MONTGOMERY COUNTY PUBLIC SCHOOLS

Evaluation Brief

November 2007 Department of Shared Accountability

Implementation of the Title I Funded Math Content Coach Initiative: Findings from 2006 Classroom Teacher Survey

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Background

During the 2005–2006 school year, the 20 Federal Title I schools in Montgomery County Public Schools (MCPS) were staffed with a 0.5 or more Full Time Equivalent (FTE) Math Content Coach (MCC) position. MCCs provide direct teacher support to strengthen and extend the school system's priority on the development and implementation of a rigorous mathematics curriculum.

Through their coaching, facilitating, and guidance, MCCs were expected to increase teacher capacity to develop and use their knowledge of mathematics content; support students' mathematical development; use effective strategies to meet diverse needs of all learners; apply practices that promote a classroom culture that engages students in mathematical conversations; apply knowledge of how connections among the mathematics standards promote the development of students' mathematical proficiency; and monitor and analyze data to inform planning and implementation of effective mathematics instruction. These objectives supported Adequate Yearly Progress (AYP) goals and MCPS Grading and Reporting guidelines.

To provide a comprehensive evaluation of implementation of the MCC initiative, several data collection activities were employed—monthly MCC logs, survey of MCCs, and survey of classroom teachers. This brief provides a summary of findings from the 2005–2006 survey of teachers. Respondents included classroom teachers and other professional staff.

Methodology

A Web-based survey was administered in May 2006. The instrument was designed to examine: a) how the initiative was implemented during the 2005–2006 school year; b) program effects on teachers' knowledge, instructional practices, and overall ability to implement a rigorous mathematics curriculum; and c) areas needing improvement.

The response rate at the school level ranged from 6% to 80% with an overall response rate of 34% (n=320). Descriptive summary statistics were computed for the structured survey items. Two-way contingency table analyses were conducted to assess which aspects of the implementation were statistically associated with reported impact on teachers' capacity to implement a rigorous mathematics curriculum. Also, the data from the open-ended survey items were reviewed and coded to summarize similar comments.

Summary of Major Findings

Overall, the data showed that MCCs accomplished their goals by offering teachers multiple opportunities to learn. The characteristics of the training and support included: a focus on content knowledge; emphasis on active learning; promoting coherence; professional development sustained over time; and encouraging collaboration among teachers. These aspects are widely accepted features of high quality professional development in the literature (Cohen and Hill, 2000; Priselac, 2003; The Council of Chief State School Officers, 2003).

Nearly all (96.6%) had interacted with their MCCs through at least one method. Over the course of the school year, more than 65% of respondents had interacted with their MCCs through three or more methods—particularly during staff meetings and/or grade-level team meetings, and informal conversations.

More than half of the respondents (> 60%) reported that MCC sessions strongly emphasized the following: planning instruction to support AYP goals, providing resources to teachers, relating mathematics standards to mathematics proficiency, using various data to monitor student performance and guide instruction, planning collaboratively with grade-level teams, and a variety of instructional strategies.

Among the aspects addressed by MCCs, the following were reported as very useful: the resources provided by MCCs, the focus on differentiating instruction within a class, as well as implementing formative assessments.

Overall, the respondents' ability to meet the learning needs of their students was expanded in various ways. The majority reported that their MCC met their expectations, was responsive, and readily available. More than half (>62%) of the respondents reported that having a MCC in the school improved nearly all aspects of mathematics instruction to a moderate or great extent. In particular, the greatest gains reported were in the areas of using various data to guide instruction, focusing on students not achieving proficiency, and using questioning to check for students understanding of mathematics.

Perceived program outcomes were most strongly associated with methods of interaction with MCCs, and mathematics topics addressed during MCC sessions. The respondents who interacted with MCCs in three or more methods and those who participated in sessions whereby mathematics content concepts were addressed reported moderate to great improvements in their knowledge of mathematics and ability to use a variety of instructional strategies.

Finally, the respondents reported they would recommend that the MCCs address the following areas during future school years: differentiated instruction with small group strategies to balance acceleration and reteaching; more activities and games; problem solving strategies for word problems; time management skills; strategies for working with struggling students; providing a wider variety of resources; and strategies to increase knowledge of mathematics language for Brief Constructed Responses (BCR).

Findings

Sixty five percent of the respondents were classroom teachers and the remaining 35% were made up of professional staff (e.g., ESOL teachers, special education, and intervention teacher). The response rate varied by school (Appendix Table A1). A third of the respondents had been teaching for 1–5 years (33.3%). More than half (51.1%) had been at the current school for 1–5 years (Appendix Table A2).

Implementation Status: To what extent did MCCs provide support and training opportunities?

Opportunities for learning and participation in MCC training. The respondents indicated that they interacted with the MCCs through the following: staff meetings (84.6%), grade level team meetings (72.5%), casual conversations (69.2%), providing resources (58.4%), and 1–to–1 meetings (47.2%). Less than 20% reported that they had interacted with the MCC through coaching (13.4%) and/or classroom demonstrations (19.7%) (Appendix Table A3). More than 50% of respondents had interacted with the MCC through four methods (Appendix Table A4).

Three-fifths or more (>60%) reported that their MCCs strongly emphasized: planning mathematics instruction, providing resources to teachers, mathematics standards, preparing and interpreting assessment data, implementing formative assessments, engaging students in mathematics discourse, planning collaboratively, and prompting students to clarify their thinking (Appendix Table A7).

More than half (>50%) of the respondents indicated that their MCCs gave strong emphasis to a variety of instructional strategies: differentiating instruction in the same class; instructional strategies appropriate for diverse learners; examining student work to monitor implementation; standards-based grading and reporting guidelines; providing questions for checking for student understanding; and study of how students learn particular topics in mathematics. Nearly half of the respondents also reported that their MCCs gave strong emphasis to differentiating assignments in the same class and in-depth study of mathematics.

Only a quarter of the respondents reported strong emphasis on use of technology to support the learning of mathematics (Appendix Table A7).

Further analysis of the data shows that those who interacted with MCCs in more than four methods were more likely to report that their MCCs put strong emphasis on a variety of instructional practices (Appendix Table A9).

Mathematics concepts/topics addressed in MCC sessions. The most frequently reported mathematics topics/concepts concentrated on during the MCC sessions were number relations and computation (83.8%) and geometry (58.1%) (Appendix Table A6).

Changes observed. Responses to open-ended items cited a variety of changes schools made in mathematics instruction: increased differentiation and creation of mathematics groups (22 of 170), more

students in Math A/increased number in acceleration (19 of 170), promoting mathematics discourse, using data to monitor progress and guide instruction (17 of 170), and increased planning for consistency (15 of 170) (Appendix Table A8).

Most useful aspects. Two hundred and twelve respondents provided comments about the topics and strategies they found most useful in their teaching. The most frequent responses were: resources (46 of 212), strategies for differentiating instruction within the same class (22 of 212), implementing formative assessments (19 of 212), and examining student work (17 of 212) (Appendix Table A10).

Program Impacts: To what extent do classroom teachers perceive that the presence of the math content coach has improved mathematics instruction?

The survey measured the extent to which having an MCC deepened teachers' mathematics content knowledge, improved teachers' instructional practices, and enhanced overall teacher effectiveness. Because of having an MCC in the school, over two thirds of the respondents indicated that their knowledge of mathematics and ability to use various instructional strategies was improved to moderate to great extent (Appendix Table A11).

Respondents' perception of the MCC was very favorable. MCCs met respondents' expectations and were readily available (Appendix A11b).

Chi square statistics revealed significant relationships ($p<0.05$ for Chi Square statistics) between areas MCCs put strong emphasis on and number of methods of interaction with MCCs and reported program impacts (Appendix Table A12). Specifically, as the number and methods of interaction with MCCs increased, the proportion of respondents reporting moderate to great impact in all the specified areas increased significantly. Overall, specialized teachers such as math support, ESOL, and special education teachers were more likely to report moderate to great impact than the classroom teachers (Appendix Table A13).

In all cases, respondents who reported that mathematics content concepts were addressed during the MCC sessions also were more likely to report moderate to great impacts on specified program impacts (Appendix Table A14). This finding is similar to other findings in literature (Garet, 2001; Cohen and Hill, 2000).

More than half of the respondents (*n*=174) provided responses to open-ended questions about the most positive impacts the MCCs had on teachers and their classrooms. The most frequently cited responses were having an easily available mathematics expert (30 of 174) and the resources provided by the MCCs (30 of 174). In addition, focus on providing multiple strategies/support for differentiating instruction, data discussions (20 of 174), and modeled lessons (15 of 174) were reported (Appendix Table A15).

Individual comments specified that students' understanding of mathematics content was more concrete—that students did better on unit assessments because of the support from the MCCs. MCCs helped teachers select students for accelerated classes, and helped teachers develop high expectations for all their students. MCCs high expectations for staff and students had a significant impact on students learning by clarifying expectations for teachers and students. Collaborative planning promoted coherence in mathematics instruction.

Implementation Challenges. Meeting needs of diverse students (41 of 203), large numbers of students lacking basic skills (31 of 203), insufficient instructional time, and/or time to re-teach (26 of 203), general MCPS curriculum concerns (23 of 203), and language limitations of English for Speakers of Other Languages (ESOL) students (13 of 203) were the most frequently reported challenges encountered by teachers (Appendix Table A16). Detailed comments indicated that differentiating for diverse needs requires too much planning and preparation. Specific comments related to the mathematics curriculum indicated that the MCPS curriculum was too abstract, was not at the developmental level for grade level, was front-loaded with certain units, or was not well aligned with the Voluntary State Curriculum.

Critical Areas Needing Improvement. Teachers were asked to identify critical areas of mathematics instruction needing improvement in their school. About half (*n*=157) provided responses. The most frequent responses indicated that students need improvements in mastering basic facts and concepts—number sense, addition, subtraction, and multiplication (33 of 157); developing problem solving strategies (27 of 157); developing mathematics language for explaining the process (BCR) (20 of 157); and understanding mathematics concepts—money, measurement, algebra, estimation, place value, geometry (14 of 157) (Appendix Table A17).

Individual comments specified that students need more time to become proficient and schools need greater focus on ELLs and special education students. Further,

teachers specified their need for mathematics data in a form that shows what students have not mastered so as to easily link data to reteaching strategies.

The most frequently reported areas for MCCs to address during future years were continued focus on differentiation with an emphasis on small group strategies to accommodate acceleration and reteaching (27 of 154); providing a variety of resources—more activities, center ideas, games, materials (16 of 154); and developing mathematics language and vocabulary especially scaffolding mathematics vocabulary for ELLs (15 of 154 (Appendix Table A18).

Recommendations

- Continue to provide multiple opportunities for MCCs to meet with teachers throughout the school year—with strong emphasis on mathematics content knowledge, active learning, and collaboration among the teachers.

- Encourage schools to systematically set aside time for professional learning on an ongoing basis in order to establish conditions necessary to support a professional learning community.

- Assess the demand on MCCs' time in relation to the number of teachers served and needs of the school.

- Continue to focus on collaborative planning as well as collaborative examination of student work. Research studies reveal effective professional development practices lead teachers to examine student work in relation to mathematics standards or other specified criteria (Ingvarson, Meirs & Beavis, 2005; Hawley and Valli, 1999).

- Provide additional support to MCCs and teachers related to mathematics content knowledge and instructional strategies specific to areas most needing improvement in their schools—mastery of basic facts and concepts, developing mathematics language, instructional strategies for ELLs, and understanding mathematics concepts.

References

Birman, B. F., Desimone, lo, Porter, A. C., & Garet, M.B. (2000). Designing professional Development that works. *Educational Policy*, 17(5), 613–649.

Cohen, D. and Hill, H. (2000). Instructional policy and classroom performance: T*he mathematics reform in California. Teachers College Record*, 102 (2), 294–343

Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal*, 38(4), 915–945.

Hawley, D. & Valli, L., (1999). The essentials of effective professional development: A new consensus. In L. Darling-Hammond & G. Sykes (Eds.) *Teaching and Learning Profession. Handbook of Policy and Practice (pp.127–150).* San Francisco: Jossey Bass Publishers.

Ingvarson, L., Meirs, M., Beavis, A., (2005). Factors affecting the impact of professional development programs on teachers' knowledge, practice, student outcomes, and efficacy. *Education Policy Analysis Archives*, 13(10), 1–28.

[i] The author would like to thank Mrs. Natalie Wolanin for her help in developing the survey, Mrs. Trisha McGauley for converting the survey to Web-based version, staff development teachers for their help in administering the surveys, Mrs. Donna Shipley for her assistance with coding and summarizing the qualitative data from the open-ended items in the survey, and the classroom teachers who contributed their time to complete the survey.

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Appendix

Table A1
Response Rate by Elementary Schools

School	*N*	Response Rate
Broad Acres	15	31.9
Burnt Mills	5	11.2
East Silver Spring	8	25.8
Gaithersburg	14	31.1
Harmony Hills	27	60.0
Highland	25	38.7
Highland View	12	34.3
Jackson Road	15	28.3
Kemp Mill	20	39.2
Montgomery Knolls	13	27.7
New Hampshire Estates	3	6.7
Oak View	21	80.8
Rolling Terrace	14	23.0
Rosemont	12	25.0
South Lake	11	22.0
Summit Hall	12	22.9
Twin brook	29	61.7
Viers Mill	11	18.6
Weller Road	36	76.1
Wheaton Woods	17	30.9
Total	**320**	**35.0**

Note. Target population was *N*=926 (Source, School at a Glance 2005–2006)

Table A2
Number and Percentage of Respondents Indicating Grade Level Taught, Teaching Experience, and Years at Current School

Background Information (multiple response*)		*N*	%
Grade taught	PreK	24	8.1
	K	80	27.0
	1st grade	92	31.1
	2nd grade	80	27.0
	3rd grade	87	29.4
	4th grade	85	28.7
	5th grade	76	25.7
Years of teaching experience	<1 year	21	6.6
	1–5 years	106	33.3
	6–10 years	89	28.0
	11–15 years	27	8.5
	16 and over years	75	23.6
Years teaching at current school	<1 year	38	11.9
	1–5 years	163	51.1
	6–10 years	83	26.0
	11–15 years	19	6.0
	16 and over years	16	5.0

Note. Other professional staff includes Special Education, ESOL, or Intervention teachers.
* In multiple responses—respondents marked more than one response; therefore the percentage of responses exceeded 100%

Table A3
Number and Percentage of Respondents Reporting
Methods of Interaction with the Math Content Coach

Methods of Interaction with MCC (multiple responses)	*N*	%
Staff meetings	258	84.6
Grade level team meetings	221	72.5
Casual/informal drop-in conversations	211	69.2
Providing resources	178	58.4
Individual meetings	144	47.2
Leadership team meetings	95	31.1
Classroom demonstrations	60	19.7
Coaching	41	13.4

Table A4
Number and Percentage Reporting Number of Methods
of Interaction with Math Content Coach

Methods of Interaction					
1–3		4–6		7–9	
n	%	*n*	%	*n*	%
121	39.7	148	48.5	36	11.8

Table A5
Methods of Interaction by Teacher Self Description

	Teacher self description			
	Classroom teacher		Other professional staff	
	n	*%*	*n*	%
Staff meetings	166	82.6	89	88.1
Grade team meetings	162	80.6	57	56.4
Leadership team meeting	50	24.9	44	43.6
Individual (1-to-1) meetings	94	46.8	50	49.5
Coaching	26	12.9	15	14.9
Classroom demonstrations	47	23.4	13	12.9
Providing resources	130	64.7	48	47.5
Casual/informal drop in conversations	140	69.7	71	70.3
Other interactions (e.g., emails, MCC is also GT teacher, MCCs pull out small groups)	32	15.9	22	21.8

Note. The Chi-square statistic is significant at the $p < 0.05$ level.

Table A6
Number and Percentage of Respondents Reporting
Mathematics Topics Addressed during Sessions with Math Content Coach

Topics addressed during MCC session (multiple responses)	*N*	%
Number relations/computation	196	83.8
Geometry	136	58.1
Algebra	103	44.0
Probability	98	41.9
Other (e.g., Statistics, graphing, mathematics vocabulary, games, manipulatives)	48	20.5

Table A7
Number and Percentage Reporting
Emphasis Given to Specified Aspects of Implementation

Focus Area	*N*	None		Slight		Strong	
		n	%	*n*	%	*n*	%
Planning mathematics instruction that supports Adequate Yearly Progress goals	296	24	8.1	67	22.6	205	69.3
Providing resources to teachers	300	21	7.0	75	25.0	204	68.0
Relating the mathematics content standards to the development of students' mathematical proficiency	294	19	6.4	77	25.9	201	67.7
State or district assessments (preparing, understanding, interpreting)	293	33	11.2	66	22.4	195	66.3
Interpretation of formative assessment data for use in mathematics instruction	292	30	10.2	75	25.6	188	64.2
Implementing formative assessments (e.g. teacher-made, textbook-developed tests, diagnostics tests etc)	295	40	13.7	71	24.3	181	62.0
Engaging all students in mathematical discourse	296	39	13.2	74	25.1	182	61.7
Planning collaboratively with other staff in grade level teams	293	29	9.8	86	29.1	181	61.1
Prompting students to clarify their thinking	296	44	15.0	70	23.9	179	61.1
Differentiating instruction within the same class	299	40	13.5	79	26.7	177	59.8
Varied instructional approaches appropriate for the needs and strengths of diverse learners	290	40	13.4	81	27.1	178	59.5
Examining student work to monitor implementation of the mathematics instructional program	293	45	15.5	74	25.5	171	59.0
Multiple instructional strategies for helping students solve mathematical problems	293	40	13.7	81	27.6	172	58.7
Providing questions to check for student understanding	295	42	14.3	87	29.7	164	56.0
Standards based grading and reporting guidelines	295	48	16.3	90	30.5	157	53.2
Study of how students learn particular topics in mathematics	295	57	19.3	83	28.1	155	52.5
Differentiating assignments within the same class	298	53	18.0	96	32.5	146	49.5
In-depth study of specific concepts in mathematics (e.g. probability, numbers, etc)	295	67	22.5	86	28.9	145	48.7
Technology to support student learning in mathematics	296	89	30.2	121	41.0	85	28.8

Table A8
Level of Emphasis* on Specified Aspects of Implementation Among Respondents
Various Methods of Interaction with Math Content Coach

		Number of Methods					
		1–3		4–-6		7–10	
		n	%	*n*	%	*n*	%
Relating the mathematics content standards to the development of students' mathematical proficiency	Slight or none	61	53.5	29	19.7	5	14.3
	Strong	53	46.5	118	80.3	30	85.7
Planning mathematics instruction that supports Adequate Yearly Progress goals	Slight or none	59	52.2	30	20.5	1	2.8
	Strong	54	47.8	116	79.5	35	97.2
Planning collaboratively with other staff in grade level teams	Slight or none	66	57.4	44	30.1	4	11.8
	Strong	49	42.6	102	69.9	30	88.2
Standards based grading and reporting guidelines	Slight or none	67	59.8	59	40.4	11	30.6
	Strong	45	40.2	87	59.6	25	69.4
Study of how students learn particular topics in mathematics	Slight or none	71	64.0	58	39.5	10	27.8
	Strong	40	36.0	89	60.5	26	72.2
In-depth study of specific concepts in mathematics (e.g. probability, numbers, etc)	Slight or none	76	67.3	68	45.9	8	22.2
	Strong	37	32.7	80	54.1	28	77.8
Varied instructional approaches appropriate for the needs and strengths of diverse learners	Slight or none	73	64.0	43	29.1	4	11.1
	Strong	41	36.0	105	70.9	32	88.9
Providing questions to check for student understanding	Slight or none	64	58.7	56	38.1	8	22.2
	Strong	45	41.3	91	61.9	28	77.8
Prompting students to clarify their thinking	Slight or none	59	53.2	47	32.2	7	20.0
	Strong	52	46.8	99	67.8	28	80.0
Multiple instructional strategies for helping students solve mathematical problems	Slight or none	63	57.8	53	36.1	4	11.1
	Strong	46	42.2	94	63.9	32	88.9
Differentiating instruction within the same class	Slight or none	67	59.8	47	32.0	4	11.1
	Strong	45	40.2	100	68.0	32	88.9
Differentiating assignments within the same class	Slight or none	74	66.1	64	43.5	10	28.6
	Strong	38	33.9	83	56.5	25	71.4
State or district assessments (preparing, understanding, interpreting)	Slight or none	62	56.4	31	21.1	5	13.9
	Strong	48	43.6	116	78.9	31	86.1
Interpretation of formative assessment data for use in mathematics instruction	Slight or none	56	50.0	43	29.9	5	13.9
	Strong	56	50.0	101	70.1	31	86.1
Technology to support student learning in mathematics	Slight or none	90	81.1	96	65.3	23	63.9
	Strong	21	18.9	51	34.7	13	36.1
Engaging all students in mathematical discourse	Slight or none	62	55.4	45	30.8	5	13.9
	Strong	50	44.6	101	69.2	31	86.1
Providing resources to teachers	Slight or none	61	53.0	28	18.9	6	16.7
	Strong	54	47.0	120	81.1	30	83.3
Implementing formative assessments (e.g. teacher-made, textbook-developed tests, diagnostics tests etc)	Slight or none	61	55.0	42	29.2	7	19.4
	Strong	50	45.0	102	70.8	29	80.6
Examining student work to monitor implementation of the mathematics instructional program	Slight or none	63	58.9	47	32.2	8	22.2
	Strong	44	41.1	99	67.8	28	77.8

Note. Categories of None and Slight Emphasis are combined for the analysis.

* The Chi-square statistic is significant at the $p < 0.05$ level. Comparison of column proportion is significant at 0.05 level.

Table A9
Number and Percentage of Respondents Reporting Changes in Mathematics Instruction their Schools Made in 2005–2006

Changes (Multiples Responses)	*N*	%
Increased differentiation and creating mathematics groups	22	12.9
More students in Math A and increased numbers in acceleration	19	11.2
Using data to monitor progress and guide instruction	17	10.0
Planning (for consistency)	15	8.8
Promoting student discourse and more mathematics emetics talk	12	7.1
Differentiation and intervention for struggling students	11	6.5
Full-effective implementation and Block schedule	11	6.5
No changes this year	11	6.5
Implementing formative assessments	9	5.3
Specific supports from MCC (e.g., implementing Model-Coach-Apply with MCC, monthly meetings with MCC, or demonstration)	7	4.1
Additional and effective assessments (e.g., covering assessments limits before MSA, creating mid-unit assessments, aligning assessment with curriculum)	7	4.1
More BCRs and BCR preparation	6	3.5
Focus on basic mathematics skills	4	2.4
MCCs' higher expectations for teachers and students	4	2.4

Table A10
Number and Percentage Reporting Most Useful Support/Topics/Strategies

Most Useful Support/Topics or Strategies	*N*	%
Providing resources to teachers	46	27.7
Differentiating instruction within same class	22	13.3
Implementing formative assessments	19	11.4
Examining student work to monitor program implementation	17	10.2
Engaging all students in mathematics discourse	15	9.0
Differentiating assignments within same class	14	8.4
Interpreting formative assessment data for instruction	14	8.4
Planning with other staff in grade level teams	12	7.2
Varying instruction to meet needs of diverse learners	10	6.0
Multiple instructional strategies for helping students learn mathematics	9	5.4
All other responses (e.g., modeled lessons, collaboration with literacy teachers, MCC pulled out small groups, assisting with struggling students, staff development opportunities)	18	10.8

Table A11a
Number and Percentage of Teachers Reporting Level of Program Impact

Program Impact	N	Not at all		To small extent		To a moderate extent		To a great extent	
		n	%	*n*	%	*n*	%	*n*	%
Helped teacher to use student assessment data to adjust instruction appropriately	272	27	10.4	49	18.9	70	27.0	113	43.6
Enhanced teachers ability to focus on students not achieving grade level standards	259	35	13.5	48	18.5	76	29.3	100	38.6
Enhanced teachers ability to use questioning to check student understanding of mathematics	257	36	14.0	48	18.7	88	34.2	85	33.1
Deepened teachers' knowledge of mathematics content	257	38	14.0	52	19.1	81	29.8	101	37.1
Enhanced teachers ability to prompt students to clarify their thinking during instruction	254	39	15.2	47	18.3	86	33.5	85	33.1
Helped teachers to provide alternative instructions for the same assignment to accommodate a variety of student strengths and needs	251	39	15.5	45	17.9	81	32.3	86	34.3
Helped teachers to present multiple solutions and alternative strategies to solve mathematical problems during instruction	255	37	14.6	51	20.1	78	30.7	88	34.6
Enhanced teachers ability to provide alternative assignments and activities to accommodate a variety of student strengths and needs	256	41	16.1	53	20.8	68	26.7	93	36.5
Helped teachers to understand the pedagogy underlying the sequence of the MCPS mathematics curriculum	259	51	19.9	46	18.0	78	30.5	81	31.6

Table A11b
Overall Respondents' Perception of their Math Content Coach

Statement	*N*	Not at all/Small extent		Moderate/ Great Extent	
		n	%	*n*	%
Math content coach met expectations	298	60	22.4	191	71.3
Math content coach was responsive and available	292	69	23.6	223	76.4

Table A12

Level of Impact* on Respondents' Mathematics Knowledge and Instructional Practices by Number Methods of Interaction with Math Content Coach

Program Impacts		Number of Methods of Interactions					
		1–3		4–6		7–10	
		n	%	*n*	%	*n*	%
Deepened teachers' knowledge of mathematics content	Not at all/Small Extent	57	58.8	32	22.9	1	2.9
	Moderate/ Great Extent	40	41.2	108	77.1	34	97.1
Enhanced teachers ability to focus on students not achieving grade level standards	Not at all/Small Extent	56	60.2	26	19.8	1	2.9
	Moderate/ Great Extent	37	39.8	105	80.2	34	97.1
Enhanced teachers ability to use questioning to check student understanding of mathematics	Not at all/Small Extent	53	58.9	29	22.0	2	5.7
	Moderate/ Great Extent	37	41.1	103	78.0	33	94.3
Enhanced teachers ability to prompt students to clarify their thinking during instruction	Not at all/Small Extent	49	53.8	35	26.5	2	5.9
	Moderate/ Great Extent	42	46.2	97	73.5	32	94.1
Helped teachers to present multiple solutions and alternative strategies to solve mathematical problems during instruction	Not at all/Small Extent	53	60.2	35	26.7	0	0.0
	Moderate/ Great Extent	35	39.8	96	73.3	35	100.0
Helped teachers to provide alternative instructions for the same assignment to accommodate a variety of student strengths and needs	Not at all/Small Extent	54	62.8	27	20.8	3	8.6
	Moderate/ Great Extent	32	37.2	103	79.2	32	91.4
Enhanced teachers ability to provide alternative assignments and activities to accommodate a variety of student strengths and needs	Not at all/Small Extent	57	64.0	35	26.7	2	5.7
	Moderate/ Great Extent	32	36.0	96	73.3	33	94.3
Helped teachers to understand the pedagogy underlying the sequence of the MCPS mathematics curriculum	Not at all/Small Extent	56	62.9	37	27.8	4	11.8
	Moderate/ Great Extent	33	37.1	96	72.2	30	88.2
Helped teacher to use student assessment data to adjust instruction appropriately	Not at all/Small Extent	48	52.7	26	19.7	2	5.6
	Moderate/ Great Extent	43	47.3	106	80.3	34	94.4

Note. The Chi-square statistic is significant at the 0.05 level.

* Categories of Not at all and Small Extent are combined for this analysis.

Table A13
Overall Impact of the Math Content Coach Initiative
Among Classroom Teachers and Professional Staff

Level of Impact		Teacher self description: Classroom teacher *n*	Classroom teacher %	Other professional staff *n*	Other professional staff %
Deepened teachers' knowledge of mathematics content	Not at all/Small Extent	72	36.9	16	21.6
	Moderate/ Great Extent	123	63.1	58	78.4
Enhanced teachers ability to focus on students not achieving grade level standards	Not at all/Small Extent	67	35.4	14	20.9
	Moderate/ Great Extent	122	64.6	53	79.1
Enhanced teachers ability to use questioning to check student understanding of mathematics	Not at all/Small Extent	68	35.6	14	22.2
	Moderate/ Great Extent	123	64.4	49	77.8
Enhanced teachers ability to prompt students to clarify their thinking during instruction	Not at all/Small Extent	71	37.0	13	21.0
	Moderate/ Great Extent	121	63.0	49	79.0
Helped teachers to present multiple solutions and alternative strategies to solve mathematical problems during instruction	Not at all/Small Extent	71	37.6	15	24.2
	Moderate/ Great Extent	118	62.4	47	75.8
Helped teachers to provide alternative instructions for the same assignment to accommodate a variety of student strengths and needs	Not at all/Small Extent	69	37.1	13	21.0
	Moderate/ Great Extent	117	62.9	49	79.0
Enhanced teachers ability to provide alternative assignments and activities to accommodate a variety of student strengths and needs	Not at all/Small Extent	77	40.5	15	24.2
	Moderate/ Great Extent	113	59.5	47	75.8
Helped teachers to understand the pedagogy underlying the sequence of the MCPS mathematics curriculum	Not at all/Small Extent	79	42.5	15	22.4
	Moderate/ Great Extent	107	57.5	52	77.6
Helped teacher to use student assessment data to adjust instruction appropriately	Not at all/Small Extent	63	32.6	11	17.5
	Moderate/ Great Extent	130	67.4	52	82.5

Note. Other professional staff was specified as special education, ESOL, intervention teacher. The Chi-square statistic is significant at the 0.05 level.

Table A14
Impact on Respondents' Mathematics Knowledge and Instructional Practices by Mathematics Concepts Addressed during Math Content Coach Sessions

Impact		Geometry		Probability		Number relations/ Computation		Algebra		Other	
		n	%	*n*	%	*n*	%	*n*	%	*n*	%
Deepened teachers' knowledge of mathematics content	Not at all/Small Extent	28	21.1	12	12.4	47	24.9	16	15.8	14	35.9
	Moderate/ Great Extent	105	78.9	85	87.6	142	75.1	85	84.2	25	64.1
Enhanced teachers ability to focus on students not achieving grade level standards	Not at all/Small Extent	21	15.9	11	11.3	42	22.6	15	15.0	11	29.7
	Moderate/ Great Extent	111	84.1	86	88.7	144	77.4	85	85.0	26	70.3
Enhanced teachers ability to use questioning to check student understanding of mathematics	Not at all/Small Extent	24	18.2	13	13.5	45	24.1	14	14.4	13	33.3
	Moderate/ Great Extent	108	81.8	83	86.5	142	75.9	83	85.6	26	66.7
Enhanced teachers ability to prompt students to clarify their thinking during instruction	Not at all/Small Extent	24	18.3	15	15.6	46	24.9	18	18.2	14	35.9
	Moderate/ Great Extent	107	81.7	81	84.4	139	75.1	81	81.8	25	64.1
Helped teachers to present multiple solutions and alternative strategies to solve mathematical problems during instruction	Not at all/Small Extent	27	20.5	12	12.4	50	27.0	15	15.3	13	35.1
	Moderate/ Great Extent	105	79.5	85	87.6	135	73.0	83	84.7	24	64.9
Helped teachers to provide alternative instructions for the same assignment to accommodate a variety of student strengths and needs	Not at all/Small Extent	26	20.0	15	15.5	48	26.2	14	14.3	12	31.6
	Moderate/ Great Extent	104	80.0	82	84.5	135	73.8	84	85.7	26	68.4
Enhanced teachers ability to provide alternative assignments and activities to accommodate a variety of student strengths and needs	Not at all/Small Extent	32	24.2	18	18.6	56	30.1	20	20.4	15	39.5
	Moderate/ Great Extent	100	75.8	79	81.4	130	69.9	78	79.6	23	60.5
Helped teachers to understand the pedagogy underlying the sequence of the MCPS mathematics curriculum	Not at all/Small Extent	33	25.8	20	20.8	60	32.8	22	22.7	13	38.2
	Moderate/ Great Extent	95	74.2	76	79.2	123	67.2	75	77.3	21	61.8
Helped teacher to use student assessment data to adjust instruction appropriately	Not at all/Small Extent	20	14.9	11	11.3	39	20.7	13	13.0	11	29.7
	Moderate/ Great Extent	114	85.1	86	88.7	149	79.3	87	87.0	26	70.3

Note. The Chi-square statistic is significant at the 0.05 level.

Table A15
Number and Percentage of Respondents Identifying Most Positive Impact Their MCC had on Teachers and their Classrooms

Positive Aspects (multiple responses)	*N*	%
Provided materials and resources	30	17.2
Always available/mathematics expert (general)	30	17.2
Use of data drives instruction (e.g. formative assessment)	20	11.5
MCC provided multiple strategies and supported differentiated instruction	20	11.5
MCC modeled lesson/classroom demonstrations	15	8.6
Provided support for struggling students	11	6.3
Team planning and lesson planning support	7	4.0
Support for accelerated students	6	3.4
Provided trainings	6	3.4
Increase in student (mathematics) discourse	5	2.9
All other positive impact (e.g., MCC looks at each child holistically, students did better in unit assessments, helped select students to accelerated classes, MCC is much appreciated and utilized at school, writing and assistance with BCR)*	21	12.1

Table A16
Number and Percentage of Respondents Reporting Challenges

Challenges (multiple responses)	*N*	%
Meeting diverse needs and differentiating instruction	41	23.7
Lack of basic skills--student below grade level	31	17.9
Inadequate time for instruction and re-teaching	26	15.0
MCPS curriculum concerns--too fast/dense/not ESOL friendly	23	13.3
English language limitations of ESOL students	13	7.5
Inadequate materials/resources	9	5.2
Assessment/unit test concerns	8	4.6
Time-related concerns (e.g., scheduling conflicts with enrichment and struggling students, not enough planning time, to develop resources, to observe other teachers)	5	2.9
Level of MCC support (e.g., no support other than collecting and displaying data, didn't help with small groups, didn't help with reteaching)	4	2.3
Mathematics texts concerns (e.g., unsatisfactory, guide doesn't follow along with HARCOURT, Every day Math is hard to follow and not good for ESOL)	3	1.7
All other challenges (e.g., grouping between grade levels, we don't challenge our students enough, many new teachers, pulled out enrichment classes missed in-class lessons, answering mathematics BCRs, difficult for Kindergarten students to work independently)	26	15.0

Table A17
Number and Percentage of Respondents Identifying Areas
Needing Improvement in their School

Area (multiple responses)	*N*	%
Students' level of mastery of basic facts and concepts	33	21.0
Familiarity and increased use of problem solving and problem solving strategies	26	16.6
Explaining the process, vocabulary for BCRs, and mathematics language	20	12.7
Teaching and retention of specific mathematics concepts need improvement (e.g., money, conversions, statistics, time, place value)	14	8.9
Pacing--students need more time to become proficient	15	7.6
Computation	9	5.7
Money	9	5.7
Solving word problems	8	5.1
Measurement	7	4.5
Estimation	7	4.5
Providing more support and instruction—for struggling students to become proficient	10	4.5
More challenge/acceleration and continued differentiation for all students	6	3.2
Algebra	4	2.5
Fractions	4	2.5
All other areas (e.g., Working with Hispanic boys, girls, would like to work more with MCCs, Unit assessments not ESOL friendly, starting math support earlier in the year, more support for first year teachers, review of grade level indicators throughout the year, not just the month before MSA)	27	17.2

Table A18
Number and Percentage of Respondents
Recommending Topics, Strategies, or Activities to be Addressed by Math Content Coaches in Future Years

Recommended Topics/Strategies/Activities	*N*	%
Differentiation with a focus on small group strategies	27	17.5
Variety and more activities—center ideas and games	16	10.4
Math language, vocabulary, and writing BCRs	15	9.7
Problem solving strategies and strategies for solving word problems	15	9.7
Lesson demonstrations/modeling	14	9.1
Support for struggling students and meeting needs of below grade level students	12	7.8
MCC should work with students (pull-out or plug-in)	12	7.8
Testing and data collection concerns (e.g., Unit test preparation, training on grading and scoring assessments, ways to assess multiple times without taking too much time)	12	7.8
Basic facts mastery and number sense	11	7.1
MCPS curriculum support, lesson planning, and management of instructional time (e.g., planning timelines, review closure items, go through different portions of curriculum)	11	7.1
Challenging and accelerating students	10	6.5
Strategies for teaching specific mathematics concepts and lessons (e.g., money, time, conversions, place value, statistics)	8	5.2
Focus of MCC activities (e.g. would like to work more with MCCs, starting math support earlier in the year, more support for first year teachers, review of grade level indicators throughout the year, not just the month before MSA)	25	16.2