical content is the focus of instruction* • *Students encounter mathematically rich and complex tasks that allow them to contribute in many different ways* • *Effective questioning techniques are used to help students examine their assumptions, cite evidence to justify solutions, and make connections among ideas and with prior learning*	Demonstrating Learning Depth of Knowledge Better for Me
Assessment	• *Ongoing, formative assessment of student understanding is used to inform instruction* • *Evaluation criteria for learning tasks and products are clearly articulated*	Assessment Change in Practice Policies Changing

Table24. Number of Passages Coded in Common, across Themes and Dates

Themes Rising from the VMP Focus Group Data	Spring 04	Fall 04	Spring 05	Spring 06
assessment	2	3	3	2
better for me	3	5	4	4
changing practice	1	1	1	1
demonstrating learning	5	7	6	5
depth of knowledge	8	4	5	5
gaps in learning	9	11	11	9
lowest students	5	10	10	8
my concern	4	6	7	8
policies changing	6	12	11	10
safety	7	9	9	7
take the risk	11	14	13	11
toward sustainability	10	13	12	8
what works	1	2	2	3
with-it-ness	7	8	8	6

When comparing the recognizable components of the Equity Framework across VMP partner sites (Table 25), there are also patterns found through analysis of their ordinal rank. "Assessment" is one of the largest parts of the discussion at every partner except for Site 2. Participants at Sites 3, 5, and 7 were most apt to discuss their concerns during the focus groups. Participants at Site 3 were recognized as being more "with-it" than those at the other locations. "Changing practice" was not as big a part of the discussion at Site 4 as it was at the others, but "depth of knowledge" was addressed more often there, as it was at Sites 2 and 7, when compared across the partnership.

Table 25. Number of Passages Coded in Common, across Themes and Sites

Themes Rising from the VMP Focus Group Data	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
assessment	4	5	3	3	2	1	3
better for me	5	3	2	2	6	3	5
changing practice	2	1	1	5	3	3	1
demonstrating learning	3	6	8	7	7	4	4
depth of knowledge	6	4	5	4	5	6	2
gaps in learning	8	11	11	5	9	8	6
lowest students	6	9	9	7	3	9	8
my concern	8	10	2	6	4	7	2
policies changing	9	10	6	7	11	10	6
safety	6	8	10	9	5	5	6
take the risk	11	11	12	9	12	12	9
toward sustainability	10	11	7	8	10	11	7
what works	1	2	7	1	1	2	4
with-it-ness	7	7	4	5	8	5	5

By summing the ordinal ranking across the VMP sites for these themes which are recognizably related to the Equity Framework, as a rough gauge of frequency given the disproportionate data collection plans across sites and years, thematic coding of *I statement* searches resulted in this list of themes, shown from highest to lowest occurring:

1) Changing Practice – Speaker is changing their practice
2) What Works – Promising practices
3) Assessment – Formative or summative assessment
4) Better for Me – Comments about training or practices which improve the speaker's life

5) Depth of Knowledge – Teachers discuss their own or their students' content knowledge increasing
6) Demonstrating Learning – Examples of new knowledge being applied
7) My Concern – When the speaker volunteers comments about their fears, their concerns
8) With-it-ness – Teachers speak with wisdom about a past, present, or future situation
9) Safety – The speaker says they feel safe, or their words indicate that they or another group feel safe
10) Lowest Students – Students who are not meeting the generally accepted standards
11) Gaps in Learning – Gaps between what a student or teacher knows and what other students or teachers know
12) Policies Changing – Teachers note that policies have changed or are changing
13) Toward Sustainability – The "what's next" question – may be evidence of progress toward sustainability
14) Take the Risk – Examples of risk taking – may be recognized by the speaker or not

Three cornerstones were an emphasis on instruction, safety, and assessment. The following passages are drawn from those which were coded for the three themes "assessment," "safety," and "with-it-ness" and are presented in order to further explore the Equity Framework as a guiding principle of VMP.

[Fall 04, Site 1: *teachers learn what to emphasize*] [3rd Grade Teacher] And I think I know better now what is so important for them, so I know to zoom in or, not to go into that next unit because this skip counting unit is really important, or this place value is really important that they feel comfortable with it.

[4th Grade Teacher] Students who come from classrooms that have already discussed these concepts, who have teachers who already go to these workshops, they come in, and I must say they are so much further beyond the rest of the class, or most of the class. You could say, 'Well that just happens to be a smart kid.' But you see that they have such a great understanding…

[2nd Grade Teacher] I know [a 3rd grade teacher] came in to me last year and she said, 'Wow, this is the first time I have ever had a student say, 'Oh lets add 28 + 36 and put it into expanded notation' and add that way.' She said that's the first time she's really seen a child explain it and talk about it that way.

[4th Grade Teacher] Was it your kids?

[2nd Grade Teacher] It was. That's why she came to me. Because she like, then she asked who was your teacher and she came and told

me that we really are putting a lot of effort into really having the kids even use math words. Like, 'Put it into expanded notation.' [Fall 04, Site 7: *teachers provide each other supportive critique*] [Special Educator, Lower Grades] With the [VMP]'s course, that was always built in. Not so much the pre-time, but the post time was built in. Anybody who had been in your room during that lesson, it was really during our lunch but that was because of the timing of the lesson and the schedule because you are trying to make it as immediate as possible after the lesson had been done. And there would be coverage for the teachers. I think that helped because you can assess [or] discuss immediately the effectiveness of what took place and share observations with someone else of what took place. [Special Educator, Middle Grades] And I think that is how team teaching is supposed to work and I know that when I team teach we are always giving each other feedback. This year I am team teaching with two para educators and we are constantly, after every class the three of us meet, even though we only have 30 seconds to do it, but we do and it's helpful to have someone else in the room to give you feedback.

[5th Grade Para Educator] Sometimes, because she is doing more of the actual teaching and I am going around and seeing what different students are picking up on and what they are missing and I think it can be helpful because it just brings the two of us together, and with the 3rd educator in the room, in seeing how well they are doing and what they need more work on.

[Spring 04, Site 2: *teachers are beginning to use formative assessments*]

[4th Grade Teacher] So we correct and I ask if anybody wants me to do any of the problems and there are usually a bunch that I have to do up on the board and they say, oh, that's what I did wrong. They are actually looking at their own problem to see what they did wrong rather than just my saying 'Oh, look what you did.'

[Group] The x or the c isn't enough anymore. Fortunately. Yeah, I think so.

[4th Grade Teacher] And I also think they are more comfortable with math, cause they can say 'Do this one' and it is a safe place to say, 'Oh this is what I did.' Its not like, 'I'm going to fail if I tell you I did this one wrong.'

[3-4th Grade Teacher] And I wonder if that is related to how we've changed our assessments, its not an end of the unit test that's kind of high stakes its more as you go along you are getting feedback on things so its ok if you mess it up. It is part of learning.

[3rd Grade Teacher] I've also given some of the assessments point values, so the kids know that for 2 points only one point goes to the answer, the other is for the work. So that kids that really need that reminder that, 'This isn't about the answer,' I think that helps them a little bit.

[Evaluator] So it sounds like that as you go along feedback, but also like kids can do better, and can try again. Is that accurate?

[K-1st Grade Teacher] I've had more kids this year, which may just be a function of 1st graders, too, but they say after they've gone over something, 'Can I have mine back?' and they want to go over something or change it and they can extend the table or whatever it is.

[3-4th Grade Teacher] One of the things I'm trying this week that I'm really excited about is giving them an opportunity to revise in a really concrete intentional way. We did this problem, we've done a

bunch of stuff since then, so now go back and part of the assessment for me is what do they know now, that they didn't know then, that they are able to put in.

[K-1st Grade Teacher] Like they do with their writing.

[Evaluator] Wow, that is fabulous.

[3-4th Grade Teacher] Well, I hope it will be fabulous.

[Spring 05: Site 1: *even the new state test is not so scary when it can be considered formative*] [4th Grade Teacher] I am happy that there is no more NSRE. Because I feel that as a 4th grade teacher all we did was think about the NSRE and I think we were trying to teach to it. There was too much focus on it.

[Math Teacher] And maybe that is a good reason for liking the change of the time of year when the test is administered. You know, having it be administered in the beginning of the next year really, I mean you still need to teach all you need to teach, but I think it will alleviate some of that pressure I know that you guys feel.

[3rd Grade Teacher] When we are aligning everything with the GLEs, my theory is that if you are teaching everything that you are

> supposed to be teaching, then you should not have to do any test prep whatsoever, other than maybe teaching them how to do a multiple choice. But you shouldn't have to be throwing all these new things at them. It should be just coming in your curriculum. And I think we have a good solid math curriculum now, in most areas, adding.

Finding 10. From this exploration, a picture is presented of VMP partner schools where teachers shared their personal learning, engaged in formative assessment, grew in their understanding of the math, and encouraged peers as well as students to demonstrate their learning. The classrooms were "safe" places to engage in experimental or "risky" explorations of both content and pedagogy. Teachers recognized when their practice was changing, but also knew when those changes "worked" for the better. In short, the Equity Framework, which was never presented as a specific outcome of VMP but as a guiding principle of the project, had informed the design and application of the project to the extent that its axioms were recognizably present in themes which rose from qualitative coding of *I statement* searches conducted of the full text focus group data.

Sub Question 3: Recognizable stages of individual or institutional change present in the data.

Sub Questions 1 and 2 have addressed primarily institutional changes as viewed across time and participating VMP sites. To look at Sub Question 3, the individual changes expressed by participating teachers were viewed through the lens of Peshkins' "*Subjective I's*." Peshkins' analysis of his own multiple-states of consciousness as

recognized during site visits to collect data at schools was the inspiration for this current analysis (Glesne & Peshkin, 1992; Peshkin, 1986, 1991). Therefore, it is fitting to bring the discussion back to his work.

The themes identified in VMP focus group data aligned rather well with Peshkin's (1986; 1991; 1992) "I's," This is somewhat surprising given that Peshkin was speaking of his own subjectivity while the subjectivity found in the VMP focus group data was implied by re-reading transcripts of the participants' statements. Nonetheless, it may be that the six "I's" which Peshkin identified are found to some degree across all populations, especially those made up of participants who are seriously reflecting on their own practice.

Table 26. Themes Felt to be Aligning with Peshkin's "*Subjective I*'s"

Ethnic-Maintenance	**Community-Maintenance**	**E-pluribus-unum**	**Justice-Seeking**	**Pedagogical-meliorist**	**Nonresearch-human**
contagion chain	better for me	evaluators role	I wish	better for me	better for me
gaps in learning	evaluators role	high stakes tests	scope of work	contagion chain	eval role
humor	gaps in learning	little change	status quo	gaps in learning	little change
kids teaching kids	high stakes tests	my concern	take the risk	humor	scope of work
little change	lowest students	planning		little change	take the risk
lowest students	my concern	pride		my concern	team
policies changing	planning	put into practice		policies changing	tension
reported conversation	pride	reflect		put into practice	validation
safety	put into practice	teams		reported conversation	where does it come from
team	reflect	uncertainty		safety	
tension	scope of work	what works		team	
validation	take the risk	with-it-ness		validation	
what works	tension			with-it-ness	
where does it come from	uncertainty				
	where does it come from				
	with-it-ness				

Most of these themes have previously been addressed as Research Questions 1 and 2, or Sub Questions 1 and 2. Therefore, themes which have not been described in as much detail will be discussed in relation to individuals' growth.

1) Humor – Teachers tell their stories with humor, includes irony, and self deprecation
2) I Wish – Speaker articulates their wishes for the future
3) Tension – When one person's comment directly opposes another's
4) Validation – Feeling validated, that one's work is important and one's efforts are acknowledged
5) Kids Teaching Kids – instances when students share their thinking

Figure 2 helps to tell the story of relationships between these five themes, which were found across the seven VMP sites. On the strength of thematic labels and their natural language definitions, participating teachers at Sites 1 and 2 were more likely to share their thoughts in terms of their wishes for the future, whereas those at Site 7 were more apt to contradict each other. Statements of or about validation were found most frequently at Sites 5 and 6, where teachers also said proportionately more about their experiences with kids teaching kids. From this view of the five themes drawn by exploration of their labels and definitions, one might conclude that discussions which took place during focus groups at Sites 5 and 6 were more serious than those held at the other locations; however the underlying text accessible through the NVivo live matrix view provides evidence that teachers at all seven sites engaged in thoughtful reflection on their learning and practice during the focus groups.

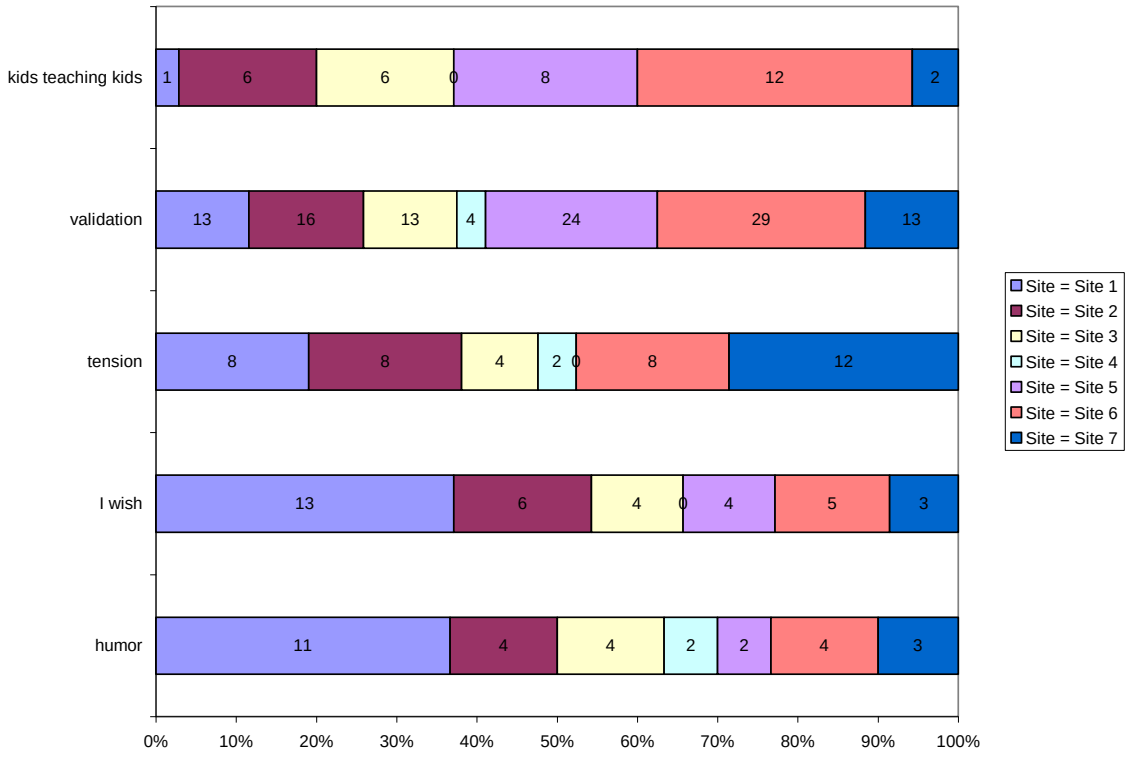

Figure 2. Distribution of 5 themes, considered across the 7 VMP sites

Following are individual teachers' statements drawn from the full text of each thematic code described above.

Humor, Site 1:

[Special Educator] I think it's just easier, if it's not your strength to do what has worked in the past.

[Elementary Teacher] I know that's true. I laugh about it now, but I really was crying last year when I took that course. Every Sunday I would cry.

[Para] It was very stressful.

[Evaluator] Which one was the course?

[Elementary Teacher] It was number sense and operational. [Math Teacher] she has a math mind. But I don't have a math mind and I never liked math in school. But, what that taught me was, I have a lot of kids in my room that are like that. And I didn't want them going out of my 3rd grade class with those same fears and hang-ups that I have carried with me. That's why I kept taking it, thinking, 'I've got to learn new techniques, I've got to be more comfortable with math.'

While the preceding section was coded for "Humor," the discussion, which took place in the fall of 2004, was not frivolous but a serious passage exploring why some teachers felt their peers were not taking part in VMP professional development. In reviewing the "Humor" coding, the code was used consistently to designate a statement which "broke the ice," such as the teacher's statement that, "I laugh about it now, but I really was crying last year…" and not to indicate that participants were "joking around" by not taking the discussion seriously. On the contrary, it seems that these ice breakers occur frequently when a speaker has something serious to say but introduces it in a lighthearted way. Many of the instances which were coded for "Humor" were also coded for "my concern" and "contagion chain," indicating that the humorous statement

resonated with others in the group, who then went on to continue a serious discussion of the topic.

I Wish, Site 2:

> [2nd grade teacher] We've broadened math to require the same amount of time and attention that literacy requires, but we don't have the same amount of time for it. And I don't know what the answer to that is because I do that every year and I'm in the same place maybe even more so because it is only my second year in a new grade level, where I get to this point in the year and say, 'Oh my god, look what I still have to do before the end of the year.'
>
> [3rd grade teacher] Well this particular group this year, I've never felt it to that extent that I feel with this group.
>
> [Evaluator] How much time in fact are you spending on math instruction?
>
> [Group] An hour, more or less.
>
> [3rd grade teacher] We committed to an hour.
>
> [3/4th grade teacher] I think many of us would say we need more time for math.

[K/1st grade teacher] I try to find ways, like morning meetings I end up doing a lot of math, so an hour of formal math block and then whatever you can squeeze in, that's what everybody does.

The preceding passage is also an example of a contagion chain. The teachers were engaged in a discussion which was initiated by one member, then taken up and elaborated on by others within the group. This, full-text re-examination revealed not a flighty or "light weight" discussion coded under the "I wish" theme, but instead an example of a specific need being expressed, that more time was felt to be needed for teaching math. This discussion which took place during the spring of 2004 was also cross-coded for the themes, "team," and "my concern."

Tension, Site 7:

In another example drawn from the fall of 2004, teachers from across the large district that was Site 7 engaged in a contagion chain discussion about the pressure they felt to stay together at grade levels.

[2nd Grade Teacher [school 2]] I will be honest and say that, what I'm thinking what I'm hearing from people before VMP there was less pressure. Whether it's self imposed, or we're imagining it. Even the timing. And it's with Everyday Math. It's the program. I think a lot of people are feeling pressure to get through the program. To stay on track. The pacing. To stay on pace.

[Evaluator] Are you trying to stay together?

[Group Comments] Within a week of each other.

[1st Grade Teacher [school 2]] But in the past that goes back to what we said before, that people didn't follow the Everyday Math program that we had, they hit or missed what they needed to teach. So, it's different in all the 1st or 2nd grades that you walked into, they really were not following the Everyday Math program per say.

[Special Educator K-2 [school 2]] They were using a lot of supplementals and skipping things.

[2nd Grade Teacher [school 1]] With that pressure you lose the creativity, and I know that's a concern.

Even though these teachers were from two different schools within the system, the pressure, or "tension" that they were feeling to keep on pace with a common teaching calendar was familiar to all.

Validation, Site 6:

[5th Grade Teacher] And the other thing that the VMP liaison would do when she came in my room which I really loved and I've stolen from her, when she asked a question and the kids would have to figure something out and then they'd all stick their hands up and she'd go 'well I know that you know the answer, you need to be sure that everybody else around you knows the answer, so I

> want you to talk to everyone around you' so that made it ok if you didn't get it, instead of raising your hand and saying 'I don't get it' when everyone was quiet. So maybe not everyone knew you didn't get it. And just their conversations, like they'd say 'how did you start this problem?' I felt they talked more mathematically. [6th Grade Teacher] … and I felt encouraged also, this was something I was doing but I felt very encouraged to do it, for a student who really wasn't on the right track, even though they discussed it, I would say, 'I'm so glad you brought that up,' 'I want to share,' 'so why did you get here,' 'let's talk about that,' 'so now let's look at it in a different perspective, in a different way,' 'what else could we do' and I feel comfortable now doing that, before I was a little, 'Eww, iffy,' like 'you are not quite right kiddo.'

The previous passage, coded from a spring 2004 focus group held at Site 6, contains two examples of the theme "validation." The first speaker had identified a technique that was modeled in her classroom by the VMP liaison – that of validating students' attempts to solve the math problems, and thus encouraging them to take the work further. The second passage, which followed on the heals of the first during the actual group discussion, was coded for "validation" because of the technique being discussed, but also because the speaker had found that techniques they themselves used to

validate student work were being validated in turn by the VMP liaison. This aspect of the VMP staff validating teachers' techniques or concerns was represented to a great degree in the coding of this theme. Perhaps another time, teasing out this aspect in light of the Equity Framework, with the emphasis on safety, and its impact on VMP work, could be the subject of further study that would inform other professional development designs.

Impact on teachers and students, over time. Additional examples follow of validation leading to learning that were identified across sites and years, with some speakers recognizing the technique at work, while others described their experiences of validation by VMP staff without naming it as such:

> [Fall 2004, Site 2] [4th Grade Teacher] … [VMP] makes public our individual struggles with math instruction in a way that could be really scary. I feel okay sitting here on this particular thing… that we are all in this together...
>
> [Evaluator] That would be interesting to see. I think a real hallmark of professionalism is that willingness to be out there talking about what we are doing so well and yes, there is so much more we need to do. Your articulating that is a real sign of the professionalism that you have, both you personally and you as a school community. It is unusual in these kinds of conversations for that point to come up.

[Spring 2004, Site 3] [Teacher] We would have discovered by our own trial and error some things that [the VMP liaison] brought to the table. You know, and said well you can discover that if you want. I guess we would have been the classic students, right? But we don't necessarily feel like we have to. You've got someone with [the VMP liaison]'s kind of experience, I'll take [their] word for it. So it really wasn't as painful doing it as it would have been without that. It took longer.

[Spring 2005, Site 5] [5th Grade Teacher] I would have to say [there is a need for] many more manipulatives. I am a 5th grade teacher, especially in the upper level in my class.

[3rd Grade Teacher] Not only… more [manipulatives] but more deliberate use of them. And I have deeper understanding of where to use them and a deeper understanding of how I don't know how to use them.

[1st Grade Teacher] I think as adult learners, we were realizing the importance of using them. At our course, we learned a lot from each other, but we used the hands-on manipulatives in our [VMP] course and now we know that there are some learners that really

have to have them in order to figure it out. That concrete visual is a huge part of math instruction this year.

[Spring 2006, Site 6] [5th Grade Teacher] And I think a huge piece of that is, like when we were doing the algebra course, a few of us have our preconceived ideas that we are never going to be able to accomplish this, and [VMP liaison] just convinces you that it is ok, and I think we in turn made it safer in our classroom, so that the kids didn't feel there was a threat in the problem solving piece. So they know what they can begin to do. Not every kid, some of them still, but most of them jump in and think they are brilliant. That they are going to take the risk and start on something rather than sitting at the desk and staring at me and thinking that they don't have any options.

Kids teaching kids, *Sites 5 & 6.* Another theme which demonstrates both teachers' personal and their schools' institutional change is that of "Kids Teaching Kids," defined as "Instances when students share their thinking." While not found in as many passages as the themes "team" or "assessment," it was recognized during the focus groups held across all VMP sites as one of the earliest and most visible changes that was brought to classrooms of the partner schools.

[Fall 2004, Site 1] [4th & 5th Grade Teacher] – I think that whole idea about more than one way to do things too. I feel that some of the stuff we have done is opening up to that not having to tell them the one way to do it. And then, really giving kids the opportunity to share where their thinking is going, which kind of puts the breaks on and slows everything down to a degree. But, how valuable that is. I know that when we have that overhead projector, because they love to share what they are doing. You can stop them after 10 minutes of working on something and say, 'Okay, how did you get started?' And then getting everyone all excited. I never did think about doing it that way.

[Fall 2004, Site 3] [Math Teacher] I mixed [the students] up [in groups] and I found that worked well... I wanted some people to get stuff wrong because the point was for other kids looking at it and figuring out where they went wrong, and then to explain it to everybody else in the group. And then you do a lot of kids explaining their work to the class. And they love it. I'll get 4 up there at the board at a time.

[Spring 2005, Site 5] [Special Educator] And that is the big difference I would notice from two years ago, that wrap up. And I think we are all so conscious of keeping the time for the discussion of strategies, which used to be more the purvey of Special Ed. So that talking about meta-cognition, having kids talk aloud, trying to use manipulatives in different ways, but really wrapping up at the end and not just saying here is your homework. But what did we learn? Because some kids learn it right then at the wrap-up. They say, 'Oh, ok, I have it now,' but they missed it in all that process…

[3rd Grade Teacher] I think they are more willing to share their own thinking, that there is an atmosphere of risk free. It is ok. And they are more respectful of listening to one another.

[Spring 2006, Site 7] [Teacher] I think the biggest change for me is how I question kids and I'm still working on that.

[Evaluator] Can you talk about that at all?

[Teacher] Well, I'm trying to add more open ended questions, trying to, you know get them to say, 'can you solve it a different way?' or I also really want them to be able to explain how they've gotten an answer, so that's been the biggest change for me.

Finding 11. From these passages are painted the picture of classrooms where collaborative work and shared learning by students were further facilitated by their teachers' guiding questions and professional growth.

Sub Question 4: How effective is this form of focus group analysis in answering the research questions?

Finding 12: Questions raised in the data which do not lend themselves to discussion in the 1st person *I statement* method of culling cannot be answered with certainty. For instance, the question raised earlier in the data of whether over time teachers participating in VMP professional development began to see their students as active rather than passive learners. If further results about the teachers' discussions of students' learning were sought, then exploration of the entire full-text, or choosing "students" or "kids" as search terms to cull the data set would be more appropriate.

Finding 13: Because the analysis of focus group transcripts was by necessity conducted at the group level, explanation of VMP program development rising from the data existed in the analysis only to the degree that teachers in the partner schools were aware of them. Because the original data source was but one component of a larger, mixed methods, evaluation design, this was not a concern for the current study but certainly could be if another program chose to rely entirely on data from essentially only one stakeholder group. While findings from detailed analysis of teacher focus group data alone could be instructive and compelling, they are nonetheless subjective, reflecting participants' memories and interpretations of events which could be seen very differently by other groups.

Finding 14: However, given findings 12 and 13, the focus on coding through *I statement* explorations has resulted in a rich sub-set of the original full-text focus group data. One which vividly and reliably, as demonstrated through longitudinal and cross sectional explorations of themes, tells this group of teachers' 1st person stories of change. Their stories, as the basis for further thematic coding and analysis, provided additional insights into factors which have lead to institutional changes across the seven VMP partner sites.[15]

Potential Methodologies

These findings suggest that the methodological approach to analysis of focus group data in the aggregate, from purposeful key word searching[16] which culls large full-text data sources, holds promise. Next steps for further study could include further analysis of thematic coding by factor loading, with the potential for devising an instrument for teachers to tune and focus their recognition of classroom conditions and practices that led to improved performance by students, and institutional reforms, with special attention to factors that indicate success toward implementation.

Factor analysis may drive the refinement of further explanatory models. The factor method can be explored because of ever improving storage technologies for keeping and coding ever larger, full-text, electronic data sets. Further exploration of the

[15] The actual coding and theme recognition within the focus group data, other than the three initial NVivo *I statement* full text searches, was conducted subjectively by this author. As a final audit of the themes which seemed to be aligning as the analysis unfolded, Cronbach's Alphas and factor analyses were conducted from the NVivo generated live matrix reports of passages coded in common with others. The results of the Cronbach's Alpha audit for the theme 'what works' are found in Appendix G, and substantiate findings that groups of themes are significantly correlated to each other. Likewise, factor analysis found that themes such as "discovery point," "depth of knowledge," and "changing practice" are aligned. Sample runs exploring factor analysis to explain relationships in this data set looked very promising (see Appendixes D and H).

[16] In this case the *I statement* searches for passages containing "I am," "I think," and "I feel."

statistical explanation for connections between themes may lead to development of a tool for identifying and measuring changes in the classroom which in the aggregate point toward institutional change.

Emerging Questions

Methodological considerations. As one of the original field evaluators who collected and transcribed this data set, some of the questions which emerged for me as a result of revisiting it had to do with handling the focus group interview process. While this was the second time I had coded this material, I am now "further away" from the time and place where the data was collected and so many times when coding the transcripts over this past year I found myself asking, "I wonder what they really meant by that," or "I wonder what their tone of voice was." By asking the former question of the data I learned to pay close attention to the context of the passage which inspired it; often speakers before or after the person whose meaning was unclear helped to illuminate their meaning. However, in some cases and particularly when asking the latter question about tone of voice, much of the context had been lost in the transcription. Another time, I recommend using a technique for transcribing from tape recordings which captures more of the non-verbal discussion, body language, facial expressions, and so on, that is lost on a "flat" printed page.

Questions for further study which emerged from the literature review over the course of the study included further study of the Equity Framework as more than a guiding principle but as a potential instrument for gauging the degree to which a learning situation was in fact equitable. In addition, the technique of applying factor analysis to

qualitative coding schemes by way of validation of the coding and as a potential performance measure is promising.

In designing focus group experiences another time, inclusion of data from additional stakeholder groups made up of students, groups of administrators, as well as project staff, would further illuminate the findings. As these sources were not available in the data under consideration, their "voices" were not heard loudly in this analysis and were present if at all only in the reported conversations of the teachers who comprised the population of interest for this analysis. It is important to make clear that this was not the only data source for the VMP evaluation, for which the data was originally collected. The decision to revisit this focus group data was made in order to further explore a rich data source of teacher voice specifically, and not to present a broader analysis across stakeholder groups.

Surprising findings. "Time" as a factor in instruction and learning appeared most frequently in the middle of the VMP's program cycle, during year three. At that point, teachers expressed concerns about many different aspects of "time." Some felt they needed more time for math, while others said that their non-math subjects needed more attention. The pressures of teachers' time for professional development were also raised most often during this period, both in connection with the formative assessment components of OGAP and around the math meeting time that was required to help teachers generally stay on the same calendar across classrooms and grade levels. Teachers were beginning to talk more about conducting their own action research, but often concluded the discussion with an allusion to lack of time in order to thoroughly investigate or complete an analysis. Discussion of issues related to time diminished

greatly in the year four data, but as has been noted, the choice of schools for focus groups was not drawn from as broad a sample that year and so findings would not be as comparable to the previous years data.

Discussions of "safety" as related to students' and teachers' learning likewise were much less frequent in the year four data. This could be due to the sampling process as noted or perhaps safety in exploring math content was taken much more for granted during that time period and so not identified as often as a topic of discussion.

A theme which was identified much more frequently in the year four data than any other time period was that of "high stakes tests." During that time some partner schools were taking part in the New England Common Assessment Project's piloting of a new statewide test for students in grades 3 through 8. This was a change in state tests from the New Standard Reference Exam that had been given only in grades 4, 8, and 10 previously, and so was understandably on teachers' minds as the pilot testing dates approached prior to and during the time when focus groups were being held that spring. This was seen from the transcripts, when the evaluators stepped "off the page" to follow up with questions about the teachers' impressions of the new tests, which were not originally a part of the interview protocol. Teachers' reported their impressions of the new tests as being generally positive. They liked having the testing spread out across more grade levels, thus "taking the pressure off" the NSRE testing grades. It would be an interesting follow up question to study whether more teachers are now being certified to teach in grades 4 and 8 as a result of the change in testing.

One concern that the teachers expressed about the NECAP was that it was given in the fall, after students had all summer to "forget" what they had learned the previous

year. While some teachers pointed out that this provided them with a formative measure at the beginning of the year, others noted that students whose learning was least secure at the end of the previous year were even less likely to meet the standards in fall testing. Again, this is an area that suggests further study of the Vermont quantitative data sets that are available directly to schools.

A final emerging question continues to receive attention for further study by the VMP designers. While initially many focus group participants spoke of students who were struggling with math as being "pulled out" from class in order to aid the classroom teacher in reaching a more evenly distributed group, as the project went on and as a result of both VMP and local support, several sites developed math "labs" over the course of the project. These were settings where students who needed extra help with math could get it, not instead but in addition to that offered by their classroom teachers, and continues to be a focus of local and project-wide study for the potential seen in this model.

Finally, as noted in the introduction, I had expected the new coding patterns to align generally well with existing VMP evaluation findings and found that to be the case, both for the VMP Benchmarks and the Equity Framework. What I had not expected was for the coding to align well with Alan Peshkin's *subjective I*'s, which he identified as his own reaction to observations both formal and informal made in school settings (see Table 26). This caused me to wonder if Peshkin's "*I's*" are more ubiquitous than I previously thought, perhaps representing stages or levels of self awareness that anyone engaged in serious reflection on their practice might recognize in themself or in others so engaged.

Chapter 5 – Discussion

Summary: A Theory of Change

Further Outcomes from Revisiting the Data

I had not expected the themes that rose from throughout the data to be so ubiquitous across the seven VMP sites. The different "flavors" of VMP professional development, encompassing as they do nearly 15 unique delivery systems including course work, workshops, classroom mentoring, curricular design, and others, depending upon the specific needs assessments conducted by VMP staff at the partner sites, while appearing disparate and unconnected from the "ground level" nonetheless come together to form an over-arching, coherent influence on the institutions that move them toward reform by valuing safety for all participants, formative assessment and feedback, model teaching, and differentiated instruction through teacher-leader and consultant led teamwork and administrative supports. Figure 3 represents a model of change that seemed appropriate at the conclusion of thematic coding but prior to further analysis of the data.

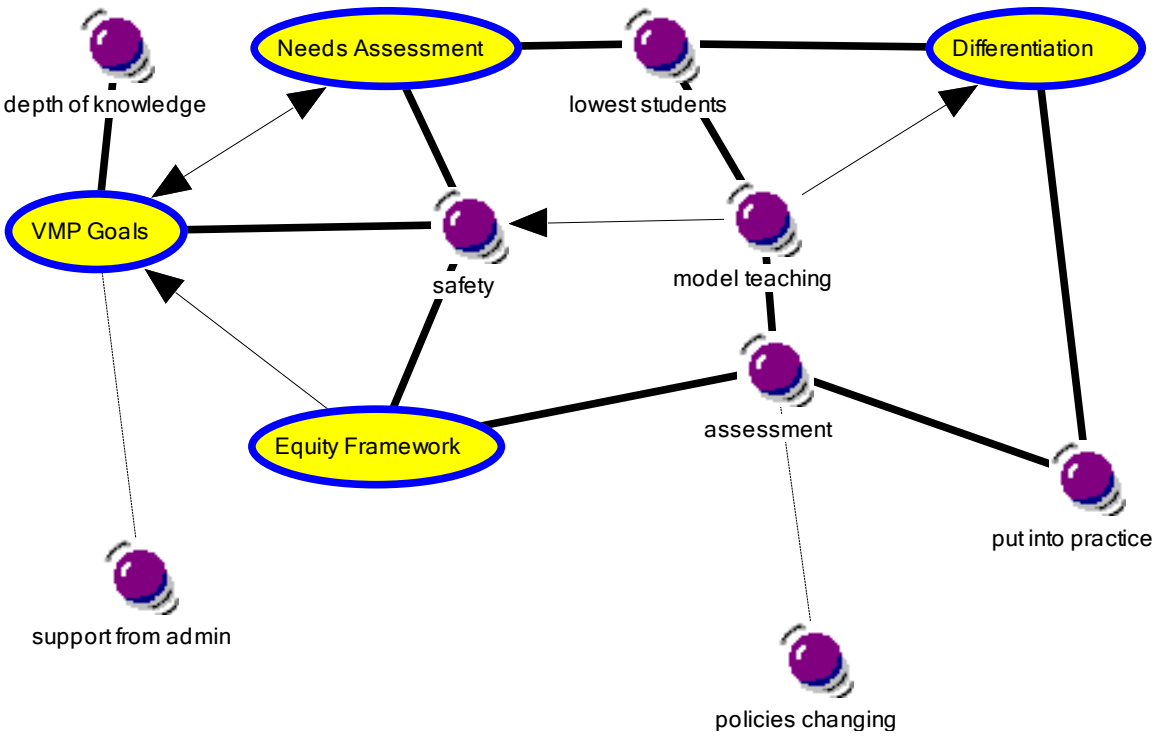

Figure 3. Initial understanding of influences leading to change in practice of institutions as a result of teachers' involvement in the VMP Partnership

Figure 4 illustrates this system as derived from the highest ranking themes found to rise in alignment with the VMP Benchmarks, and the Equity Framework, as coded across the seven participating sites. In the model, solid lines with arrows designate themes which are thought to be common to both the Benchmarks and the Equity Framework. Solid lines without arrows are those which are recognized in the Benchmarks alone. Dashed lines are recognized in the Equity Framework, and dotted lines are themes or activities connected to themes which did not rise to the highest ranked order, but which were expected to do so prior to thematic analysis (see Figure 3).

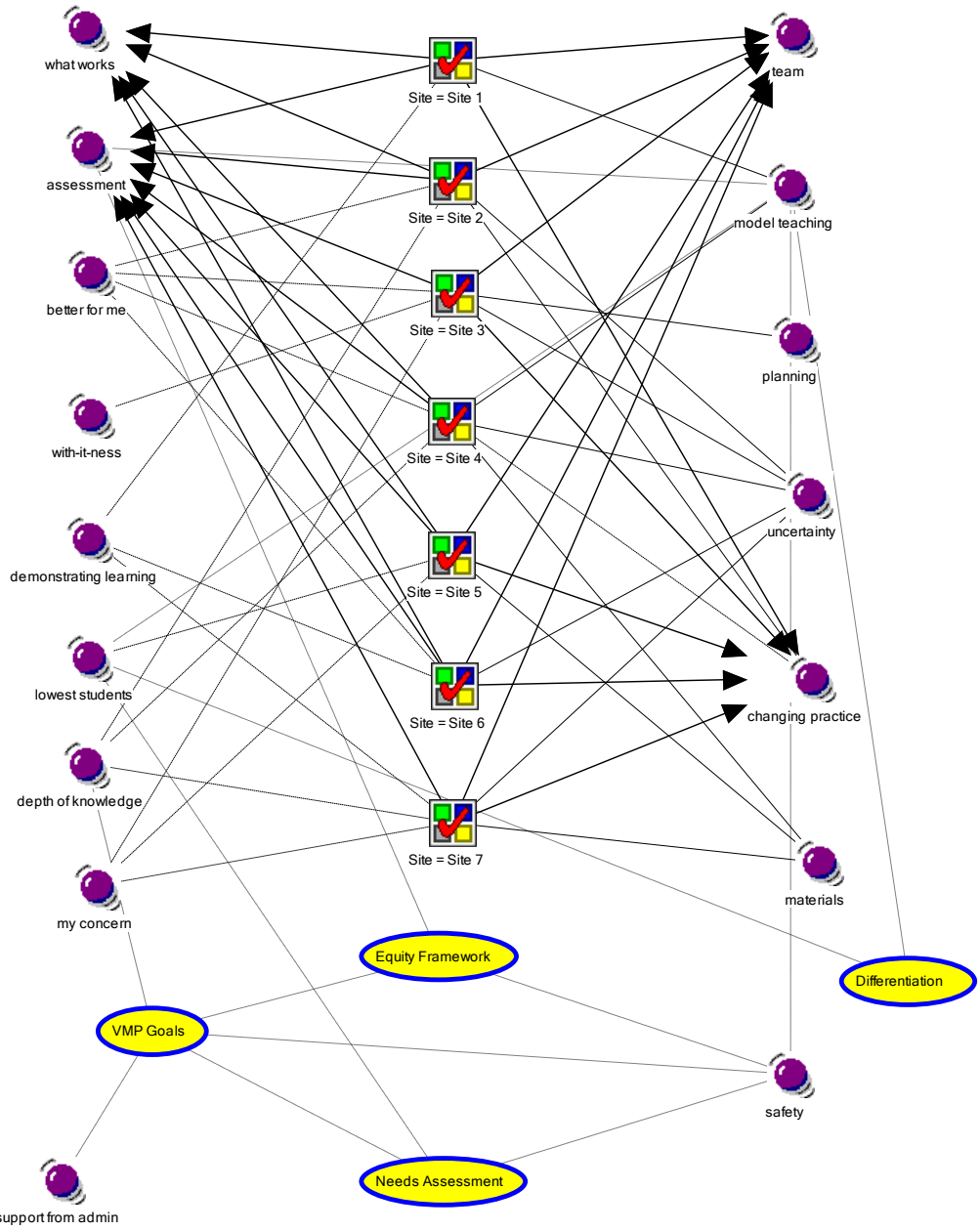

Figure 4. The differently "coupled" strategies of VMP, a theory of change examined across VMP sites

VMP's goals, as driven by the needs assessment process and informed by the guiding principles of the Equity Framework, have helped to promote a culture for change. But the catalyst for school change occurring in this model is both internal and external to

the VMP, driven by policies which are in a constant state of change at all levels, locally, statewide, and nationally (i.e., the choice of specific math text or curriculum, implementation of the Vermont Grade Level Expectations, local and standardized testing). It remains to be seen how robust this model for change is now that VMP's financial and leadership supports are necessarily withdrawn with the end of the grant funding.

The three activities shown in the first model, VMP's goals, its needs assessment process, and the Equity Framework, are next shown in Figure 5 still connected to the themes which originally were felt to align well as explanations for institutional change as understood at the conclusion of the thematic coding process but prior to further data analysis. While these themes, of "differentiation," "safety," and "support from admin" did not rise out of the coding to the level of say "assessment," or "what works," their position in the model as a theory of change is maintained because of the important roles that this strategy and two support systems are felt to play in creating conditions under which change is possible.

By overlaying these connections, detailed into the model of change from the analysis of the data described in the Methodology and Findings Chapters, one now finds an "exploded diagram" that overlays the most often identified themes at each of the participating sites with influences from the "top down" (in the form of VMP's Benchmarks III-a, b, and c for institutional change), and the "bottom up" (through the influence of the Equity Framework and the initial hunches at completion of thematic coding).

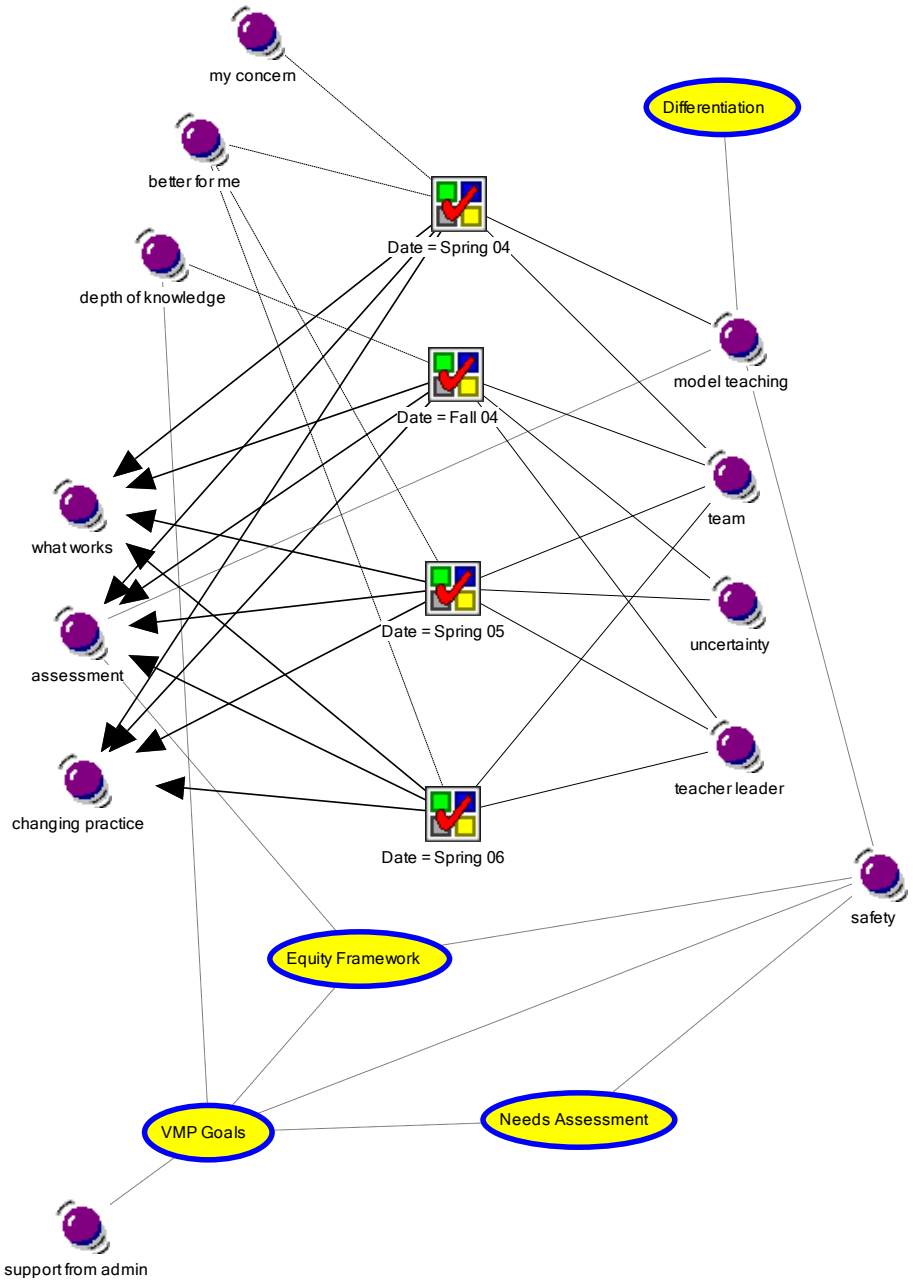

Figure 5. The differently "coupled" strategies of VMP, a theory of change examined across VMP years

Solid lines without arrows are those which are recognized from the Benchmarks alone. Dashed lines are recognized in the Equity Framework, and dotted lines are themes or activities connected to themes which did not rise to the highest ranked order, but which

were expected to do so prior to thematic analysis (see Figure 3). The confluence of common practice found around some themes which were important to many sites, while less frequently found themes were nonetheless highly important to other sites, serves to illustrate a phenomenon which VMP leaders refer to as the project's "tightly coupled/loosely coupled" design. This indicates that while some components of the program are found across the project the design drew upon local conditions, as understood through data collection that included the needs assessment process and were specific to individual sites. This finding is in agreement with that of the Year 2 VMP Evaluation report, which noted, "A hallmark of the Vermont Mathematics Partnership is its ability to tightly couple efforts at all sites and by all partners to the… goals while simultaneously encouraging flexibility of implementation and multiple delivery systems. This tightly coupled/loosely coupled combination is evident at each site, within each research and study team, and in the approaches utilized by the PI's, the Leadership Team, and the staff" (Harris, Nolte, & Ratmeyer, 2004, p. 3)

This phenomenon was evident from re-examining the focus group data as well. At Site 1, the themes of "what works," "assessment," "team," and "changing practice" rose among the most frequently found at the site and from both the Benchmarks and Needs Assessment analysis. However, the theme "model teaching" rose only from the Benchmarks analysis, while the theme "demonstrating learning" rose from the Equity Framework alone. The dotted line reminds us that "model teaching" was thought to be connected to the themes of "assessment," "safety," and "lowest students" in the earlier model.

Organizational change and growth over time. Figure 5 once again uses solid lines with arrows to designate highly ranking themes which are found to be common to both the Benchmarks and the Equity Framework (see Tables 19 and 23). Solid lines without arrows are those which are recognized from the Benchmarks alone. Dashed lines are recognized in the Equity Framework and dotted lines are themes or activities connected to themes which did not rise to the highest ranked order, but which were expected to do so prior to thematic analysis (see Figure 3). As distinguished from the model across sites (Figure 4), one can see "into" not the difference between VMP partners but the change that took place across time in this view of the data from participating teachers' *I statements* across the four time periods.

The themes "what works," "assessment," and "changing practice" have all been important across the years studied. "Model teaching" was discussed frequently in the first year, perhaps because it was a new practice for most participating teachers to have master teachers visit their classrooms. By the second year, depth of knowledge was a leading theme. In later years, "better for me," "team," and "teacher leader" reflected the changes taking place for teachers, both personally and in their institutions, through continuing participation in VMP.

Study's Relevance

For the teachers and K-12 school partners of VMP, these findings serve to confirm and further validate the program. In addition, a connection has been demonstrated between the individual experiences of teachers who in their classrooms engaged in the many faces of VMP professional development, and its goals and guiding principles not only through a series of courses, workshops, and teacher-leader led

activities but as a truly constructed life-changing experience. Themes rising from the focus group data aligned well with the "top down" MSP Elements and the VMP Goal and Benchmark documents. Significantly, themes rising from this further analysis of the data also made more concrete theoretical guiding principles of the Equity Framework; a connection between the Equity Framework and successful school reform efforts is strongly recommended for further study. Finally, the project's description of itself as a "tightly coupled/loosely coupled" design is clearly supported by the data.

Implications and Recommendations for Evaluation Practice/Application

The observation that change is neither top down nor bottom up is in keeping with this re-examination of the VMP focus group data (Fullan, 2001). The story of personal and institutional change has been told through themes which rose from participants' experiences as well as those which were purposefully designed into VMP by its leaders. By documenting areas where themes from both top down and bottom up research designs converge, findings of the larger mixed-method external VMP evaluation are enhanced while being further validated through this detailed exploration of 1st person teachers' voice.

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Appendix A

VMP Goals

Goal 1: Teachers and teachers in training deeply understand mathematics and can translate their knowledge into high levels of student learning.

Goal 2. School support systems are rich with learning opportunities for students and teachers.

Goal 3. Partner schools and districts use valid and reliable ongoing assessments and feedback systems to continuously improve mathematics results for all students.

Goal 4: Mathematicians and educators collaborate to develop high-quality professional development materials and protocols for teachers in training and to build understanding of mathematics content, instructional strategies, equity strategies and educational leadership.

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.

Goal 6: Partnerships

VMP Evaluation Focus Group Questions, Fall 2003

VMP Focus Questions	Baseline Questions
1. What of your participation has had an impact on your **understanding** of and **confidence** in mathematics?	1. What resources do teachers here have that impact their **understanding** of mathematics? 2. What would help build teachers' **understanding** of and **confidence** in mathematics?
2. What of your participation has had an impact on your instruction? 3. How has this affected students?	3. Prior to VMP, what has had the greatest impact on your math instruction? 4. How has this affected students?
4. What of your participation has had an affect on mathematics assessment? 5. How has assessment data been used by : ▪ You? ▪ The students? ▪ The school?	5. What resources, training opportunities, etc have had an impact on your assessment of mathematics? 6. How has assessment data been used by : ▪ You? ▪ The students? ▪ The school?
6. What resources, training opportunities, etc have had an impact on your understanding, instruction and assessment? 7. What changes have you seen in student performance as a result of the training you have had?	7. What strategies does your school use to promote effective mathematics education? 8. What changes would you like to see in student performance as a result of the VMP training you will receive?
8. Share an example of research you have read or conducted that has affected your practice.	9. Is there research you have read or conducted that has affected your practice? 10. Are any teachers in your school conducting action research? What are their methods/results?

Appendix B

VMP K-12 Partners

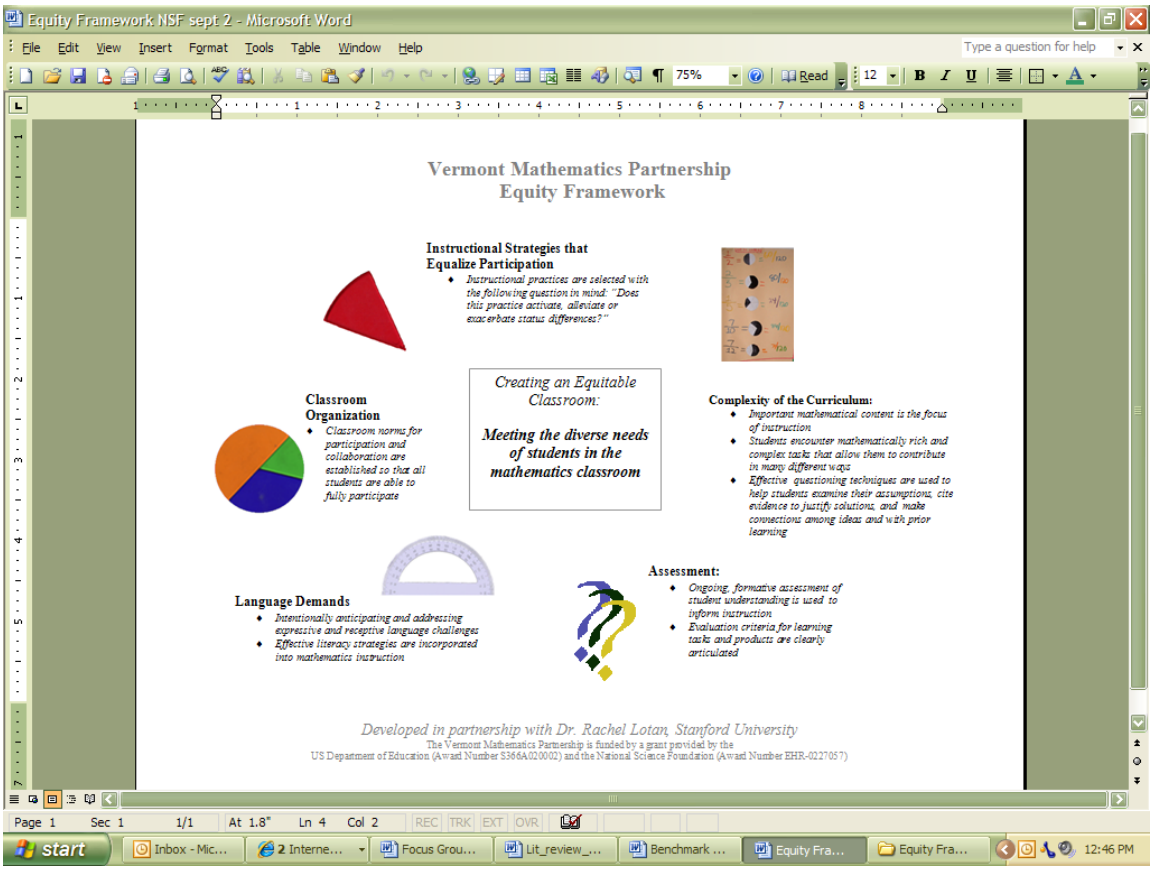
Demographics of the VMP K-12 Partners

Schools Selected from District VMP Partners	**Grades	***N Teachers in School	**N Students in School	*N Families '99	*N Families in Poverty '99	**district	***N Teachers in District	**N Students in District	%Teachers to Students VMP School	%Teachers to Students VMP Dist.	%Families in Poverty
1	pk-8	83	942	2,306	229	pk-12	252	2985	8.81	8	9.93
2	k-5	29	265	3,770	87	k-12	208	2628	10.9	8	2.31
3	9-12	79	800	655	53	k-12	182	1905	9.88	10	8.09
3	6-8	35	366	655	53	k-12	182	1905	9.56	10	8.09
4	pk-6	81	1079	417	27	pk-12	149	1868	7.51	8	6.47
5	k-2	19	260	4,270	440	k-12	237	2790	7.31	8	10.3
5	k-2	23	250	4,270	440	k-12	237	2790	9.2	8	10.3
5	3-6	51	740	4,270	440	k-12	237	2790	6.89	8	10.3
6	k-8	21	185	519	25	k-8	102	1005	11.4	10	4.82
7	k-8	22	306	1,167	57	k-12	167	1791	7.19	9	4.88
7	k-6	5	75	1,167	57	k-12	167	1791	6.67	9	4.88
7	k-6	19	219	1,167	57	k-12	167	1791	8.68	9	4.88
7	k-6	23	395	1,167	57	k-12	167	1791	5.82	9	4.88
7	7-12	58	735	1,167	57	k-12	167	1791	7.89	9	4.88
7	k-6	4	32	1,167	57	k-12	167	1791	12.5	9	4.88
7	k-6	3	29	1,167	57	k-12	167	1791	10.3	9	4.88

* http://censtats.census.gov/cigi-bin/pct/pctProfile.pl
** 2004-2005 Vermont Education, VT Principals' Association, VT Superintendents Association
*** http://education.vermont.gov/new/html/data/teacher_FTE.html

Appendix C

The Equity Framework



Appendix D

Factor Analysis, Conducted from Qualitative Thematic Coding

Theme	1*
Discovery point	0.840872
Depth of knowledge	0.754692
Changing practice	0.726181
Take the risk	0.726076
Wow	0.713175
Put into practice	0.70712
Better for me	0.702889
What works	0.688231
Kids teaching kids	0.680901
Demonstrating learning	0.661084
Model teaching	0.627705
Safety	0.616664
Differentiation	0.595153

* 1 rotated component

Appendix E

Coded Theme	Cronbach's Alpha comparisons with the Theme "what works"
better for me	0.981497
contagion chain	0.933677
discovery point	0.862534
evaluators role	0.815041
fear of math	0.805008
gaps in learning	0.969603
high stakes tests	0.853444
humor	0.90204
I wish	0.332756
kids teaching kids	0.900276
left out	0.993932
little change	0.965399
loves math	0.713316
lowest students	0.960996
my concern	0.995241
need admin support	0.73757
parents	0.577808
planning	0.83718
policies changing	0.917457
policies fractured	0.624001
pride	0.886341
put into practice	0.98303
reflect	0.992349
reported conversation	0.914162
safety	0.945398
scope of work	0.834795
status quo	0.459655
take the risk	0.818029
team	0.964532
tension	0.923516
toward sustainability	0.794926
tunnel vision	0.499938
uncertainty	0.996048
validation	0.973347
what works	1
where does it come from	0.931381
with-it-ness	0.989902
wow	0.690014

Appendix F

Thematic Analysis Documentation Forms

Theme	# of Passages	1st Occurrence	Last Occurrence	Meaning
apologetic	3	23-Sep	2-Oct	Speaker expresses regret
assessment	156	11-Aug	8-Oct	Formative or summative assessment
bait & switch	7	24-Aug	8-Oct	One thing is promised and another delivered
better for me	130	20-Jul	8-Oct	Comments about training or practices which improve the speaker's life
changing practice	189	20-Jul	8-Oct	Speaker is changing their practice
contagion chain	90	22-Aug	8-Oct	When the speakers "ping" ideas off each other, toward understanding or recognition of a situation
demonstrating learning	105	20-Jul	8-Oct	Examples of new knowledge being applied
depth of knowledge	116	20-Jul	8-Oct	Teachers discuss their own or their students' content knowledge increasing
differentiation	55	30-Jun	8-Oct	Examples of differentiation
discovery point	89	20-Jul	8-Oct	The "ah-ha" moments, when teachers reach greater understanding about math content, their students or their teaching
document review	3	14-Sep	23-Sep	Speaker discusses existing data sources
evaluators role	129	20-Jul	17-Apr	Evaluators lead the discussion, may share their opinion
experience	10	11-Sep	1-Oct	An experience is described

Theme	# of Passages	1st Occurrence	Last Occurrence	Meaning
fear of math	22	30-Jun	8-Oct	The speaker fears math or discusses someone who does
Gaps in learning	59	11-Aug	8-Oct	Gaps between what a student or teacher knows and what other students or teachers know
High stakes tests	44	20-Jul	8-Oct	Usually referring to state testing, NSRE or NECAP
humor	30	22-Aug	8-Oct	Teachers tell their stories with humor, includes irony, and self deprecation
I wish	35	24-Aug	24-Aug	Speaker articulates their wishes for the future
kids teaching kids	35	20-Jul	1-Oct	Instances when students share their thinking
left out	43	20-Jul	8-Oct	When the speaker feels left out, or recognizes that a specific group is being left out of the process
Little change	24	20-Jul	2-Oct	Events or practices which have not been influenced by VMP
loves math	19	20-Jul	8-Oct	Speaker loves math, or discusses someone who does
lowest students	70	20-Jul	8-Oct	Students who perform at the lowest end of the scale
lowest students	70	20-Jul	8-Oct	Students who are not meeting the generally accepted standards
materials	104	11-Aug	8-Oct	Curriculum, math program, manipulatives
model teaching	100	30-Jun	8-Oct	Watching another teach
my concern	107	22-Aug	8-Oct	When the speaker volunteers comments about their fears, their concerns
Need admin support	18	6-Sep	1-Oct	The speaker perceives a lack of administrative support

Theme	# of Passages	1st Occurrence	Last Occurrence	Meaning
Para-educators	21	30-Jun	8-Oct	Para-educators' work is described
parents	19	12-Aug	8-Oct	Speakers discuss the parents' role -- usually in connection to students' learning
planning	72	20-Jul	8-Oct	Engaged in looking ahead
policies changing	58	20-Jul	8-Oct	Teachers note that policies have changed or are changing
policies fractured	19	11-Sep	8-Oct	Some policies appear to the speaker to be at odds with others
Pride	31	11-Sep	8-Oct	The speaker shows pride for their work, their students' work, their school's accomplishments
put Into practice	101	25-Aug	8-Oct	Descriptions of methods, influences, and results of their having adjusted their teaching styles during the grant period
reflect	96	20-Jul	8-Oct	The speaker engages in reflection
reported conversation	25	12-Aug	2-Oct	Teachers quote each other, their students, parents, or administrators
research questions	28	11-Sep	8-Oct	The speaker identifies questions they are interested in
safety	77	12-Aug	8-Oct	The speaker says they feel safe, or their words indicate that they or another group feels safe
scope of work	25	6-Sep	1-Oct	Definitions of the scope of work and its impacts
status quo	11	20-Jul	8-Oct	Same old thing all over again
support from admin	24	11-Sep	8-Oct	Examples of support being provided by the administration
take the risk	17	18-Sep	1-Oct	Examples of risk taking -- may be recognized by the speaker or not

Theme	# of Passages	1st Occurrence	Last Occurrence	Meaning
teacher leader	94	30-Jun	8-Oct	An authority figure with higher math-content knowledge -- the VMP math mentors or mathematicians, or local teacher leaders
Team	145	20-Jul	8-Oct	Instances of students, teachers, or schools working together for a common end
tension	42	18-Sep	8-Oct	When one person's comment directly opposes another's
Time	142	20-Jul	8-Oct	Time as a factor, in teaching, learning
toward sustainability	42	12-Aug	1-Oct	The "what's next" question -- may be evidence of progress toward sustainability
tunnel vision	10	18-Sep	1-Oct	Single-mindedness, may be recognized by the speaker or not
uncertainty	130	30-Jun	8-Oct	Uncertainty about support, practice, methods, students' learning
validation	112	12-Aug	8-Oct	Feeling validated, that one's work is important and one's efforts are acknowledged
What works	169	20-Jul	8-Oct	Promising practices
where does it come from	12	11-Sep	1-Oct	Questions of support, training, knowledge
with-it-ness	93	20-Jul	8-Oct	Teachers speak with wisdom about a past, present, or future situation
Wow	5	24-Aug	1-Oct	Extraordinary statements about learning

Adapted from Miles and Huberman (1994, p. 283)

Appendix G

Themes Aligning with the "What Works" Coding, N of Passages & Cronbach's Alpha Analysis (full report of Alphas in Appendix E)

Theme "what works"	# Passages in Common with "what works'	Alpha	Description
Team	145	0.965	Instances of students, teachers, or schools working together for a common end
Validation	112	0.973	Feeling validated, that one's work is important and one's efforts are acknowledged
Contagion chain	90	0.934	When the speakers "ping" ideas off each other, toward understanding or recognition of a situation
Safety	77	0.945	The speaker says they feel safe, or their words indicate that they or another group feels safe
Lowest students	70	0.961	Students who perform at the lowest end of the scale
Gaps in learning	59	0.970	Gaps between what a student or teacher knows and what other students or teachers know
Policies changing	58	0.917	Teachers note that policies have changed or are changing
Tension	42	0.924	When one person's comment directly opposes another's
Kids teaching kids	33	0.900	Instances when students share their thinking
Humor	30	0.902	Teachers tell their stories with humor, includes irony, and self deprecation
Reported conversation	25	0.914	Teachers quote each other, their students, parents, or administrators
Little change	24	0.965	Events or practices which have not been influenced by VMP
Where does it come from	12	0.931	Questions of support, training, knowledge

Appendix H

Results of Factor Analysis 10/26/07	Factor
	One
Discovery point	0.841
Depth of knowledge	0.755
Changing practice	0.726
Take the risk	0.726
Wow	0.713
Put into practice	0.707
Better for me	0.703
What works	0.688
Kids teaching kids	0.681
Demonstrating learning	0.661
Model teaching	0.628
Safety	0.617
Differentiation	0.595
	Two
Lowest students	0.818
Gaps in learning	0.806
Left out	0.785
My concern	0.679
	Three
Need admin support	0.774
Scope of work	0.695
Planning	0.682
Policies fractured	0.588
	Four
Document review	0.765
Experience	0.714
	Five
Bait and switch	0.798
Apologetic	0.730
Status quo	0.645

Appendix I

Themes Rising from VMP Focus Group Data, Shown by Numbers of Coding Passages identified across Date, Site, and Alignment with Sub Questions 1, 2, and 3

Themes Rising from the VMP Focus Group Data	Spring 04	Fall 04	Spring 05	Spring 06	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Themes Aligning with VMP Benchmarks III-a, b, & c	Themes Aligning with Equity Framework	Themes Aligning with Peshkin's "I's"
apologetic	1	1	0	1	3	0	0	0	0	0	0			
assessment	25	59	56	16	27	18	20	10	18	44	19	x	x	
bait and switch	3	1	1	2	4	1	1	0	0	1	0			
better for me	24	41	52	13	16	25	25	11	13	30	10		x	x
changing practice	30	62	76	21	33	32	42	8	17	30	27	x	x	
contagion chain	17	37	28	8	18	13	11	7	13	15	13			x
demonstrating learning	16	36	41	12	28	14	10	4	12	26	11		x	
depth of knowledge	13	44	47	12	15	19	17	9	14	19	23		x	
differentiation	13	20	15	7	7	8	6	5	6	19	4			
discovery point	13	39	26	11	16	14	11	5	12	25	6	x		
document review	0	1	1	0	0	0	0	1	0	1	0			
evaluators role	16	29	71	10	15	23	16	12	22	27	11		x	x
experience	1	4	5	0	2	1	2	0	1	4	0			
fear of math	1	11	7	3	4	0	0	3	6	7	2			
gaps in learning	11	22	19	7	12	4	4	8	8	14	9		x	x
high stakes tests	6	11	24	3	5	6	2	5	7	11	8			x
humor	8	10	10	2	11	4	4	2	2	4	3			x
I wish	13	7	11	4	13	6	4	0	4	5	3			x
kids teaching kids	5	17	11	2	1	6	6	0	8	12	2			x
left out	7	15	18	3	11	3	5	5	3	10	6			
little change	5	7	9	3	8	3	3	1	2	4	3	x		x
loves math	1	8	6	4	8	1	1	2	2	3	2			
lowest students	16	24	22	8	15	7	8	4	17	13	6		x	x
materials	17	35	42	10	14	8	12	13	21	22	14	x		
model teaching	24	35	36	5	22	14	7	13	13	25	6	x		
my concern	21	38	40	8	12	6	25	7	16	18	23		x	x
need admin support	3	3	10	1	0	0	8	3	2	3	1	x		
para-educators	4	7	7	3	5	3	0	0	2	4	7			
parents	2	12	3	2	2	1	1	0	6	8	1			
planning	12	18	31	11	12	13	20	2	4	7	14	x		x
policies changing	15	19	19	5	10	6	13	4	5	11	9	x	x	x

Themes Rising from the VMP Focus Group Data	Spring 04	Fall 04	Spring 05	Spring 06	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Themes Aligning with VMP Benchmarks III-a, b, & c	Themes Aligning with Equity Framework	Themes Aligning with Peshkin's "I's"
policies fractured	4	8	4	3	2	2	1	5	2	4	3	x		
pride	3	9	16	3	6	3	5	3	5	8	1	x		x
put into practice	13	41	39	8	9	16	14	4	15	34	9			x
reflect	18	33	32	13	15	16	17	3	15	24	6			x
reported conversation	4	12	8	1	10	0	0	0	5	9	1			x
research questions	4	10	12	2	3	3	0	3	4	10	5	x		
safety	14	30	24	9	15	11	7	0	14	21	9	x	x	x
scope of work	6	6	12	1	1	4	7	0	4	7	2			x
status quo	3	2	4	2	4	0	2	0	3	1	1			x
support from admin	3	11	7	2	3	2	2	1	6	5	4	x		
take the risk	4	4	7	2	2	4	0	0	4	5	2	x	x	x
teacher leader	17	31	33	13	16	10	15	7	12	24	10	x		
team	25	44	54	22	22	25	24	4	24	25	21	x		x
tension	6	13	16	7	8	8	4	2	0	8	12			x
time	29	36	60	17	21	18	25	11	15	29	23			
toward sustainability	9	10	15	8	5	4	12	1	6	6	8		x	
tunnel vision	1	7	1	1	1	1	0	0	0	5	3			
uncertainty	21	51	50	8	12	22	21	12	15	28	20	x		x
validation	18	37	52	5	13	16	13	4	24	29	13			x
what works	30	60	64	15	39	27	12	18	28	34	11	x	x	x
where does it come from	1	4	6	1	1	1	0	1	6	0	3			x
with-it-ness	14	34	35	10	14	12	18	8	10	21	10		x	x
wow	0	4	1	0	1	1	0	0	0	3	0			
totals	590	1170	1296	350	572	465	483	231	473	762	420	20	11	28