



**A Study of Classroom Experiences of
Teachers of Advanced Mathematics to
Grade 5 Students**

Office of Shared Accountability

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Executive Summary

The M-Stat Monitoring Team—Advanced Math in Grade 5, and the Office of Shared Accountability collaborated to study the classroom experiences of elementary school teachers of advanced mathematics to Grade 5 students. The key research question was: What aspects of teachers' background, professional development, and characteristics contribute to Grade 5 students' successful performance in middle school math?

School staff that had taught Math 6 to Grade 5 students for at least two years, including a racially diverse class in 2007–2008, were identified and invited to participate. Individual interviews with 25 teachers at 25 schools were conducted in May and June 2009. Student achievement data were used to divide interviewed teachers into two groups. The group labeled more successful had at least 78% of its students score proficient on all Math 6 unit assessments in 2007–2008; the group labeled less successful had less than 66% of students score proficient on all unit assessments. Also, individual interviews with a staff member who worked with these teachers (e.g., math content coach) were conducted at 15 of the 25 schools.

The findings indicated that more than one half of both the more successful and the less successful teachers were the only Math 6 teachers to Grade 5 students in their school. Further, compared to the less successful teachers, a higher percentage of the more successful teachers—

- used course assessments and previous teaching experience for planning a unit;
- indicated that student-to-student discourse and stages of learning (i.e., concrete, representational, abstract) were helpful to their students or sometimes helpful to their students;
- reported that college courses and support from other teachers within the building were helpful or sometimes helpful to them for teaching Math 6 to Grade 5 students; and
- reported that planning time was a helpful resource for Math 6.

Based on the findings, the Advanced Math M-Stat team should consider the following suggestions to support enrollment and successful completion of Math 6 or higher by Grade 5 students:

- Support all elementary school teachers of Math 6 by creating a professional learning community among teachers of Math 6 in elementary and middle schools.
- Support less successful teachers by improving their ability to do the following:
 - Use assessments as a resource for planning a unit.
 - Incorporate student-to-student discourse and stages of learning (i.e., concrete, representational, abstract) in their lessons.
 - Work with other teachers within the building to make planning time more useful.
- Consider the extent of the teacher's college coursework in mathematics as one aspect of selecting staff members to teach Math 6 to Grade 5 students.

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Background

Goal 2 of the Montgomery County Public Schools (MCPS) strategic plan, *Our Call to Action: Pursuit of Excellence 2009–2014*, is to provide an effective instructional program with the ultimate goal of preparing all students for success after high school (MCPS, 2009a). To reach this goal, “MCPS strives to have students take advanced mathematics in elementary school so they can be prepared for completion of Algebra 1 or higher-level mathematics by the end of Grade 8, as well as for enrollment in Honors and Advanced Placement courses in middle and high school” (MCPS, 2009b, p. 38). A related school-system target for 2009–2010 is that 41.1% of MCPS students will successfully complete Math 6 or higher by the end of Grade 5 (MCPS, 2009a). Successful completion is determined by performance on the on-grade-level items on all MCPS mathematics unit assessments.

To support enrollment and successful completion of Grade 5 students in Math 6 or higher, the M-Stat Monitoring Team—Advanced Math in Grade 5 was formed as part of the MCPS M-Stat process.¹ To ensure equity of access to rigorous courses for all students, this team monitors the attainment of the strategic plan targets for proficiency in Grade 5 on advanced mathematics for all subgroups and for all schools. Completion of advanced math in Grade 5 also is being monitored among the MCPS milestones of academic success, known as the Seven Keys to College Readiness (MCPS, 2009c).

Current Study

This study was requested by the M-Stat Monitoring Team—Advanced Math in Grade 5 to examine the classroom experiences of elementary school teachers of advanced mathematics in Grade 5. The purpose of this study was to aid the M-Stat team’s efforts to propose guidelines that support enrollment and successful completion of Math 6 or higher by Grade 5 students in areas such as professional development, teacher selection, and supports (in addition to professional development) for teachers.

Other desired outcomes for this research were to identify teacher characteristics that support Grade 5 student success in Math 6 or higher and to gain insights into challenges facing teachers whose Grade 5 students are less successful in advanced mathematics courses. The following question guided this research: What aspects of teachers’ background, professional development, and characteristics (i.e., attitudes, beliefs, and skills) contribute to Grade 5 students’ successful performance in middle school math?

¹ In MCPS, the M-Stat process provides a framework for monitoring critical aspects of student achievement. The teams “drill down to root causes, focus on areas of need, develop action plans for improvement, and document best practices for recognition and dissemination throughout the system” (MCPS, 2008).

Methodology

Sample

The research sample included MCPS staff members who had taught Math 6 to Grade 5 students for at least two years including 2007–2008, were working in MCPS in spring 2009, and who had a racially diverse class in 2007–2008. The latter reflected the M-Stat team’s interest in equity for all students. (Although the intention was to identify all such teachers, difficulties in doing so might have limited the sample size. The main difficulty was that student records were linked to the homeroom teacher, instead of the math teacher.) Racially diverse was defined as at least four African American students and at least four Hispanic students in the Math 6 class. One teacher who was on the Advanced Math M-Stat team was eliminated because she had helped develop the study. The remaining teachers were invited to participate (except for one teacher who mistakenly was not contacted); out of 28 teachers from 28 schools invited to participate, 25 agreed to an interview.

Along with the teacher, a staff member (e.g., math content coach) from each of the 28 schools, who supported these teachers, was invited for an interview, if available. However, in six schools the teacher interviewed was also the math content coach or math focus teacher; four schools did not have such a staff member; and in one school, the math content coach was a member of the Advanced Math M-Stat team and was eliminated. Out of 17 math-support staff members invited to participate, 15 agreed to an interview. These 15 math-support staff members were composed of 7 math content coaches, 3 staff development teachers, 3 math intervention and/or focus teachers, 1 assistant principal, and 1 magnet coordinator.

Interviews

To understand what teacher-related factors contribute to student outcomes, it was necessary to know the identity of each teacher in the study. Therefore, individual interviews were the proposed methodology. Interview questions were developed based on input from the Advanced Math M-Stat team members to address the following topics of interest:

- Professional development experiences
- How teachers learn or relearn mathematics content
- Organizational supports (other than professional development) available to the teacher
- Planning a unit
- Incorporation of key concepts from recent MCPS professional development

An Office of Shared Accountability (OSA) staff member interviewed each teacher or math-support staff member individually. Interviewers used a semi-structured questionnaire (see Figures A1 and A2).

Analysis

To distinguish more successful from less successful teachers, student performance data from the 2007–2008 year (in which all teachers taught) were used. Proficiency rates on the Maryland School Assessment (MSA) mathematics tests and the MCPS unit assessments in Math 6 were analyzed for each teacher's class. All interviewed teachers had at least 80% of their students score proficient or advanced on the MSA math test; therefore, these results were not used to distinguish among teachers. Examination of the percentage of students who passed all unit assessments by teacher indicated a break between 66% and 78%. Therefore, 66% was used to distinguish between more and less successful teachers. The percent of students scoring proficient in the more successful group ranged from 100% to 78% and those scoring proficient in the less successful group ranged from 65% to 24%.

The interviews were processed through descriptive statistics and coding of qualitative data. The goal was to identify similarities and common themes across teachers within each group (more vs. less successful) by comparing and contrasting background, professional development, and characteristics between the two groups of teachers.

Findings

Detailed findings from the teacher interviews are presented below. Information from interviews with math-support staff members (e.g., math content coach, staff development teacher) is summarized with tables of findings in Appendix B.

Classroom Experiences of Interviewed Teachers

Classroom experiences of the interviewed teachers are summarized in Table 1. The more successful and less successful teachers were similar on all aspects. All teachers taught their students every day, and more than one half of both groups (16 of 18 more successful and 4 of 7 less successful) taught 75–90 minutes per day. There was a similar pattern between the two groups of teachers on whether they taught subjects other than mathematics to their students. Just over one half of each group of teachers (10 of 18 more successful and 4 of 7 less successful) were the only teacher of Math 6 to Grade 5 students in their school.

Table 1
Classroom Experiences of Interviewed Teachers

Experience in most recent Math 6 class taught		More successful N = 18		Less successful N = 7	
		n	%	n	%
Days per week with students	5 days per week	18	100.0	7	100.0
Minutes per day with students	60 minutes	1	5.6	1	14.3
	65 minutes	0	0	1	14.3
	70 minutes	1	5.6	0	0
	75 minutes	7	38.9	2	28.6
	80 minutes	4	22.2	0	0
	90 minutes	5	27.8	2	28.6
	120 minutes	0	0	1	14.3
Taught other subjects to students	No	6	33.3	3	42.9
	Yes, to some students	7	38.9	3	42.9
	Yes, to all students	5	27.8	1	14.3
Other staff who taught Math 6 to Grade 5 students at school	No others	10	55.6	4	57.1
	One other	4	22.2	2	28.6
	Two others	4	22.2	1	42.9

Planning a Unit

Teacher responses are in Table 2 for the question: How do you typically plan a unit? The role of the following resources—unit assessments, curriculum guide, and online resources—was of interest. Key findings on these topics and others were:

- Two thirds of the more successful teachers (12 of 18) reported using expectations or due dates from assessments for planning, including 7 who planned backwards using the assessments with or without the curriculum guide, 4 who started with assessments to get an overall view or to see what's expected, and 1 who looked at the assessments in

general. Only about one half of the less successful teachers (3 of 7) reported use of assessments for planning, other than for identifying vocabulary.

- Almost all teachers (15 of 18 of the more successful and 5 of 7 of the less successful) referred at least once to using the guide for planning. Approaches included starting with the guide, getting indicators from the guide, using the guide for review, or using it for more detailed planning.
- About one fifth (4 of 18) of the more successful teachers reported using online resources for planning a unit. None of the less successful teachers mentioned this resource.
- About one quarter of the more successful teachers (5 of 18) applied teaching experience or their past year's plans when planning a unit. None of the less successful teachers mentioned this approach.

Table 2
Teacher Responses About Planning a Unit

Planning a unit responses	More successful N = 18		Less successful N = 7	
	n	%	n	%
Use assessment, for expectations/due dates, plus guide and plan backwards	7	38.9	0	0.0
Apply teaching experience/past year's plans	5	27.8	0	0.0
Start with assessment to get overall view/see what's expected	4	22.2	3	42.9
Use guide for weekly/more detailed planning	3	16.7	1	14.3
Use online resources	3	16.7	0	0.0
Use textbooks/other resources	3	16.7	0	0.0
Use assessments for vocabulary list or to make sure wording is familiar	2	11.1	2	28.6
Start with the curriculum guide	2	11.1	1	14.3
Use guide for reteaching/start with review lessons	2	11.1	0	0.0
Use guide, but may reorder and/or regroup	2	11.1	0	0.0
Use guide (general)	2	11.1	0	0.0
Use indicators from guide	1	5.6	2	28.6
Look at required/review items in guide	1	5.6	1	14.3
Pick and choose from the guide	1	5.6	1	14.3
Start with preassessments	1	5.6	1	14.3
Start with guide plus assessments	1	5.6	0	0.0
Look at assessments for review and extension	1	5.6	0	0.0
Look at assessments (general)	1	5.6	0	0.0
Use online math dictionary	1	5.6	0	0.0
Don't use preassessments	1	5.6	0	0.0
Don't use textbook	1	5.6	0	0.0
Use Math 5 assessment to cut and paste into Math 6 assessments	0	0.0	1	14.3

Note. Each teacher gave up to four responses.

Application of Key Concepts From Recent MCPS Professional Development

To determine the extent to which each teacher incorporated four key concepts emphasized in recent MCPS professional development, teachers responded to the following question for each of the four concepts: Which instructional practice is helpful for your students' success in Math 6? Responses to this question are in Table 3. Key findings were:

- All of the more successful teachers found student-to-student discourse to be helpful to their students' success. Fewer of the less successful teachers (5 of 7) indicated they found student-to-student discourse to be helpful to their students' success.
- At least one half of both groups (13 of 18 more successful teachers and 4 of 7 less successful teachers) reported the stages of learning to be helpful or sometimes helpful to students. The percentage of more successful teachers (72%) who reported the stages of learning to be helpful or sometimes helpful was larger than the percentage of less successful teachers (57%).
- Almost all of the less successful teachers (6 of 7) found games helpful to their students' success. In contrast, only about one half of the successful teachers (10 of 18) reported games were helpful to their students' success.
- Approximately 40% of each group (8 of 18 more successful teachers and 3 of 7 less successful teachers) found rich focus problems or problem solving helpful or sometimes helpful.

Table 3
Teacher Responses About Instructional Practices

Instructional practice responses	More successful N = 18				Less successful N = 7			
	Helpful or sometimes helpful		Not helpful or not mentioned as helpful		Helpful or sometimes helpful		Not helpful or not mentioned as helpful	
	n	%	n	%	n	%	n	%
Student-to-student discourse	18	100.0	0	0	5	71.4	2	28.6
Concrete, pictorial/representational, abstract stages of learning	13	72.2	5	27.8	4	57.1	3	42.9
Games	10	55.6	8	44.4	6	85.7	1	14.3
Rich focus problems or problem solving	8	44.4	10	55.6	3	42.9	4	57.1

Math-support staff members responded to the following question, for the same four concepts: Which of these instructional practices, if any, do you think have been particularly important in contributing to fifth graders' success in advanced math? Responses to this question were very similar to those for teachers (Table B1, Appendix B).

Professional Development Experiences

For a wide variety of professional development experiences, teachers reported which ones were particularly helpful for teaching Math 6 to Grade 5 students (Table 4). (Note that teachers did not indicate whether or not they had participated in each professional development experience.) Key findings were as follows:

- About one half of each group of teachers (11 of 18 more successful teachers and 3 of 7 less successful teachers) found Tier I summer training in Math 6 or Math 7 helpful for teaching Math 6 to Grade 5 students.
- At least one half of both groups (10 of 18 more successful teachers and 6 of 7 less successful teachers) reported that support from non-classroom teachers was helpful or sometimes helpful for teaching Math 6. The percentage of less successful teachers (86%) that did so was greater than that of more successful teachers (56%).
- About one half of more successful teachers (10 of 18) said that college courses were helpful or sometimes helpful. Only about one quarter of less successful teachers (two of seven) said so.
- About one third of more successful teachers (7 of 18) indicated that support from other teachers within the building was helpful or sometimes helpful. Only one of the seven less successful teachers indicated so.
- For the remaining professional development activities, less than one half of the teachers in both groups reported them as helpful.
- See Appendix C for comments from teachers about professional development experiences that were helpful (Figure C1) and those that were not helpful (Figure C2).

Table 4
Teacher Responses About Professional Development Experiences

Response	More successful				Less successful			
	N = 18		N = 7		N = 18		N = 7	
	n	%	n	%	n	%	n	%
Tier I required summer training on Math 6 or Math 7 ^a	11	61.1	7	38.9	3	42.9	4	57.1
Support from non-classroom teachers within the building	10	55.6	8	44.4	6	85.7	1	14.3
College courses (past or current)	10	55.6	8	44.4	2	28.6	5	71.4
Studying Skillful Teaching 1 or 2, or both ^a	9	50.0	9	50.0	3	42.9	4	57.1
Support from other teachers within the building	7	38.9	11	61.1	1	14.3	6	85.7
Followup sessions to required summer training on Math 6 or Math 7 ^a	5	27.8	13	72.2	3	42.9	4	57.1
Cluster activities	5	27.8	13	72.2	2	28.6	5	71.4
MA68 Addressing needs of highly able elementary students ^a	3	16.7	15	83.3	1	14.3	6	85.7
Increasing students' math proficiency ^a	0	0.0	18	100.0	1	14.3	6	85.7

Note. Teachers did not indicate whether or not they had participated in each experience.

^aSystemwide sessions provided by the MCPS Office of Organizational Development.

Organizational Supports Available to Teachers

Of the variety of school-level teaching supports (other than professional development) available, teachers reported which ones were particularly helpful for teaching Math 6 to Grade 5 students (Table 5). Key findings were as follows:

- Almost all teachers in both groups (17 of 18 more successful teachers and 6 of 7 less successful teachers) indicated resources provided were helpful supports for this course.
- Close to three fourths of teachers in both groups (13 of 18 more successful teachers and 5 of 7 less successful teachers) said their class schedule helped them for this course.
- About one half of teachers in both groups (9 of 18 more successful teachers and 3 of 7 less successful teachers) reported that available technology was helpful for this course.
- Close to one half of teachers in both groups (8 of 18 more successful teachers and 4 or 7 less successful teachers) said the classroom setup was helpful.
- Nearly one half of the more successful teachers (8 of 18) reported planning time as being helpful, but less than one third of the less successful teachers (2 of 7) said it was helpful. Among the remaining five less successful teachers, one complained about a lack of time and interruptions, while the other four did not comment on planning time at all.
- Only 2 out of 18 more successful teachers and 2 out of 7 less successful teachers said it was helpful to have a paraeducator or another teacher in their classroom. Note that nine teachers did not have a paraeducator.

Table 5
Teacher Responses About School-level Teaching Supports

School-level teaching support responses	More successful N = 18				Less successful N = 7			
			Not helpful or not mentioned as helpful				Not helpful or not mentioned as helpful	
	n	%	n	%	n	%	n	%
Resources (e.g., manipulatives, other materials)	17	94.4	1	5.6	6	85.7	1	14.3
Class schedule (e.g., daily classes, length of class)	13	72.2	5	27.8	5	71.4	2	28.6
Technology	9	50.0	9	50.0	3	42.9	4	57.1
Classroom (e.g., location, size, setup)	8	44.4	10	55.6	4	57.1	3	42.9
Planning time	8	44.4	10	55.6	2	28.6	5	71.4
Paraeducator or another teacher in the classroom ^a	2	11.1	10	55.6	2	28.6	2	28.6

^aExcludes six more successful teachers and three less successful teachers who did not have a paraeducator.

For the above list of school-level teaching supports, math-support staff members also reported which ones were particularly helpful for Math 6 to Grade 5 students. Their responses were very similar to those from teachers (Table B2, Appendix B).

Instructional Supports

To understand how teachers get support with unfamiliar math content that they had not seen recently, if ever, teachers responded to the following questions:

Can you give me an example of an unfamiliar math topic in Math 6, or one that stretched your own math understanding, where you had to seek additional information or support (e.g., topic that you needed help explaining)? What did you do to get that additional support?

Teacher responses on the resource used to get the additional support or information about an unfamiliar topic are in Table 6. Key findings were:

- Both groups of teachers used a variety of resources.
- The resources used by more successful teachers were similar to those used by less successful teachers.

Table 6
Resources for Getting Information About an Unfamiliar Topic

Resource	More successful N = 18		Less successful N = 7	
	n	%	n	%
Ask a math teacher	5	27.8	3	42.9
Ask math content coach	2	11.1	1	14.3
Go online	2	11.1	1	14.3
Use book or textbook	2	11.1	0	0
Ask math trainer	2	11.1	0	0
Math Dude video	0	0	1	14.3
Spouse	1	5.6	0	0
No resource mentioned	7	38.9	2	28.6

Note. Each teacher gave up to two responses.

Recommendations for Supports and Advice

To determine what supports MCPS could provide, teachers were asked: What could MCPS do, at a centralized level or at your school, to support you in teaching Math 6 to fifth graders? Responses are in Table 7. Math-support staff members answered a similar question; their responses are in Table B3, Appendix B. Key findings were:

- About one half of both teacher groups (9 of 18 more successful teachers and 3 of 7 less successful teachers) indicated that MCPS could support teachers by providing more trainings, workshops, and professional development. Likewise, about one half of the math-support staff members (8 of 15) indicated MCPS could support teachers by providing trainings. Detailed suggestions for trainings from teachers and math-support staff members are in Figure D1, Appendix D.
- Likewise, about one half of both groups of teachers (8 of 18 more successful teachers and 4 of 7 less successful teachers) and one half of the math-support staff members (7 of 15) indicated that MCPS could support teachers by providing a system for sharing

information with other teachers of Math 6 in elementary or middle schools. There were requests for meeting in groups, for example within a cluster, and requests for an online community to share materials and communications. As noted above, over half of all teachers interviewed did not have a colleague in their school who taught Math 6 to Grade 5 students.

- About one quarter of the math-support staff members (4 of 15) recommended that MCPS begin acceleration for mathematics in earlier grades (Figure D2, Appendix D).
- Suggestions included in the response category coded other from teachers and math-support staff members are located in Figure D3, Appendix D.

Table 7
Teachers' Responses About MCPS Support

Response	More successful N = 18		Less successful N = 7	
	n	%	n	%
More trainings/workshops/refreshers/ professional development support	9	50.0	3	42.9
Share with other Math 6 teachers in elementary or middle schools	8	44.4	4	57.1
Reword curriculum and assessments for Grade 5 students	3	16.7	1	14.3
Provide a paraeducator	3	16.7	1	14.3
Align curriculum, textbook, and assessments on topics or on vocabulary	3	16.7	0	0
Have basic fact program	2	11.1	0	0
Show us what to skip or what to stress	2	11.1	0	0
More planning time	1	5.6	2	28.6
Provide Promethean boards	1	5.6	1	14.3
Other	8	44.4	2	28.6

Note. Each teacher gave up to four responses.

To share advice with others, Math 6 teachers were asked: If you were going to mentor another teacher of Math 6 to fifth graders, what two or three key pieces of advice would you give to that teacher? Responses are in Table 8. Key findings were:

- The most frequent key piece of advice from the more successful teachers (7 of 18) was to look for expectations/language used/due dates in the assessment beforehand and plan backwards.
- The most frequent key piece of advice from the less successful teachers (4 of 7) was to use manipulatives or hands-on learning.
- About one quarter of both groups (5 of 18 more successful teachers and 2 of 7 less successful teachers) gave the following key advice about students: preassess, expect gaps, and make sure students have the background knowledge they will need.
- Advice included in the response category coded other may be found in Appendix E.

Table 8
Teachers' Advice to Mentor a Teacher of Math 6 to Grade 5 Students

Advice	More successful N = 18		Less successful N = 7	
	n	%	n	%
Look at assessments for expectations/language used/due dates beforehand, and plan backwards with this information	7	38.9	1	14.3
Preassess/expect gaps/make sure students have background knowledge	5	27.8	2	28.6
Ask for help/network/talk to other teachers	4	22.2	1	14.3
Make sure students understand assessment vocabulary	4	22.2	0	0
Use manipulatives/hands-on learning	3	16.7	4	57.1
Make fun/games/activities	3	16.7	1	14.3
Read/use curriculum guide	3	16.7	1	14.3
Take trainings	3	16.7	0	0
Use small groups	3	16.7	0	0
Know content	2	11.1	1	14.3
Present information in different ways	2	11.1	0	0
Use discourse/get students talking about math	1	5.6	2	28.6
Preview/make connections	1	5.6	2	28.6
Differentiate	1	5.6	1	14.3
Pace with kids	0	0	2	28.6
Other	9	50.0	2	28.6

Note. Each teacher gave up to four responses.

Teacher-related Factors That Impede Student Success

Math-support staff members were asked: What factors do you think impede fifth graders' success in Math 6, in terms of teachers' background, professional development, or skills, or supports provided to teachers? Responses that were limited to the terms identified in the question are in Table 9. Key findings were:

- About one quarter of math-support staff members (4 of 15) identified lack of teacher content knowledge and lack of teacher knowledge of strategies as factors that impede Grade 5 students' success in Math 6.
- Miscellaneous factors included in the category coded other may be found in Appendix F.

Table 9
Math-support Staff Members' Responses on Teacher-related Factors That Impede Grade 5 Students' Success in Math 6

Response	Math-support staff members (N = 15)	
	n	%
Lack of content knowledge by teachers	4	26.7
Lack of knowledge of strategies for teachers to use	4	26.7
Teachers' expectations/beliefs for students	3	20.0
Need small class size	2	13.3
Isolation/not being able to talk or plan with other Math 6 teachers	2	13.3
Other	10	66.7

Note. Each respondent gave up to five responses.

Recommendations

Based on the findings, the Advanced Math M-Stat team should consider the following suggestions to support enrollment and successful completion of Math 6 or higher by Grade 5 students. Additionally, so as to determine the best response, the team should review and discuss suggestions from study respondents for professional development (Figure D1) and for supports from MCPS, such as acceleration in kindergarten through Grade 4 (Figure D2) and other supports (Table 7 and Figure D3).

- **Support all elementary school teachers of Math 6 by creating a professional learning community among teachers of Math 6 in elementary and middle schools.** Most of the teachers in this study were the only teacher of Math 6 to Grade 5 students in the school; this situation is likely to continue. To support communication, sharing, and professional growth, provide opportunities for teachers to interact online and in person. Recommended online opportunities include webinars and an ongoing, online learning community. A recommended in-person option is a Teacher-stat (i.e., a teacher level M-Stat) to present and reinforce the findings from this study. Along with interaction among teachers of Math 6 in elementary schools, include interactions between both elementary and middle school teachers of Math 6, either by cluster or within the entire district.
- **Support less successful teachers by improving their ability to do the following:**
 - **Use assessments as a resource for planning a unit.** As practiced by more successful teachers and as per their recommendations, focus on how to use expectations, due dates, and vocabulary from the MCPS unit assessments for planning backwards. Emphasize the value of such planning.
 - **Incorporate student-to-student discourse and stages of learning (i.e., concrete, representational, abstract) in their lessons.** This study did not examine where the difficulty lies with less successful teachers and these topics. Therefore, it is important not to simply offer more professional development sessions on these topics (in case these teachers have not received this training), but also to follow up with attendees to determine whether the sessions were or were not useful or whether attendees found the sessions helpful but have not been able to incorporate the concepts in their lessons.
 - **Work with other teachers within the building to make planning time more useful.** Nearly all teachers who said that planning time was particularly important referred to planning with other teachers. However, relatively few less successful teachers reported that planning time or other teachers at their school were important for teaching Math 6 to Grade 5 students. Therefore, efforts to develop collaborative planning skills or other skills that allow teachers to plan with their school colleagues are recommended. Along with teachers of Math 6 to Grade 5 students, these colleagues could be math-support staff members and teachers of Math 5 whose instruction should include above-grade-level extensions.

- **Consider the extent of the teacher's college coursework in mathematics as one aspect of selecting staff members to teach Math 6 to Grade 5 students.** The majority of more successful teachers reported that mathematics courses in college were particularly helpful for teaching; these courses “provide a depth of knowledge for math.” Encourage both staff members who hire new teachers and those who assign teachers to instruction of Math 6 to Grade 5 students to consider the positive value of college coursework in mathematics.

References

- Montgomery County Public Schools. (2009a). *Our Call to Action: Pursuit of Excellence 2009–2014*. Rockville, MD: Author.
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Appendices

Appendix A: Interview Protocols

Figure A1

Interview Protocol for Teachers

Introduction

As you know, the M-Stat Monitoring Team—Advanced Math in Grade 5 and the Office of Shared Accountability (OSA) are collaborating to study the classroom experiences of elementary school teachers of advanced mathematics to Grade 5 students. Our interview today is an important component of that study.

Your individual responses are **confidential**. The Advanced Math M-Stat Team will use responses from all interviewees to propose guidelines on professional development and other supports for teachers of advanced math to Grade 5 students. This study will not evaluate individual teachers or schools.

The focus of the interview is about your experiences in the classroom and teacher supports, when teaching Math 6 (Math A) to fifth graders. To keep to 45 minutes, we will not cover curriculum, assessments, or student characteristics.

Background

1. Are you teaching Math 6 to fifth graders this year? Yes No
2. Did you teach Math 6 to fifth graders last year? Yes No

Classroom experiences

Please answer the following questions with respect to your most recent year of teaching Math 6 to fifth graders. (Circle year: 2007-08 2008-09)

3. How much time did you teach the fifth graders in Math 6?
 - How many days/week? _____
 - How many minutes per day? _____
 4. Did you only teach math to these fifth graders or did you teach them other subjects? (Circle one)
 - Math only
 - Math plus other subjects
 5. How many other staff members at your school also taught Math 6 to fifth graders during the same year as you did? _____
 6. How did you typically plan a unit? (If not mentioned, ask the following: When planning a unit, what is the role of the following resources):
 - Unit assessments
 - Curriculum guide
 - Online resources

7. Can you give me an example of an unfamiliar math topic in Math 6, or one that stretched your own math understanding, where you had to seek additional information or support? (e.g., topic that you needed help explaining) What did you do to get that additional support?
8. **Show list:** Which of these instructional practices, if any, were particularly helpful for your students' success in Math 6? If helpful, please describe how you used them in your Math 6 class.
 - Student to student discourse
 - Games
 - Rich focus problems/Problem solving
 - Concrete, pictorial/representational, abstract stages of learning

Teacher support Please answer the following questions with respect to your most recent year of teaching Math 6 to fifth graders.

9. Which of your professional development experiences were particularly helpful to you for this course? By professional development, I mean a broad range of experiences, including the following (**Show list**):
 - College courses (currently or in the past)
 - Systemwide sessions provided by Office of Organizational Development, such as
 - Studying Skillful Teaching 1 and 2
 - MA68 Addressing the Needs of the Highly Able Elementary Mathematics Student
 - Increasing Students' Mathematical Proficiency
 - Tier I required summer training on Math 6 or Math 7
 - Follow up sessions to the required summer training on Math 6 or Math 7
 - Cluster activities, such as meetings across schools of teachers of Math 6
 - Support from non-classroom teachers within the building, such as Staff Development Teacher, Math Content Coach, Math Focus Teacher
 - Support from other teachers within the building (e.g., co-planning, co-grading)
10. **Show list:** Which of the following school-level supports were particularly helpful to you for this course?
 - Resources (e.g., manipulatives, other materials)
 - Class schedule (e.g., daily classes, length of class, etc.)
 - Para-educator or another teacher in the classroom
 - Classroom (e.g., location, size, set up)
 - Planning time
 - Technology
11. What could MCPS do, at a centralized level or at your school, to support you in teaching Math 6 to fifth graders? (If necessary, use following as probes:
 - Professional development: type (any type, see above list) and content
 - Organizational supports (any type, see above list)
12. Wrap up question: If you were going to mentor another teacher of Math 6 to fifth graders, what two or three key pieces of advice would you give to that teacher?

Figure A2
Interview Protocol for Math-support Staff Members

Introduction

As you know, the M-Stat Monitoring Team—Advanced Math in Grade 5 and the Office of Shared Accountability (OSA) are collaborating to study the classroom experiences of elementary school teachers of advanced mathematics to Grade 5 students. Our interview today is an important component of that study.

Your individual responses are **confidential**. The Advanced Math M-Stat Team will use responses from all interviewees to propose guidelines on professional development and other supports for teachers of advanced math to Grade 5 students. This study will not evaluate individual teachers or schools.

The focus of the interview is how teachers' background, professional development, or skills, or supports provided to teachers affect fifth graders' success in advanced math, especially Math 6. To keep to 45 minutes, we will not cover curriculum, assessments, or student characteristics.

Background

1. What is your title? _____
2. How long have you held that position? _____
3. How long have you been at this school? _____
4. What is your role at this school in working with or supporting teachers of advanced math to Grade 5 students?
5. Have you taught advanced math to Grade 5 students? Yes No
 - If yes, what course (e.g., Math 6, Math 7) and what school year?
6. **Show list.** Which of these instructional practices, if any, do you think have been particularly important in contributing to fifth graders' success in advanced math? If helpful, please describe how they were used in Math 6 classes.
 - Student to student discourse
 - Games
 - Rich focus problems/Problem solving
 - Concrete, pictorial/representational, abstract stages of learning

7. Which professional development experiences have been particularly helpful for teachers of Math 6 or other advanced math courses to fifth graders? By professional development, I mean a broad range of experiences, including the following (**Show list**):

- College courses (currently or in the past)
- Systemwide sessions provided by Office of Organizational Development, such as
 - Studying Skillful Teaching 1 and 2
 - MA68 Addressing the Needs of the Highly Able Elementary Mathematics Student
 - Increasing Students' Mathematical Proficiency
 - Tier I required summer training on Math 6 or Math 7
 - Follow up sessions to the required summer training on Math 6 or Math 7
- Cluster activities, such as meetings across schools of teachers of Math 6
- Support from non-classroom teachers within the building, such as Staff Development Teacher, Math Content Coach, Math Focus Teacher
- Support from other teachers within the building (e.g., co-planning, co-grading)

8. **Show list.** Which of the following school-level supports have been particularly helpful for teachers of Math 6 or other advanced math courses to fifth graders?

- Resources (e.g., manipulatives, other materials)
- Planning time
- Class schedule (e.g., daily classes, length of class, etc.)
- Technology
- Para-educator or another teacher in the classroom
- Classroom (e.g., location, size, set up)

9. What could MCPS do, at a centralized level or at your school, to support teachers of Math 6 or other advanced math courses to fifth graders?

(If necessary, use the following as probes:)

- Professional development: type (any type, see above list) and content
- Organizational supports (any type, see above list)

10. Wrap-up question:

What factors do you think **impede** fifth graders' success in Math 6, in terms of teachers' background, professional development, or skills, or supports provided to teachers?

Appendix B: Detailed Results From Interviews With Support Staff

Table B1
Math-support Staff Members' Responses About Instructional Practices

Response	Math-support staff members (N = 15)					
	Helpful or sometimes helpful		Not helpful or not mentioned as helpful		Don't know	
	n	%	n	%	n	%
Student-to-student discourse	13	86.7	1	6.7	1	6.7
Concrete, pictorial/representational, abstract stages of learning	10	66.7	4	26.7	1	6.7
Games	8	53.3	6	40.0	1	6.7
Rich focus problems or problem solving	7	46.7	7	46.7	1	6.7

Table B2
Math-support Staff Members' Responses About School-level Teaching Supports

Response	Math-support staff members (N = 15)			
	Helpful		Not helpful or not mentioned as helpful	
	n	%	n	%
Resources (e.g., manipulatives, other materials)	12	80.0	3	20.0
Class schedule (e.g., daily classes, length of class)	12	80.0	3	20.0
Planning time	7	46.7	8	53.3
Technology	6	40.0	9	60.0
Classroom (e.g., location, size, set up)	6	40.0	9	60.0
Paraeducator or another teacher in the classroom	4	26.7	5 ^a	33.3

^aExcludes six staff members who said that teachers of Math 6 to Grade 5 students rarely receive a paraeducator.

Table B3
Math-support Staff Members' Responses About MCPS Support

Response	Math-support staff members (N = 15)	
	n	%
Provide more training/workshops/refreshers/professional development support	8	53.3
Share with other Math 6 teachers in elementary or middle schools	7	46.6
Begin acceleration in earlier grades	4	26.7
Make smaller class sizes	3	20.0
Provide Promethean boards	2	13.3
Other	11	73.3

Appendix C: Teacher Comments About Professional Development Experiences

Figure C1

Teacher Comments About Professional Development Experiences That Were Helpful

Tier I required summer training on Math 6 or Math 7

- The summer in-service helped a lot. I took that before I taught Math 6. But they usually only have time for units 1 + 2. It would be nice if during the year, they could go over unit 3+4 before we get to it. There's lots of good sharing of ideas at those.
- I took this last summer. It was great.
- I took two years ago with my old MCC. She supported me back at school, helped me to make that training more worthwhile (than others might have had).
- This provided a lot of good ideas.
- This was helpful because we did some problems and talked about depth of concepts. I've used some of these activities.
- I did both and they gave me good ideas.
- It gave me a chance to ask questions.
- I trained to be a summer trainer which helped me gain more knowledge of curriculum and indicators. Keyed in on the vocabulary of Math 6.
- During the summer I took training for new teachers to Math 6 but we only covered units 1 and 2. This was very useful and I wish they would expand it to cover the other units.
- This was particularly helpful because it went through various ideas about how to teach topics and it also provided time to collaborate with teachers from different schools.
- The classes I've gone to where they've focused on a unit have been helpful.

Support from non-classroom teachers within the building

- Our SDT is an excellent resource here. A math person. Resources, how to use the guide.
- This year I go to the Assistant principal. He taught at a magnet school and so I've gone to him for help, especially for science.
- This year having the math content coach teaching has been nice. She's really been my teammate.
- Helped me put my math block together. I have always felt supported.
- Using the MCC is very helpful. I would've liked (MCC) more in-class with me helping with instruction. Maybe it's because this is above grade level students and she's more needed in the other classes. She's more of a resource to me.
- I get help from our SDT, IDA, and AP who was a math RT in a middle school prior to coming to here.
- MCC and GT specialist all are helpful.
- The SDT was very helpful to plan out and coming up with activities to get to the core of what they need. Did some co-grading with the SDT, who was the MCC last year.
- One of the four teachers has a focus title and has been instrumental in helping me feel prepared to help students.
- Staff Development Teacher, Math Content Coach, Math Focus Teacher-Both helpful.
- MCC provides many hands on ideas to use with my students.

- The math content coach is extremely helpful for suggestions, she's taught the course before and knows the sticking points that happen
- MCC has been very helpful and supportive.
- Staff Development Teacher-meets with small groups to provide support or acceleration and the AP in the building is good for suggesting ideas for concepts.
- Math Focus teacher is the most helpful. She works with students and helps me in whatever I need her to do.
- Our MCC is great. We both helped the new teacher this year.

College courses (past or current)

- Algebra and Geometry are essential. I was an accountant. I had had a lot of math in my background. I just took Algebra again. A statistics course was helpful as well.
- Teaching math class in college—I still come back to some of those strategies. For example, we were told to never use base 10.
- College courses (currently or in the past)—Took lots of math courses which helps. I taught high school Algebra, Honors Geometry and Geometry and realized that kids needed to be receiving much more math help at an earlier age to make them good math students.
- Currently I'm training in college for my secondary masters. Increases in student development is fantastic – answers why this before that and is based on a brain theory. It stresses student to student discourse.
- These courses provide my depth of knowledge for math.
- Teaching is a 2nd career for me. I received UMD master's and the math methods class had an impact on how I teach math. (We covered) methods of six, modeled manipulatives, games + instruction. So it was instrumental for me.
- Math related (courses) helpful
- Graduate courses because I'm taking a focus on middle school math so I understand the background and where they're heading next. The graduate program is all Montgomery county ES + MS school teachers so it helps to share and compare.
- High school and college math courses, definitely.
- My course study for certification in Grades 1–8 was concentrated in math and science.
- Provided me with the background knowledge I needed to teach math.
- Concentration in math from UMD

Studying Skillful Teaching (SST) 1 or 2, or both

- Took both which were helpful for classroom management
- SST 1 + 2 were very helpful with strategies, discourse, questioning, cooperative learning, etc.
- I took SST 1. Good for learning appropriate assessments and “take aways” that work for any course
- SST – gave me fair sticks for warm-up
- Studying Skillful Teaching 1 and 2—This training was the closest thing I got to teach me how to manage a class, but not much of a relation to math.
- Studying Skillful Teaching 1—not math directly, but useful ideas for any subject.
- SST1 was helpful for differentiation and getting students motivated

Support from other teachers within the building

- Nice to have another teacher who also teaches this course.
- Planning with other Math 6 teacher. Weekly planning. Started with the “big plan” for the year, matching curriculum guides and VSC standards up to MSA. Triangulation. We use the unit assessment to make a plan.
- There are four teachers who teach Math A. Last year we were all new, so we got together as part of our flex time. We rely on each other. Particularly the first year of the math content coach. We also do coplanning and grading.
- Support from colleagues definitely. Bring ideas and sharing. This is even more so than the training mentioned above. I haven’t needed the MCC’s support only because I’m very comfortable with math so I just haven’t had the opportunity to need her. Otherwise, I’m sure she’s a good resource.
- We have 3 teachers teaching, including the MCC. We plan together each week, share materials with the newer teacher, plan formatives. I got a lot of benefit from looking at the unit assessments (through the eyes of a new teacher)—a good experience this year
- Support from other teachers within the building (e.g., co-planning, co-grading)- collaboration with other teachers is always helpful.
- Teacher who taught course last year has been very helpful.

Follow up sessions to required summer training on Math 6 or Math 7

- These are always beneficial. Every unit has a preview training, lasting about two hours. We go over important steps. There is take-away information, assessment information.
- Great. Teachers brought ideas of how to teach, especially hard topics such as rotations.
- Follow up was good.
- Also follow up (helpful), talking to teachers.
- Follow up sessions to the required summer training on Math 6 or Math 7
- I attended a few of these years ago. Some had good things, such as geometry, but a lot was redundant because I was already familiar with Math 6.

Cluster activities

- Definitely cluster planning—when I was the only one here, the (other) ES teacher and I hooked up. This year the MS got together with all the Math 6 teachers in the cluster. It was helpful because they told us what they see and what they need us to do – students’ weaknesses. Also do planning with another ES teacher. It’s great to hear how others are handling abstract concepts and what’s worked for them.
- Cluster activities, such as meetings across schools of teachers of Math 6-our cluster only (all MS and elementary teachers of Math 6) met to talk about areas that were troublesome for students.
- I worked on many, many cluster meetings, with Spanish immersion.
- Sharing ideas is always helpful
- Cluster activities, such as meetings across schools of teachers of Math 6-Met with MVMS teachers to talk about what students need to know when they come to MS.

MA68 Addressing needs of highly-able elementary students

- MA68 Addressing the needs of the highly able elementary mathematics student-Wonderful training.
- Taken MA68—very helpful. It was the best and encouraged my love and to pursue my skills in math. It opened up a big window and I started to focus on math.
- Incredibly helpful
- MA68 Addressing the needs of the highly able elementary mathematics student-helpful for creative ways to learn the concepts.

Increasing students' math proficiency

- Math Proficiency training was most helpful because it gives rich focus questions and hones in on the importance of students talking to each other and how much student background and experience play in. How do you know if the students don't have the skills? Draw on their prior knowledge. They may just not recognize it at first.

Other experiences

- Idea of a training that shows lesson with stations (teacher time with rotating times) would be helpful. To go through a scenario of teaching a small group of remedial [students] while having two other stations. Also, how to incorporate the challenge items now that I've figured out [how] to group the students and stations. I didn't get that (last year), but I got some of that with the in-service training here. Here, math has been a focus for Grades 3–5 for the in-school staff development and that's been more helpful.
- Used to have meetings with other teachers who taught Math 6 to 5th graders for each unit of the curriculum. We would bring materials to the meeting to use to create activities for whatever unit we were going to discuss.
- The math reasoning training is fantastic because the next week I used it.
- Not much offered beyond the first year, when there was training before each unit. That was really helpful. It would be good to be able to take for a refresher or to be able to go to these. Those were some of the best training experiences I've had with the county.
- Many schools should have a math content coach and more support. There would be math support for the earlier grades and there would be an overall stronger math program. Many teachers do not love to teach math and they pass this on to their students.
- Last fall I took Algebra as part of professional development so that I would know what my students would be doing in their next course of math.

Figure C2
Teacher Comments About Professional Development Experiences That Were Not Helpful

Tier I required summer training on Math 6 or Math 7

- I had already taught math 6 when I took this and we just went over the activities of unit 1. It was not beneficial. It was not an overview of what we'll do overall in the year. I want to hear the expectations of the students in geometry, statistics, etc. We need a comprehensive look at what I'm expected to teach.
- Tier I was not very helpful because I was new to teaching Math A. I walked away with 1-2 things for Unit 1. I did not feel I had a good understanding of what I needed to go and do. I had the first lesson, but was like "now what?"
- Tier 1 was good but can't use right away. The follow up is more beneficial because it's while you're doing it and getting ready to do it.
- This training is too quick and brushes over the content.

Support from non-classroom teachers within the building

- The staff development person is not helpful. She has no experience with this course. I'm the one with the experience and who knows what works and what doesn't.
- I don't need MCC [Math Content Coach] support, but we share ideas. She's about manipulatives; I'm more about problem solving.

Support from other teachers within the building

- I probably give more of the support here, but there's no one for me to ask. I'll go to the advanced math 4 teacher sometimes, but there's no one else.

Cluster activities

- I've been to a couple of cluster meeting. For example with the middle school, but a lot of it was them telling us what they were expecting. They look very different with 40-minute clocks. It was not as useful as collaborating with the other elementary school. Also, there's a difference between on-grade level 6th graders vs. the above grade level. The middle schools are more likely to have more of the struggling students taking Math A.
- I would like to see more interaction with teachers in the cluster. Getting together with other Math A teachers, maybe 1x a semester, to share would be way more helpful. You could share successes and frustrations.

MA68 Addressing needs of highly-able elementary students

- MA68 Addressing the needs of the highly-able elementary mathematics student-This training emphasized a book that led to many math discussions, but it did not give me classroom management skills for how to conduct discussions with my students. They would rarely stay on topic.

Appendix D: Comments on Supports MCPS Could Provide

Figure D1

Detailed Suggestions for Trainings From Teachers (T) and Math-support Staff Members (S)

MA68 and related training

- Offer a continuation of the MA68 course. (T)
- There's an MA60 class, it's a county class on manipulatives. It dealt with manipulatives for a variety of strands. I would love more training on the manipulatives we use. (T)
- I found M68 powerful. Make it more available down county so that it's easily accessible. (S)
- Require teachers to take Tier 1 training and compensate them. Provide math professional development courses. Look at what math is offered to teachers and you will see MA68 and that is all. Compare it to how many reading-related courses are available. If we are going to emphasize the importance of math then offer professional development in math. (S)

Follow-up

- Have refresher courses for those who've been teaching. It would be nice to have a day for those who are familiar. So you're not overwhelmed and they can say "you know when you teach _____, here's an interesting way to do this." I could really use it and it would be very helpful, but I don't know if it's possible with the budget situation. (T)
- Provide training for new teachers on content and strategies. (S)
- They used to have follow-up sessions, but I don't think they do anymore. We had three to four optional evening sessions as we got closer to a unit. The math specialist did an overview of the unit and highlights of the important items, made suggestions, pointed out parts of the guide book to help them, and teachers could ask questions and get suggestions. These were more valuable than the summer training. It would be huge if they could have that. Most teachers would go. It would be optional from 4-6 pm. It would also be a forum to talk about issues. (S)

Curriculum strategies

- Professional development of how to incorporate 5th grade MSA questions not covered in 6th grade course. (T)
- I would like to meet with program people to learn strategies for how to work with things covered in the assessment that are not in the curriculum. (T)
- Provide another training session for Units 3, 4, 5 for Math 6 similar to the Unit 1 and 2 sessions I attended previously. (T)
- Provide more training in how to use the four strategies you listed above for Math A teachers. (S)
- When this directive went out, many teachers did not have math backgrounds and the schools had to pick grade 5 teachers and tell them "you're teaching Math A." Also, they [teachers] don't have the long-range view so they tend to teach procedurally/formulas and not holding on to the understanding. It needs more support in the way of professional development. (S)

Technology

- I would like more training on technology. I have access, but need to learn how to put it all together for an interesting lesson or to hit different learning styles. (T)
- Would be helpful if staff development could provide ideas for implementation of technology with content of course. (T)

Other

- Training could be more comprehensive. And to have other opportunities beyond math 6 like specific units throughout the year. Many teachers are alone at their schools. (T)
- Keep offering the classes for Math A, etc. to be sure teachers have the skills. (T)
- Trainings where teachers can interact with other Math 6 teachers would be good. (T)
- Need workshops that offer things to be used immediately with a class (ideas, games, activities, etc.). (T)
- I would like to learn some projects to help expand understanding, like center activities. Make it more fun, but not at a basic level. (T)
- Training for primary-level teachers on higher-level thinking plus questions. They're very generalized, move to the level to answer higher-level questions. More on student-to-student discourse for math in the primary grades. Skillful teaching is good for discourse, but it would be good to have a version specifically for math. (S)
- Our teachers are knowledgeable, but more professional development online to reference and get support. When I've sent my questions to the math office, only a few were a-ha answers (i.e., we didn't know that at all). Most are noting things, math errors that were made. (S)
- Could always use more staff and materials, but training is big. Critical components of small-group instruction – why it works best, the importance of discourse, etc. so that more teachers really understand. (S)

Figure D2
Comments From Support Staff on Need for Acceleration for Mathematics in Earlier Grades

- We have to build the capacity at the lower grades. The first grade to teach 2nd grade level with excursions into 3rd grade, etc. Kindergarten teachers have made an effort to expose students to 1st grade math and were surprised by the outstanding results. Once teachers understand what and why, they get on board. It used to be “if I have time” about teaching the next level, but that key piece is important. Then they begin to make progress. (S)
- If it’s not going to change, then start at the primary level (starting with Pre-k and kindergarten) with advanced math in the curriculum. (S)
- Properly realign the math curriculum from grade K–5 so that students are being advanced from the beginning and more students will be ready for Math 5. They should start with the kindergarten curriculum. The K program used to be half day and now it is full day. If they took half of the 1st grade curriculum and moved it down to K (which definitely needs to be beefed up) then they would have room to shift the entire math curriculum for each grade. I think realignment of the elementary math curriculum would solve lots of problems. (S)
- Also, revise the curriculum in the lower grades so that you’re not pushing it on them. Put the advanced skills in the curriculum throughout the lower grades if you want them to have the skills in grade 5. Don’t have them only as challenges. (S)

Figure D3
Suggestions Included in the Other Category on MCPS Supports Needed From Teachers (T) and Math-support Staff Members (S)

- We need the safety compasses in order to teach the extensions. (T)
- Update the questions that are wrong in the guides. Get revisions out, I've never gotten any revisions. Even some of the answer keys to the unit assessments are wrong. (T)
- Scheduling of events within the school that take kids out of class can really cause problems getting through the curriculum. (T)
- Make sure you understand the content and the progression. (T)
- Make it as hands on as possible and promote student-to-student discourse. (T)
- Also, make sure teachers are ready to teach on grade and accelerated classes throughout 1st grade and up. Make sure discussions are happening at lower grades. (T)
- The way we pick the kids for advanced math should be more indepth. Some kids are not ready; one student has never passed a test this year. If we test them at the end of grade 4, then we'll have one more set of data to look at with MSA and teacher recommendations. We can say, "if you can do this you can go into Math A." They are a possible candidate. At the beginning of the year when they take a test for placement, they may have just forgotten over the summer. I put a student in regular math because she did poorly on the beginning of year pretest, but soon she remembered and pulled out all this knowledge. She was misplaced and now (that she moved math courses) she's excelled and is going into Algebra next year. (T)
- This should be one assessment for everyone, not school created. It should have the 5th grade objectives that you need to know before moving on—i.e., factors, multiples, etc. They need to know certain skills before coming to this class. Unit 2 is the hardest and they need to know 5th grade objective. If they don't know it, then I have to move down and start from the basics. (T)
- Funds for extra before- or after-school classes to help accelerate students. Struggling students at this school get extra reading support this way. We need to provide this kind of support for accelerating students. (T)
- If a student masters (i.e., 71%) of on level, they should move up and the next teacher should be sensitive to the gaps the student is missing. Sometimes the conversation with the teachers needs to be done at the abstract level. We need to have more conversations like that. There was push back at the beginning of the year. It's about those students who can't get it and not about accelerating students. I think teachers mark their progress by how fast their slow students progress. It's a different philosophy. (S)
- Have Math 6 course as a CPD [Continuing Professional Development] course. Get both credit hours and knowledge related to this class. Provide a power lesson for each unit, bringing someone in to demonstrate. Math Content Coach for every school! (S)
- Someone in central office to have to call for support. For example, when I found the question in the assessment that was wrong. (S)
- Teachers often speak of the order of the units (their displeasure) and I know from my own experience with the math department that it's very intentional and that it's based on developmental needs. There needs to be more time for teachers to learn how and why the curriculum is laid out and how math is taught developmentally. (S)
- Form a partnership with the colleges to allow teachers to take math courses to better their subject knowledge. (S)

- Rewrite the Math 6 guide so there is a 5th grade version and a 6th grade version so teachers who teach Math 6 to 5th graders have a resource that helps them know how to cover material 5th grade students need to know to handle the 6th grade topics. Right now if their students don't get concepts, they have to spend time back mapping to see where the problem is. This is time they spend researching information that could have already been provided. It is instructional time they lose. (S)
- I think they're assuming the staff development person is a support, but not all are math knowledgeable. (S)
- Provide more time for math. We have 60 minutes a day except Friday when we have 90 and it is not enough time to cover the curriculum and provide support to the students in concepts that give them difficulty. (S)

Appendix E
**Teachers' Advice Included in the Other Category for a Teacher of Math 6
to Grade 5 Students**

- Work on fractions, decimals, etc. from day 1.
- Set expectations high with parents and kids in the demand of the course. It is important that they understand that this class is different (middle school level) and that the assessments are different. Students will have more homework and they need more support from home and school.
- Start with a daily warm-up. Give a weekly quiz.
- Break down by week. Unit is too broad for a focus—instead create “angle week,” “circle week,” etc. Easier for students.
- Kids who are going to access the challenge parts still need instruction. They’re the hardest to plan for. They aren’t as needy. It takes extra planning for these students. It requires instruction because not all of it matches up. Some units connect between on and above, some seem random.
- Give students lots of practice.
- Ask for a good paraeducator. This can make a difference for you and for your students.
- Teach for more than one year so that you know the vertical articulation of various grade levels.
- Give them as much information as you can. Don’t limit what you teach them to the curriculum.
- Don’t give 30 problems for homework. Don’t have to beat a dead horse. I think most teachers know this.
- Set out overall year plan in advance.
- Be aware that there is a strong parent factor in this course.
- Gather as many extra materials, activities, resources, and websites as you can.
- If students are struggling at the beginning, make it feasible that they can go back to grade 5. A lot of teachers feel they are stuck and can’t go back, but they need to know that it’s okay if a student goes back to on-grade level.

Appendix F

Miscellaneous Comments From Math-support Staff Members on Teacher-related Factors That Impede Grade 5 Students' Success in Math 6

- The mindset of (the teachers in terms of) accelerating. Mastery is 71% of the objectives. The teacher is not happy with that. She needs to have 90–100%. As long as 71–72% met, the goal is met for that course.
- Teacher needs to be exposing students to Math 7 at the same time. When I asked which students will go on beyond math 7 next year, only one student was recommended for Algebra. I know there's probably more that are capable.
- If a school can designate an experienced teacher, that's helpful. Having this teacher for 5 years and another teacher with Math A experience is coming back next year, will be very helpful. You don't have to train newbies.
- Curriculum does a great job with strategies for solving problems, but when you get to abstract math, students are using the basic strategies they know and they need to leave that and start thinking abstractly.
- Make sure we can breakdown and we're respecting student perspectives and strategies. If it works in the end, that's their strategy.
- MCC [Math Content Coach] as a full-time position needs to be in place. Could teach a section. Could provide resources. If that was his/her focus—wow! Model discourse throughout the building. Provide a power lesson for each unit.
- We need Promethean boards. We don't have them here.
- I think all grade levels of teachers need to be introduced to how math concepts taught at each grade are linked to the big picture. For example, if a kindergarten teacher teaches the concept or a fraction and thinks of it only as the simple idea of teaching a student to shade one half of an apple without taking it a step further, then they are not buying into the big picture of where fractions will be going with that student and what they could be doing to help that student understand it just a little bit deeper. Why not expand it to one half as it relates to the whole or even one and one half. By the time a student reaches fifth grade they should have a strong understanding of fractions and fraction operations. I think it would be a good idea for elementary teachers to follow the development of a concept like fractions from kindergarten math to middle school or high school math.
- We're really excited where the county is going, but we need to take a look at what we're calling these math courses. If we want them to have Math 6, move some of the indicators down to Grade 5 so that more students can get them.
- Teachers need to think of assessments as an ongoing process, everyday, not “the MSA” and “the unit test.” Formal data collection needs to be opened up to use less traditional forms of assessments.