

Evaluation Report 2007-2008 Mathematically-Connected Communities—Phase II (MSP)

The following is an evaluation report from the first year of the second three-year grant for Mathematically-Connected Communities (MC²)-Phase II., a Math Science Partnership (MSP) Grant funded by the New Mexico Public Education Department with flow-through monies from the United States Department of Education Federal MSP program. The report describes our findings from the first year of the initial three-year MSP grant. The report will cover from May 30, 2007 to June 31, 2008 and will include reports on both sets of one-week summer academies, June 2007 and June 2008. We have done this to create an annual report that aligns more accurately with our new funding cycle and with our work. Future reports will cover from July 1 to June 31 for each of the next two years of the MC²- Phase II project.

There were important changes made in the second phase of the MC² grant. While evaluation was not emphasized in the first grant, we formed an evaluation team for the second phase of MC², designed a more complete evaluation plan, and put additional resources in the grant to fund both quantitative and qualitative formative and summative evaluation. Another change in MC²- Phase II was a focus on partnering only with districts who had agreed to use a reform and standards-based mathematics curriculum. In almost all cases this meant using the *Connected Mathematics Program* at the middle school level. Districts also signed memorandums of agreements with us to provide data and to pay for half of the costs of professional development, for substitutes for teachers and for materials for their teachers to use in implementing these new curricula. It was fortunate that phase II of our project also corresponded with a new mathematics adoption in the state so that districts had additional funds and getting full sets of materials was not as much of a problem as it would have been without this funding.

In addition to treating the district as the unit of analysis for mathematics teaching and learning we also had learned from our first MSP grant that the amount, type and quality of district and school administrative leadership and support was critical for raising math achievement for all students. Two members of the group, Drs. Janice Bradley and Cathy Kinzer, developed specific leadership institutes beginning in June 2007. These institutes have now evolved in some districts to actual on-going district mathematics leadership teams, representing all stakeholders in the district from community members to teachers, administrators, parents and others as they work together to improve mathematics learning.

The evaluation plan that was developed for MC²-Phase II to study teacher and student mathematics achievement was based on using the district as our unit of analysis. In order for a district to be a full partner, the district must

1. have completed a Memorandum of Agreement with the MC² project
2. provide time for teacher collaboration,
3. provide financial support for implementation of standards-based mathematics teaching,
4. support monthly professional development workshops. and
5. require attendance of all teachers at MC² Summer Academies.

EVALUATION PLAN

Mathematically-Connected Communities—Phase II (MSP)

The MC² Evaluation Team included Ken Korn, evaluation consultant, Karin Wiburg, educational researcher, and Naomi Schmidt, statistician, along with trained classroom observers and a graduate assistant.

Below are listed the project goal and each of the five objectives for the grant. For each objective we have included a list of activities and how we evaluated these activities. This is followed by a presentation and analysis of the evaluation data which have been collected for each objective.

Goal: Partner districts will establish a rich, standards-based mathematics curriculum leading to increased student achievement.	
Objective 1: Districts will adopt and use mathematics resources that promote teaching of the New Mexico Content and Process Standards for Mathematics.	
Activities:	Evaluation:
Provide PD for District Leadership Teams, mathematics leaders and teachers in use and implementation of standards-based curriculum.	<ol style="list-style-type: none"> 1. Collect demographic data on all participants. 2. Track hours and type of PD received by teachers, principals, and district administrators. 3. Collect summer academy evaluations.

1. Objective 1: 1. Demographic Data

The following table describes the number of teacher participants in the MC² Summer Academies in both Summer 2007 and Summer 2008. There were five MC² academies throughout New Mexico in 2007 and four in 2008.

MC² Summer Academies							
# of Participants		# of Districts Represented		# of Schools Represented		% of Teachers Who Have Attended MC² Summer Academies Before	
2007	2008	2007	2008	2007	2008	2007	2008
283	242	24	24	81	73	43%	64%

Below are the complete results of the Teacher Demographic Questionnaires from the 2007 MC² Summer Academies, followed by the complete results of the 2008 MC² Summer Academies.

Demographic Questionnaire for Project Participants--Summer 2007 Combined Responses from All Summer Academies

Total Number of Participants: 283
Total Number of Districts Represented 24
Total Number of Schools Represented 81

1. Gender (# of respondents: 283)	number / percent
Male	77 / 27%
Female	206 / 73%

2. Ethnicity (# of respondents: 281)	number / percent
African American	4 / 1%
American Indian	3 / 1%
Asian American	3 / 1%
White, Not Hispanic	143 / 51%
Hispanic /Latino	116 / 41%
Pacific Islander	1 / <1%
Multi-Racial	11 / 4%

3. Subject area of the participants' degree(s)					
<u>Bachelor's Degree</u> (# of respondents: 282)	number / percent	<u>Master's Degree</u> (# of respondents: 279)	number / percent	<u>Doctoral Degree</u> (# of respondents: 283)	number / percent
none	4 / 1%	none	136 / 49%	none	279 / 99%
mathematics	26 / 9%	mathematics	6 / 2%	mathematics	--
math education	19 / 7%	math education	12 / 4%	math education	1 / <1%
education	156 / 55%	education	97 / 35%	education	2 / <1%
humanities	11 / 4%	humanities	2 / <1%	humanities	--
social sciences	18 / 6%	social sciences	2 / <1%	social sciences	--
sciences	17 / 6%	sciences	4 / 1%	sciences	--
other	31 / 11%	other	20 / 7%	other	1 / <1%

4. What grade(s) did you teach last year? (# of respondents: 267)			
number / percent			
one or more grade levels Grades 1- 5	one or more grade levels Grades 6, 7 & 8	one or more grade levels Grades 9, 10, 11 & 12	mixture of Grades 6-8 and 9-12
5 / 2%	198 / 74%	53 / 20%	11 / 4%

5. How many years have you been teaching? (# of respondents: 283)					
number / percent					
0-2 years	3-5 years	6-10 years	11-15 years	16-20 years	over 20 years
32 / 11%	38 / 13%	74 / 26%	59 / 21%	22 / 8%	58 / 20%

6. How many years have you been teaching math? (# of respondents: 278)					
number / percent					
0-2 years	3-5 years	6-10 years	11-15 years	16-20 years	over 20 years
52 / 19%	59 / 21%	66 / 24%	42 / 15%	16 / 6%	43 / 15%

7. How many years have you been teaching in your present district? (# of respondents: 283)					
number / percent					
0-2 years	3-5 years	6-10 years	11-15 years	16-20 years	over 20 years
62 / 22%	60 / 21%	80 / 28%	42 / 15%	22 / 8%	17 / 6%

8. Was last year the first time you taught this/these grade level/s? (# of respondents: 277)	
number / percent	
YES	NO
58 / 21%	219 / 79%

9. Did you teach in the bilingual program last year? (# of respondents: 279)	
number / percent	
YES	NO
43 / 15%	236 / 85%

10. Are you a Special Education teacher? (# of respondents: 279)	
number / percent	
YES	NO
60 / 22%	219 / 78%

11. Have you ever participated in one of the MC2 Summer Academies? (# of respondents: 281)	
number / percent	
YES	NO
122 / 43%	159 / 57%

12. Have you participated in any professional development in any of these areas?	
<u>Lesson Study</u> (# of respondents: 266) number / percent	
YES	NO
97 / 36%	169 / 64%
<u>Unit Study</u> (# of respondents: 261) number / percent	
YES	NO
72 / 28%	189 / 72%
<u>Gadsden Math Initiative (GMI)</u> (# of respondents: 269) number / percent	
YES	NO
82 / 30%	187 / 70%



Demographic Questionnaire for Project Participants Summer Academies 2008

Number of Participants	242
Number of Districts Represented	24
Number of Schools Represented	73

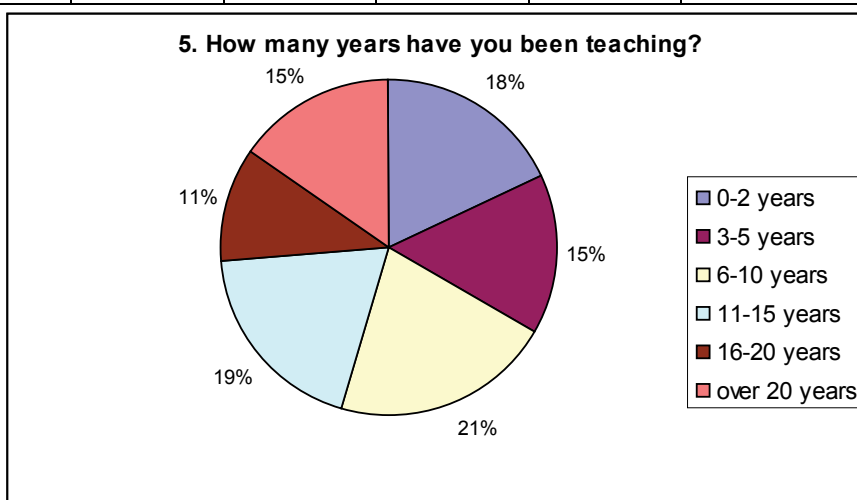
1. Gender		2. Ethnicity		3. Subject Area of Your Degree(s)					
				Bachelor's Degree		Master's Degree		Doctoral Degree	
101	Male	7	African American	6	none	105	none	187	none
141	Female	3	American Indian	19	mathematics	5	mathematics	0	mathematics
		4	Asian American	17	math education	17	math education	0	math education
		119	White, Not Hispanic	128	education	64	education	5	education
		102	Hispanic / Latino	3	humanities	1	humanities	0	humanities
		1	Pacific Islander	13	social sciences	1	social sciences	0	social sciences
		4	Multiracial	22	sciences	3	sciences	1	sciences
		2	No response	56	other	39	other	5	other
				2	no response	19	no response	46	no response
				<small>24 multiple responses</small>		<small>12 multiple responses</small>		<small>2 multiple responses</small>	

► **4. What grade(s) did you teach last year?**

	below 6th	6 th – 8 th	9 th – 12 th	mixture of K-5 and 6-8	mixture of 6-8 and 9-12	no response
Number	17	155	43	17	7	3
Percent	7%	65%	18%	7%	3%	

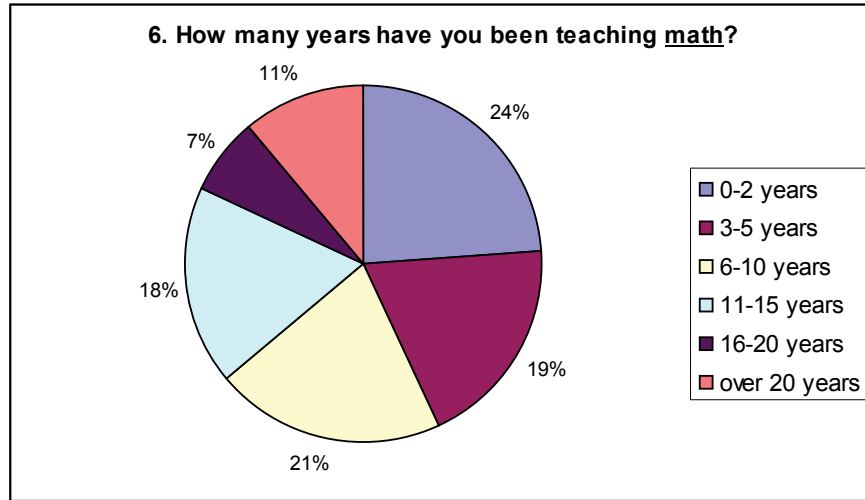
► **5. How many years have you been teaching?**

	0-2 years	3-5 years	6-10 years	11-15 years	16-20 years	over 20 years	no response
Number	44	37	50	47	27	37	0
Percent	18%	15%	21%	19%	11%	15%	



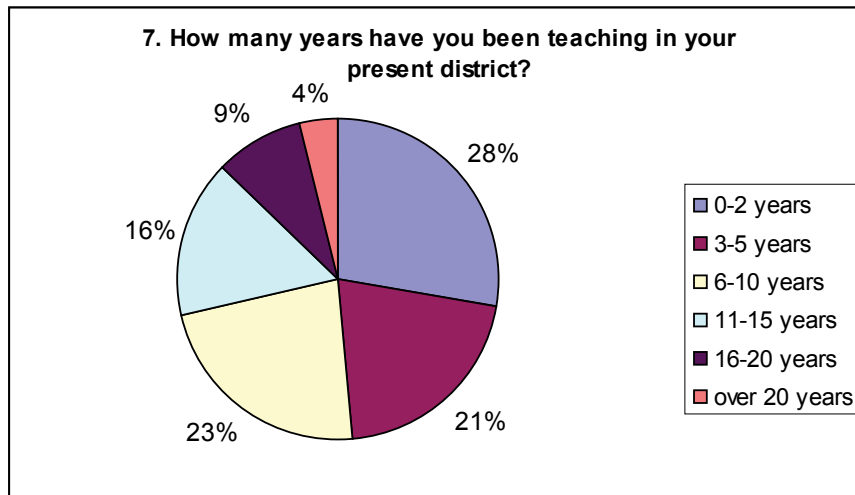
► 6. How many years have you been teaching math?

	0-2 years	3-5 years	6-10 years	11-15 years	16-20 years	over 20 years	no response
Number	57	47	52	43	17	26	0
Percent	24%	19%	21%	18%	7%	11%	



► 7. How many years have you been teaching in your present district?

	0-2 years	3-5 years	6-10 years	11-15 years	16-20 years	over 20 years	no response
Number	67	51	55	38	22	9	0
Percent	28%	21%	23%	16%	9%	4%	



	YES	NO	No Response
► 8. Was last year the first time you taught this/these grade level/s?	49/20%	192/80%	1
► 9. Did you teach in the bilingual program last year?	38/16%	202/84%	2
► 10. Are you a Special Education teacher?	54/22%	188/78%	0
► 11. Have you ever participated in one of the MC2 Summer Academies?	154/64%	87/36%	1

It can be seen from the summary of the demographic data that the teachers who attended the academies represented the diversity of the students served in our partner districts. There are almost as many Hispanic teachers as Caucasian teachers and there are a reasonable percentage of teachers who teach English Language Learners and Special Education Students. However, very few of the teachers have degrees at the BA or Masters level in mathematics and the vast majority have degrees in education. Since Colleges of Education, especially at the elementary level, require very little mathematics preparation courses, it can be seen why the need for teachers to get more math content is pressing in the districts we served. Hopefully, teacher preparation programs will begin to increase mathematics requirements for K-12 teachers. Without an adequate math background it is difficult for teachers to teach a high-quality, inquiry-based curriculum.

2. Objective 1: 2. Professional Development (PD)

In addition to the intense 40 hour summer academies offered to teachers in partner districts, teachers were also provided with on-going follow-up professional development during the school year. Teachers also had the option of completing an intense additional summer academy during the summer that was a mathematics class and built additional knowledge in a math content area. The content of the Two-week math course in 2007 was Geometry and the Two-week math course in summer 2008 was Number and Operations. Each of these additional mathematics-focused academies had approximately 25 teachers. The math academy on Number and Operations for July 2008 and the possible impact on teacher mathematics knowledge will be discussed in the 2008-2009 report. It can be seen in a later section that MC² teachers who attended either the short or long academy in the summer of 2007 showed significant gains on the Mathematics Knowledge for Teaching (MKT) (University of Michigan, Ball et.al) in summer of 2008 in a later section.

During the school year, every month, each of the MC² field specialists is required to submit a record of the professional development they have supplied districts. The information below is an aggregate of the information supplied by the field specialists for 2007-2008.

DATA FROM THE MC² PROFESSIONAL DEVELOPMENT LOGS* 2007-2008

690	Number of educators served
109	Number of schools served
9	Mean number of professional development hours each educator received
6	Median number of professional development hours each educator received
1-16	Range of how many professional development sessions each educator attended

The amount of professional development each educator received during the school year ranged from a minimum of 10 minutes to a maximum of 67 hours, 10 minutes. The table below and the pie chart on the next page summarize the amount of professional development received by 675 of the educators served by MC² staff throughout New Mexico in the 2007-2008 school year. There were 15 participating educators whose records did not indicate the length of the PD

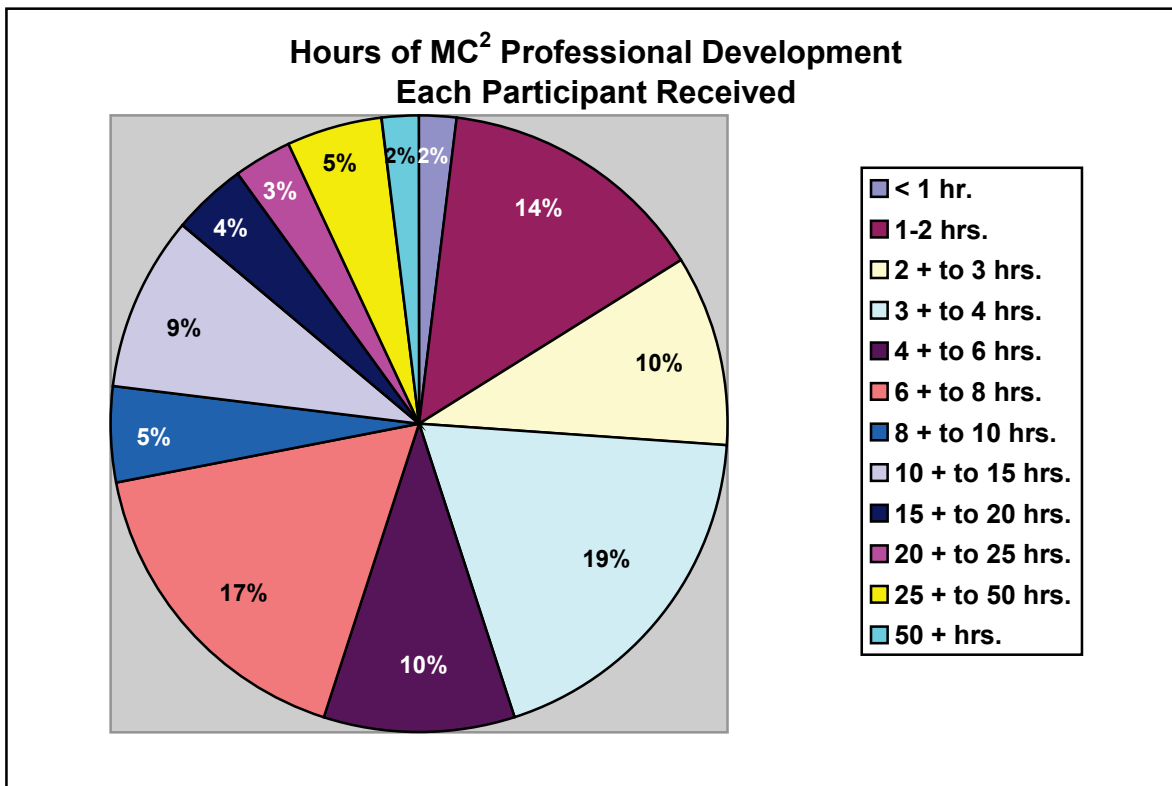
Evaluation Report- Mathematically-Connected Communities 2007-2008

sessions they attended, so their data has not been included. Many of the teachers also received 40 more hours of professional development during the summer academies.

**Hours of MC² Professional Development Each Participant Received
During the School Year
2007-2008**

Total Number of PD Hours Received	Number / Percentage of Participants
< one hour	14 / 2%
1-2 hours	95 / 14%
2 + to 3 hours	70 / 10%
3 + to 4 hours	125 / 19%
4 + to 6 hours	67 / 10%
6 + to 8 hours	112 / 17%
8 + to 10 hours	37 / 5%
10 + to 15 hours	60 / 9%
15 + to 20 hours	30 / 4%
20 + to 25 hours	18 / 3%
25 + to 50 hours	34 / 5%
50 + hours	13 / 2%
	675 / 100%

* All data is documented with professional development logs signed by participants.



There were 284 PD sessions/experiences offered by MC² staff during the 2007-2008 school year. The PD may have been offered to large or small educator groups or to individual teachers or administrators. The chart below categorizes the different types of PD offered and the number of sessions which included each of these types of PD. More than one type of PD may have been delivered during each session.

Types of Professional Development (PD) Offered and How Often During 2007-2008

TYPE OF PD	How Many Sessions Included This Type of PD
Mathematics Content (MC)	32
Assessment (A)	54
Planning, Studying or Modeling Units or Lessons (LP)	125
Pedagogy (P)	96
Curriculum Alignment / Textbook Study (CAT)	38
Instruction Support / Leadership Development (ILD)	93
Unspecified or Miscellaneous	18

The length of each PD session ranged from 10 minutes to 8 hours. The chart below shows how many participants received each length of PD. It is important to remember that the vast majority of the participants attended more than one session of PD.

Length of	Number of
-----------	-----------

Length of	Number of
-----------	-----------

Evaluation Report- Mathematically-Connected Communities 2007-2008

PD Session	Participants Receiving This PD
10 minutes	21
15 minutes	1
20 minutes	8
25 minutes	12
30 minutes	83
40 minutes	49
45 minutes	32
50 minutes	7
55 minutes	1
Less than 1 hour	214 / 13%

1 hour	139
1 hour, 15 mins.	5
1 hour, 20 mins.	1
1 hour, 30 mins.	115
1 hour, 40 mins.	6
1 hour, 45 mins.	12
2 hours	140
1-2 hours	418 / 25%

2 hours, 30 mins.	24
2 hours, 40 mins.	15
2 hours, 45 mins.	11
3 hours	161
2 ½ to 3 hours	211 / 13%

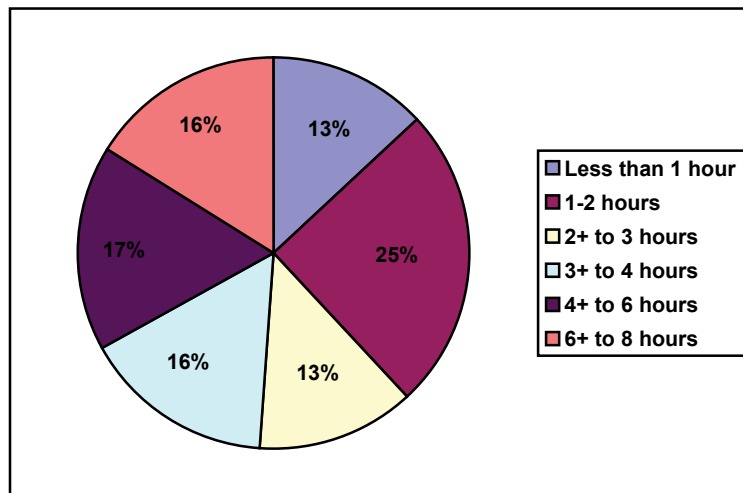
PD Session	Participants Receiving This PD
3 hours, 15 mins.	23
3 hours, 20 mins.	1
3 hours, 30 mins.	21
4 hours	221
3 ¼ to 4 hours	266 / 16%

4 hours, 30 mins.	7
5 hours	37
5 hours, 30 mins.	26
6 hours	211
4 + to 6 hours	281 / 17%

6 hours, 30 mins.	32
7 hours	200
7 hours, 30 mins.	7
8 hours	35
6 + to 8 hours	274 / 16%

No time given	26
----------------------	-----------

Lengths of the PD Sessions Offered to Educators by the MC² Staff



3. Objective 1: 3. Summer Academy Evaluations

It should be noted again that due to a change in our funding year and our current work, our report for 2007-2008 includes a report on two sets of summer academies. Data from both academies are presented below. Below is a chart which aggregates the results of the teacher evaluations from the five 2007 summer academies. The survey consisted of seven statements which were to be rated on a Likert Scale and four questions which solicited a written response.

MC2 Summer Mathematics Academies Evaluations from Teachers Summer 2007

Percent of Participants Responding “Agree” or “Strongly Agree”
(number of responses is in parentheses)

	Las Cruces 1 June 4-8	Las Cruces 2 June 11-15	Alamogordo June 20-22	El Rito June 25-29	Hobbs July 9-13	Totals
1. I feel the MC ² Summer Academy will make a positive difference in the way I teach mathematics next year. (246)	99%	99%	100%	100%	100%	99%
2. The information at the MC ² Summer Academy was delivered in a way that made sense to me. (247)	96%	97%	100%	100%	100%	98%
3. I was given time to reflect and ask questions about the information provided. (246)	96%	99%	100%	100%	100%	98%
4. The academy was well organized. (243)	94%	93%	100%	100%	100%	96%
5. The facilitators(s) were knowledgeable about what they were presenting. (245)	98%	98%	100%	100%	100%	99%
6. I plan on making changes in my teaching next year as a result of attending the academy. (245)	96%	96%	100%	100%	100%	98%
7. I would like further training to support what was presented at this academy. (245)	93%	99%	100%	100%	95%	96%

Below is a report which aggregates the results of the teacher evaluations from the 2008 summer academies. The survey consisted of eight statements which were to be rated on a Likert Scale and four questions which solicited a written response.

- The percent of respondents indicating they either “Agreed” or “Strongly Agreed” with each of the eight statements on the survey ranged from 97.4% for *Statement #5 (The academy was well organized.)* and *Statement #8 (I would like further training to support what was presented at this academy.)* to 100% for *Statement #6 (The facilitators were knowledgeable about what they were presenting.)*.
- Of the 232 respondents, 61 (26%) “Strongly Agreed” with all eight statements. Only 13 respondents indicated disagreement with any statement on the teacher evaluation instrument.

Also, the vast majority of the teachers wrote responses for the questions. The most frequent responses are presented on the next several pages.

**MC2 Summer Mathematics Academies
Evaluations from Teachers
Summer 2008**

Percent of Participants Responding “Agree” or “Strongly Agree”
(number of responses is in parentheses)

	Las Cruces 1 June 2-6	Hobbs June 9-13	Las Cruces 2 June 16-20	Northern June 23-27	Totals
1. The format of this summer’s academy was appropriate for my needs. (232)	98%	96%	100%	100%	98.7%
2. I feel the MC ² Summer Academy will make a positive difference in the way I teach mathematics next year. (232)	99%	100%	100%	100%	99.6%
3. The information at the MC ² Summer Academy was delivered in a way that made sense to me. (231)	98%	100%	100%	98%	98.7%
4. I was given time to reflect and ask questions about the information provided. (231)	98%	100%	100%	100%	99.1%
5. The academy was well organized. (228)	93%	100%	100%	100%	97.4%
6. The facilitators(s) were knowledgeable about what they were presenting. (229)	100%	100%	100%	100%	100%
7. I plan on making changes in my teaching next year as a result of attending the academy. (232)	99%	100%	100%	98%	99.1%
8. I would like further training to support what was presented at this academy. (230)	94%	100%	99%	100%	97.4%

Most Frequent Responses from the 2008 MC2 Summer Academies

How will your knowledge from the Academy impact your students’ learning of mathematics? (The number of similar responses is in parentheses. Some teachers wrote more than one response.)

- In general, the knowledge will translate into better student understanding / learning. (161)
- Specifically, I will use more effective group work / collaborative learning. (54)
- Specifically, I will use better questioning techniques. (29)
- Specifically, I will be better able to assess / evaluate student learning. (14)
- Specifically, I will be better able to plan lessons. (8)
- Specifically, I will be able to implement Launch, Explore, Summarize more effectively. (5)
-
- No Response (11)

What are the three (3) most important things you learned at the Academy? (Number of similar responses is in parentheses. Teachers responded with anywhere between one and five things that they learned.)

- Ideas / strategies / techniques to facilitate effective group learning / collaborative learning (97)
- How to better assess / evaluate student learning (75)
- Ways to improve questioning techniques (57)
- The importance of Launch, Explore, Summarize (40)
- Difference between “focus” and “funneling” (28)
- How to set up / use interactive notebooks / IAN (21)
- Importance of vertical alignment / how all the curriculum is connected with each grade level (16)
- Importance of detailed planning for instruction (16)
- Internet resources for math (16)
- More math skills (13)
- It is ok not to finish a lesson or not to cover everything. (10)
-
- No Response (5)

What aspects of the Academy do you think need to be improved? What suggestions do you have to improve your learning experience at the Academy? Please be specific. (Number of similar responses is in parentheses.)

- Nothing needs to be improved or changed. / Praise for the Academy (50)
- Want opportunities to attend more break-out sessions (37)
- More time for teacher networking / for teachers to share classroom techniques, procedures, successes, challenges (12)
- Handouts need to be available for all sessions for all academy participants. (8)
- Survey (MKT) should not be given after lunch. (8)
- Need more vertical teaming sessions (7)
- Need for a specific academy geared to teachers new to CMP/IMP (7)
- Need more breaks (7)
- Negative comments regarding food (6)
- Negative comments regarding facilities (6)
-
- No Response (27)

What further training would be helpful to you? Please be specific. (Number of similar responses is in parentheses.)

- More of the same (21)
- More training on assessment / grading methods (20)
- Examine more books / units we haven't worked on yet (18)
- More communication / training during the school year (16)
- Look at more teacher videos (14)
- Further training on cooperative learning (11)
- Need more math knowledge (10)

More training on interventions / meeting the needs of struggling students and students with special needs (9)

More opportunities for game “make and take” sessions (7)

Training on classroom management techniques (7)

More calculator training (6)

Have more teachers share their success stories (5)

No Response (39)

Objective 2: All district mathematics teachers will gain pedagogical content knowledge.	
All teachers in partnering school districts will participate in PD activities to develop teacher pedagogical content knowledge	1. Measure growth in teacher pedagogical content knowledge through pre and post assessments using the <u>Mathematics Knowledge for Teachers Survey (MKT)</u> , University of Michigan). <i>Pre-test given in Summer 2007 (Form A) and post-tests given in Summer 2008 (Form B)</i>

Objective 2: 1. Mathematical Knowledge for Teachers

In summer 2007, 325 middle and high school teachers completed the Mathematical Knowledge for Teaching (MKT) survey. In summer 2008, 241 middle and high school teachers completed the MKT survey after receiving professional development. Based on matching all of these surveys by teacher, 132 teachers had completed a survey in both 2007 and 2008. Our analysis was based on these 132 responses that were matched by teacher for both years. This information is summarized in the table below.

Number who completed the Survey in 2007	Number who completed the Survey in 2008	Number who completed the Survey in both 2007 and 2008
325	241	132

Each of the 132 teachers took a survey in 2007 as the pre-professional development survey, and also a similar survey in 2008 as the post-professional development survey. The surveys measured two kinds of content knowledge: numbers, concepts, and operations (NCOP), and geometry (GEO). The measure of efficacy of the professional development, called delta MKT, is the difference in the standardized scores for each content area in those surveys calculated separately as follows:

delta NCOP MKT =
2008 standardized NCOP MKT score – 2007 standardized NCOP MKT score

delta GEO MKT =
2008 standardized GEO MKT score – 2007 standardized GEO MKT score

Delta MKT scores need to be considered for each content area independently. Delta MKT scores of zero indicate no change in score, while positive scores indicate a higher score in 2008 and negative scores indicate a lower score in 2008.

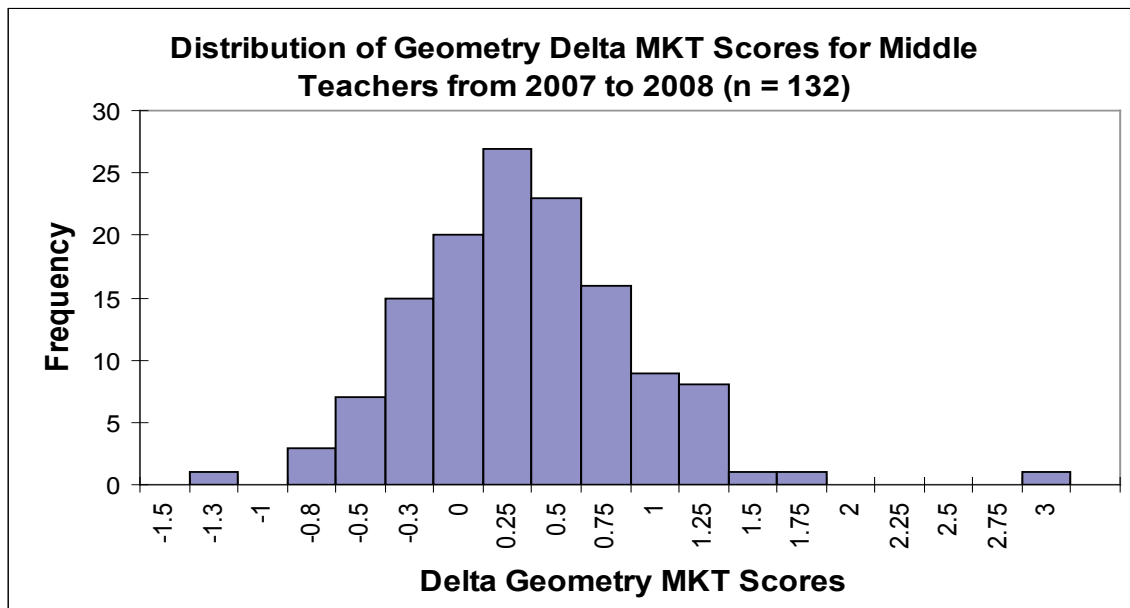
Our analysis includes

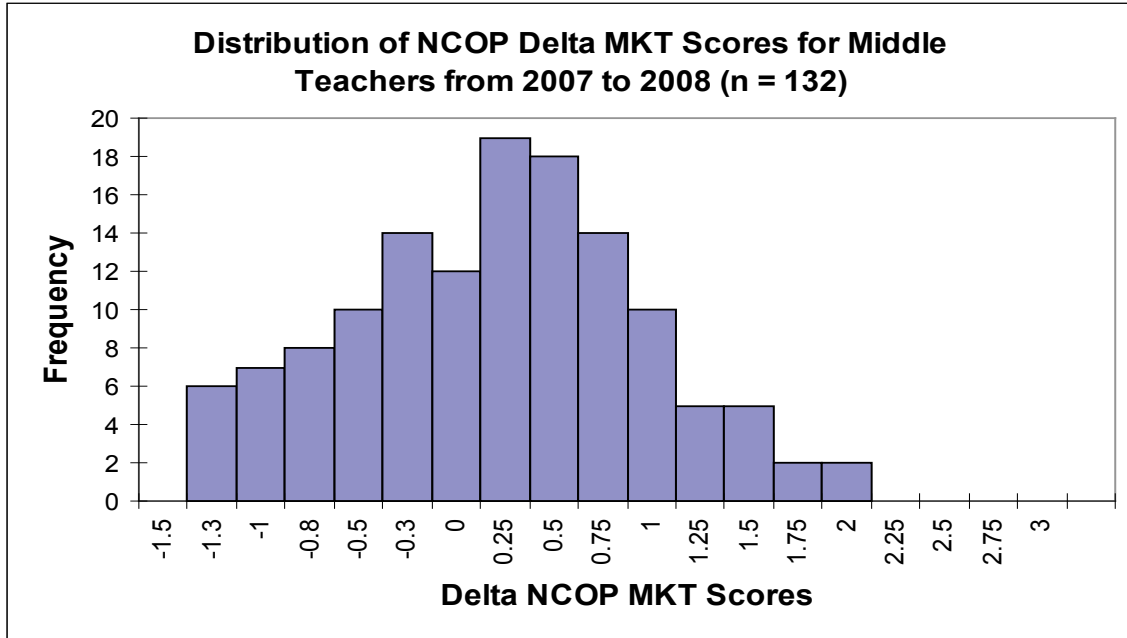
- a histogram of the delta MKT scores
- d , the mean delta MKT score or the effect size gain. This is the standardized mean delta MKT score for pre and post scores for the group. For comparison purposes, $d = 0.20$ is small, $d = 0.50$ is medium, and $d = 0.80$ is large.
- the standard error of d , SE_d
- the percent of participants who scored greater than zero. Scores greater than zero indicate that professional development had been effective.

The mean delta MKT score d , standard error, and percent of participants who scored greater than zero are summarized in the table on the last page.

The distributions of geometry and NCOP scores are shown in the histograms on the next page. The histograms for each set of scores are presented together, and all histograms in this summary have identical x-axis scales to facilitate comparison. Geometry delta scores have a bell-shaped distribution centered at 0.25. Almost two-thirds of the scores are greater than zero. The mean delta MKT score of 0.21 indicates a small gain in score from 2007 to 2008 and is significant at $p < 0.0001$. There is one extremely high score, 2.93.

NCOP delta scores are approximately bell-shaped as seen in the following histogram, with the much higher frequencies in the left tail than the right tail. In contrast to the geometry scores, there are more participants with NCOP scores less than zero, and especially less than -0.3. NCOP scores are more variable than geometry scores as seen in the larger left tail and as measured by the standard error of the effect gain, 0.07 and 0.05, respectively.





Overall, geometry and NCOP scores increased slightly from 2007 to 2008, suggesting that professional development may have been effective. Geometry scores were generally higher than NCOP scores, and they were more consistent, particularly in the range of delta MKT scores less than zero. This increased variability in NCOP scores is a possible reason why the mean delta MKT scores for NCOP were not statistically significant in any analysis.

Geometry was the main emphasis during the summer academies in 2007 and one might consider that it takes up to a year for a teacher to integrate the knowledge gained into her or his teaching. During the summer of 2008 numbers and operations were chosen as the main emphasis and it is hoped this learning will be reflected in next year's results.

Table of Summary Statistics

Group	Statistic	Content Area	
		Geometry	NCOP
All participants from all school districts (n = 132)	d and statistical significance *** or NS (not significant)	d = 0.21*** (p < 0.0001)	d = 0.08 ^{NS}
	Standard Error of d	SE _d = 0.05	SE _d = 0.07
	Percent of participants with scores > than 0	65 percent	57 percent
	Standard Error of d	SE _d = 0.13	SE _d = 0.13
	Percent of participants with scores > than 0	60 percent	63 percent

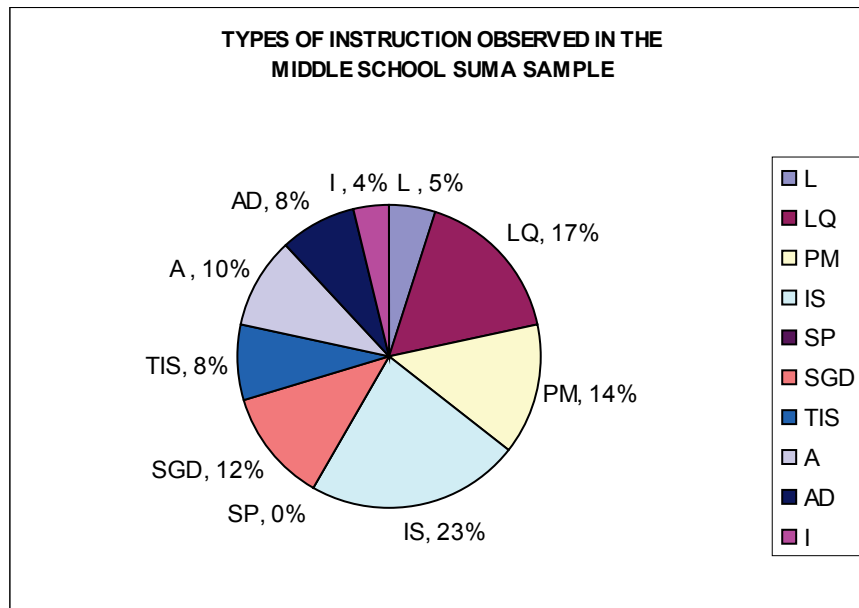
Objective 3: Districts will integrate ongoing professional development into the school culture.	
Partner district schools will establish school-based Professional Learning Communities (PLCs) to support teacher collaboration. Teachers will implement what is learned from professional development and PLC meetings into classroom math instruction.	Classrooms will be randomly selected from three districts served by MC ² . Selected classrooms will be observed by trained evaluators using two observational tools: 1. Classroom Snapshot 2. Levels of Use <i>Observations of at least 10% of the classrooms will be conducted in Spring 2008, 2009, and 2010.</i>

Objective 3: 1. Classroom Snapshots

Classrooms were studied in depth by two teacher researchers in 2008 providing a picture of how schools were integrating the new Connected Math Program in their first year. In year one these observations were done primarily in Las Cruces Public Schools but are currently being expanded to additional districts in Spring 2009.

Evaluation Report- Mathematically-Connected Communities 2007-2008

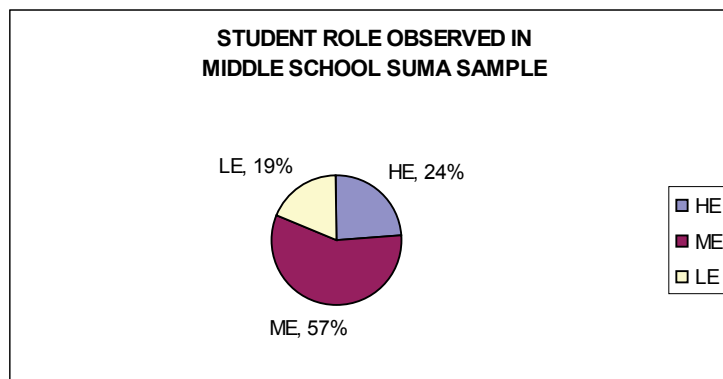
Below is a chart showing the percent of time each type of instruction was observed using the Classroom Snapshot Instrument in Spring 2008.



- L= LECTURE / PRESENTATION
- LQ = LECTURE W/ QUESTIONS, CLASS DISCUSSION
- PM = PROBLEM MODELING / DEMONSTRATION
- IS = INDEPENDENT SEATWORK
- SP = STUDENT PRESENTATION
- SGD = SMALL GROUP WORK/DISCUSSION
- TIS = TEACHER/INSTRUCTOR INTERACTING W/ STUDENT
- A = ASSESSMENT
- AD = ADMINISTRATIVE TASKS
- I = INTERRUPTION

The chart below shows the level of student engagement that was observed using the Classroom Snapshot Instrument Spring 2008.

- LE = LOW ENGAGEMENT
- ME = MEDIUM ENGAGEMENT
- HE = HIGH ENGAGEMENT

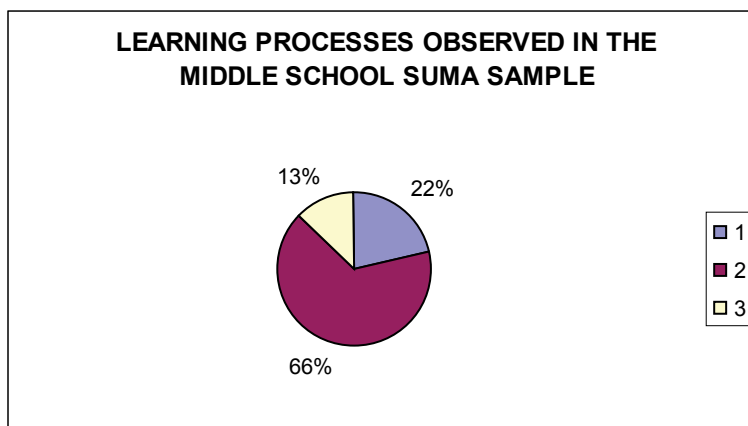


Below is a chart showing the learning processes that were observed using the Classroom Snapshot Instrument in Spring 2008.

1 = RECEPTIVE (LECTURES, OBSERVING, PRESENTATIONS)

2 = STRUCTURED PRACTICE / APPLICATION / REVIEW (RECITATION, WORKSHEETS, REVIEW)

3 = CONSTRUCTION OF KNOWLEDGE (ORGANIZING, DESCRIBING, INVESTIGATING, INVENTING)



Objective 3: 2. Levels of Use

The Levels of Use instrument was refined during the first year through a process of working with professional development teachers in the Las Cruces Public School. The refined instrument is now being used by MC2 Math specialists to look at all their schools and districts. At a recent meeting the field specialists reported that most of their schools were currently at a Level 2 which corresponds to initial efforts to integrate the new math curriculum, Connected Math Program. The instrument and the evaluation criteria are included below. This average rating of a 2 by the field specialists seems appropriate for the first year of the implementation of a new mathematics curriculum. Many teachers are still at the survival level and struggling to teach a whole new way. They need to learn both new math and new pedagogy. However just having a tool to use to look at the classroom can help them and us develop “eyes for learning” about our work.

Implementation of Standards Based Classroom Instruction--Levels of Use Ratings

Category	Description
<p>Non-use (Level 0)</p>	<p>Little or no evidence of student thinking or engagement with important ideas of mathematics. Instruction is characterized as one of the following: <u>“Passive” Learning</u>—Students are passive recipients of information from the teachers or textbook; material is presented in a way that is inaccessible to many of the students. <u>Activity for Activity’s Sake</u>—Students are involved in hands-on activities or other individual or group work, but the lesson lacks a clear sense of purpose and/or a clear link to conceptual development of mathematics. Overall, the lesson is highly unlikely to enhance students’ understanding of mathematics or develop the capacity to successfully “do” mathematics.</p>
<p>Beginning Step (Level 1)</p>	<p>Instruction contains some elements of effective practice, but there are serious problems in the design, implementation, content, and/or appropriateness for many students in the class. The lesson design may include elements of standards based instruction, but instruction is primarily teacher centered and emphasizes learning procedures for solving computation problems rather than an exploration of mathematics concepts. Overall, the lesson is very limited in its likelihood to enhance students’ understanding of mathematics or develop the capacity to successfully “do” mathematics.</p>
<p>Nearing Proficient (Level 2)</p>	<p>The lesson generally reflects student-thinking/student-centered instruction and makes use of investigative curriculum resources. Students are, at times, engaged in meaningful work, but there are some weaknesses in the in the design, implementation, and/or content of the instruction. For example, the teacher may short-circuit a planned exploration by telling students what they “should have found”. Teacher does not fully assess effectiveness of lesson in terms of developing student understanding, but is more concerned with student engagement. Implementation of curriculum resources is mechanical, and may not adequately address the needs of all students in the class. Overall, the lesson is somewhat limited in its likelihood to enhance students’ understanding of mathematics or develop the capacity to successfully “do” mathematics.</p>
<p>Proficient (Level 3)</p>	<p>The lesson design and implementation incorporates a student-thinking/student-centered model and makes use of investigative curriculum resources. Students actively participate in meaningful work that builds conceptual understanding of mathematics, but there are minor weaknesses in the design, implementation, and/or content of the instruction. Implementation of curriculum resources is still somewhat mechanical, but the teacher is able to reflect on the lesson’s effectiveness in terms of developing student understanding. Overall, instruction is quite likely to enhance most students’ understanding of mathematics and develop the capacity to successfully “do” mathematics.</p>
<p>Advanced (Level 4)</p>	<p>Instruction is purposeful and all students are highly engaged most or all of the time in meaningful work that builds conceptual understanding of mathematics. The lesson is well designed and artfully implemented, with flexibility and responsiveness to students’ needs or interests. Assessment and instruction are fully integrated and the teacher assesses the effectiveness of lessons by assessing student understanding of concepts. The teacher is able to independently develop lessons that are centered on a mathematical problem. Instruction is highly likely to enhance most students’ understanding of mathematics and develop the capacity to successfully “do” mathematics.</p>

Objective 4: Students in partner districts will show growth in mathematics achievement on the New Mexico Standards-Based Assessment	
Students will take the standardized NMSBA each spring.	<ol style="list-style-type: none"> 1. New Mexico SBA student achievement data will be used to measure changes in student achievement for all student groups. 2. Analyze the relationship between the amount and type of teacher professional development provided and student achievement. 3. Analyze the relationship between teacher knowledge for teaching mathematics and student achievement.

Objective 4: 1. NMSBA Data

Below are New Mexico Standards Based (NSBA) math data for the past three years. The first chart shows the percent of proficient and advanced students in each of the participating districts.

Sixteen of the nineteen districts (84%) showed overall gains from 05-06 to 07-08.

**New Mexico Standards Based Assessment (NMSBA)
Mathematics Results for Districts Served by MC²
2005-2006, 2006-2007 and 2007-2008**

DISTRICT	ALL STUDENTS				
	% Proficient & Above				
	05-06		06-07		07-08
Alamogordo	42.0	↗	44.1	↗	44.4
Corona	22.9	↗	36.4	↗	42.9
Dexter	28.4	↗	33.9	↘	27.2
Espanola	15.4	↗	19.9	↗	24.5
Eunice	26.6	↗	34.0	↘	26.3
Gadsden	29.4	↗	33.5	↗	35.1
Hatch	22.0	↘	21.4	↗	26.6
Hobbs	31.3	↗	31.5	=	31.5
Lake Arthur	25.5	↘	22.2	↗	27.7
Las Cruces	32.8	↗	34.8	↘	34.2
Loving	17.0	↗	24.1	↘	21.0
Lovington	29.4	↘	28.7	↗	29.8
Moriarity	30.0	↗	34.3	↗	42.2
Raton	30.2	↗	32.5	↗	37.3
Ruidoso	34.5	↘	32.1	↗	37.0
Santa Rosa	24.3	↘	22.8	↗	27.7
Taos	26.1	↗	30.0	↘	29.9
Tatum	33.8	↗	36.8	↘	33.8
West Las Vegas	18.0	↗	22.3	↗	25.3

ALL STUDENTS MATH ACHIEVEMENT

05-06 to 06-07	06-07 to 07-08
Districts showing gains : 14 / 74%	Districts showing gains : 12 / 63%
Districts showing losses: 5 / 26%	Districts showing losses: 6 / 32%
Districts showing no change: 0 / 0%	Districts showing no change: 1 / 5%
Range of change: -3.3 to +13.5	Range of change: -7.7 to +7.9
Mean change: +2.9	Mean change: +1.5
Median change: +3.0	Median change: +1.6
→ 16 of the 19 districts (84%) showed overall gains from 05-06 to 07-08. ←	

Source: New Mexico Public Education Department www.ped.state.nm.us

This next chart presents the NMSBA scores for those schools in the participating districts that were most involved in professional development with the MC² staff. Seventeen of the twenty schools (85%) showed overall gains from 05-06 to 07-08.

New Mexico Standards Based Assessment (NMSBA) Mathematics Results for Schools Served by MC²* 2005-2006, 2006-2007 and 2007-2008

School / District	ALL STUDENTS				
	% Proficient & Above				
	2005-2006		2006-2007		2007-2008
Chaparral MS, Alamogordo 46033	38.8	↘	36.1	↘	34.8
Holloman MS, Alamogordo 46037	40.6	↗	44.5	↗	51.6
Mt. View MS, Alamogordo 46003	28.1	↗	33.5	↗	35.1
Corona Elementary, Corona 38038	35.3	↗	38.1	↗	41.4
Dexter MS, Dexter 6048	31.6	↗	39.8	↘	33.0
Chaparral MS, Gadsden 19032	27.5	↘	26.6	↘	23.1
Gadsden MS, Gadsden 19052	24.8	↗	26.2	↗	32.8
Santa Teresa MS, Gadsden 19175	21.1	↗	28.5	↗	34.1
Highland JHS, Hobbs 33057	20.7	↗	36.1	↗	48.9
Houston JHS, Hobbs 33059	24.6	↘	23.1	↗	29.1
Camino Real MS, Las Cruces 17002	26.4	↗	30.9	↘	28.8
Lynn MS, Las Cruces 17086	28.0	↘	27.8	↘	27.2
Picacho MS, Las Cruces 17035	17.5	↗	18.7	↗	20.7
Sierra MS, Las Cruces 17144	29.9	↗	32.3	↘	31.0
Vista MS, Las Cruces 17170	25.8	↘	23.4	↗	29.8
Moriarty MS, Moriarty 81102	15.4	↗	17.9	↗	32.5
Raton MS, Raton 9135	17.9	↗	24.0	↗	30.0
Ruidoso MS, Ruidoso 36130	27.9	↘	24.0	↗	32.0
Anton Chico MS, Santa Rosa 25020	3.3	↗	6.7	↗	8.0
Tatum JHS, Tatum 35090	35.4	↘	20.0	↗	50.0

Source: New Mexico Public Education Department www.ped.state.nm.us

SUMMARY

05-06 to 06-07	06-07 to 07-08
Schools showing gains : 13 / 65%	Districts showing gains : 14 / 70%
Schools showing losses: 7 / 35%	Districts showing losses: 6 / 30%
Range of change: -15.4 to +15.4	Range of change: -6.8 to +30.0
Mean change: +1.9	Mean change: +4.8
Median change: +2.5	Median change: +4.5
→ 17 of the 20 schools (85%) showed overall gains from 05-06 to 07-08. ←	

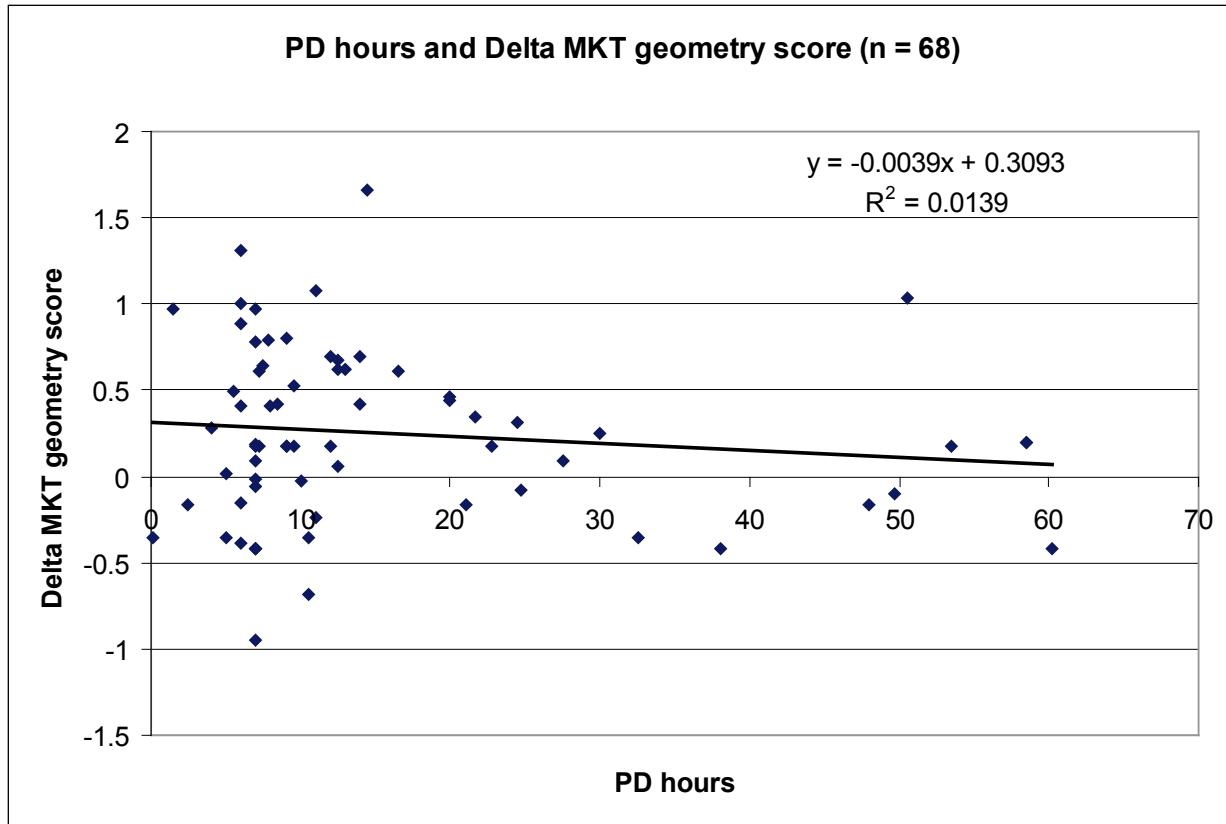
**Results are displayed only for middle/junior high schools in districts that fully met the requirements outlined in the memorandum of agreement. These schools partnered closely with MC² personnel and helped to design professional development which was specifically geared to meet the specific needs of the campus.*

Objective 4: 2. Relationship between NMSBA Results and PD

This was not measured in the first year of implementation since all data were not yet available. An analysis of this relationship will be included in next year’s report.

Objective 4: 3. Relationship between NMSBA Results and MKT Results

As we began to do some initial analysis of possible relationships between the hours of Professional Development and teacher’s scores on the Mathematical Knowledge for Teaching (MKT) instrument, we found basically no relationship given the small amount of professional development and the fact that teachers were just beginning the new mathematics program. We also saw this in a similar math reform project at the beginning and it was only in the third year of the project that a clear relationship between hours of professional development and growth in teacher knowledge was found. In addition, most of the teachers in this project, as well as their schools, are in the very first year of the implementation of a new standards-based mathematics curriculum. The following chart shows the lack of connection between pd hours and knowledge of geometry.



Objective 5: MC² will work with partner districts to establish and support leadership teams to facilitate improvement in mathematics teaching and learning	
Administrators, principals and teachers will use SBA data analysis to evaluate student mathematics learning and to determine next steps.	<ol style="list-style-type: none"> 1. Provide principal academies and workshops to assist administrators in supporting standards-based mathematics instruction. 2. Professional development specialists for each partner school(s) will track the work of leadership teams including dates and minutes of meetings.

Objective 5: 1. Principal Workshops and Academies, Leadership Teams

During the 2007-2008 school year there were a variety of district leadership workshops and academies offered. There was one district leadership team in one district that operated during the year. Currently in the 2008-2009 there are three or four district leadership teams beginning which will be reported on in next year’s report. The project also began to hold professional development meetings for math coaches in partner districts. The three different kinds of professional development for leaders is described in the following section.

1. Mathematics Leadership Learning Academies.

The table below shows the number of people who participated in mathematics leadership learning academies by location. Each of these regional groups met twice, once in September 2007 and again in February of 2008. They met for four hours each time or a total of eight hours professional learning on how to support mathematics programs.

SouthEast Area	Northern New Mexico	Central New Mexico
45 leaders	50 leaders	35 leaders

2. One District Mathematics Leadership Team was formed in the Las Cruces Public School District in Las Cruces, New Mexico. The team was comprised of 30 people representing nine levels of the school district system (teachers, principals, district, parents, state representative, school board member, businessman, university mathematics educators and mathematicians).

The District Leadership Team, currently called the MAC (Mathematics Advisory Council) met 7 times for 4 hours each time or for a total of 28 hours during the 2007-2008 school year. The group was facilitated by Dr. Janice Bradley, who used a researched-based working systemically process developed at the Southwest Regional Development Lab over five years. Participants used this leadership development process to understand and analyze the school system, and to plan action for improving student achievement.

3. Math Coaches Learning Communities

There were two math coaches learning communities formed in 2007-2008. One was held in the North and included 25 coaches from the following five districts: Espanola, West Las Vegas, Moriarty, Raton, and Santa Rosa. This group met 4 times for 5 hours each time and received 20 hours of professional development.

A second math coach's community of five math coaches met three times for four hours each time and thus received 12 hours of professional development related to leadership in mathematics education. The group consisted of both math coaches and administrations.

Final Words

As can be seen from the summary of our evaluation of the MC2 project last year, and how it affected teachers and students, the study of a project involved in creating real change in math teaching and learning is very complex. Only summary data is included in this report, and there are many additional avenues that can and will be explored in the next two years. Slowly, we are beginning to create a culture that values data feedback and evaluation and participation in reflective thinking about our mathematics reform work.. Every month we have two-day professional development workshops for all of the MC2 staff with people coming from all over the state. During these workshops we work on mathematics, mathematics learning, tools for

coaching, and additionally assessment and evaluation. We have begun to use some reflective formative assessment with this group including analyzing where our clients are in terms of the Concerns-based Adoption Model (CBAM). The Public Education Department and mathematicians and math educators around the state developed a new instrument called the QMEM, the Quality Matrix for Excellence in Mathematics that looks at the elements in a district that affect mathematics achievement (leadership, curriculum, and professional development). We have held three focus groups with staff and have been asked to do more.

Additional evaluation of mathematics reform projects is essential if we are to learn from our work and better it for the future. It would be helpful if funding agencies provided additional guidelines, especially for formative evaluation, as diverse stakeholders work to increase the mathematics achievement of our nation's students and learn to understand how this can be done.

Karin Wiburg and Ken Korn, November 20, 2008