

## **REPORT OF FACT FINDING REVIEW**

### **John J. Marshall Elementary School**

### **Boston Public Schools**

#### **Executive Summary**

The Review Team found several factors working in combination to impede efforts to improve student achievement in mathematics at the John J. Marshall Elementary School. Primary among them is a persistently high rate of teacher turnover over the past several years, precipitating the addition of several first and second-year teachers who are unfamiliar with the *Investigations* mathematics curriculum and have not acquired the deep conceptual understanding of mathematics or developed a repertoire of pedagogical strategies required to effectively implement the program. This instability in staffing has significantly limited the positive academic impact of the school's family structure, and has undercut teacher, school, and district investments in professional development. In addition, difficulties with adequate and appropriate scheduling of coaching support for teachers in the classroom, have contributed to inconsistent math instruction and stagnant student performance. If current conditions persist, it is unlikely that any specific initiatives undertaken to improve teaching and learning in mathematics will have the requisite positive effect on student performance.

#### **I. Curriculum and Instruction**

The John J. Marshall School has been working to implement the district's elementary math curriculum, TERC *Investigations* in Number, Data, and Space, for several years. The curriculum is very structured, and provides individual soft-cover books for each unit, as well as teacher guides. A rigorous pacing guide provides a scope and sequence for instruction in each grade level, and vertically from grades K-5. This curriculum program is generally aligned with the state learning standards in mathematics. In some cases, the scope and sequence do not line up exactly with skills or strands as they are tested by the state assessment system in math. The district supplements the curriculum with 2 programs, AYP mathematics and with ten-minute math.

At the present time, the structural components for the delivery of *Investigations* in a workshop model are in place in most classrooms: launch, explore and summary. However, observers found limitations in the depth of teacher content knowledge and understanding. The negative impact of this limitation was evidenced in the inconsistent presentation of clear and accurate content, constraints on the variety of pedagogical approaches to problem solving, in the general lack of precision with mathematical concepts and language, and teachers' apparent inability to extend student thinking and talking about math (i.e., discourse) to higher levels.

#### **II. Climate and Culture for Learning**

When the Marshall School opened in 1971, the school was organized into "Families." In the 1970s and 1980s the school was reorganized by the principal into grade level pods. In 1993, the current principal restored the Family model to promote teacher stability, familiarity, and a small school culture. Students stay in the same family through grade five and siblings are assigned to the same "family." The principal and teachers agree that this structure has a positive impact on school culture, but this correlation is not clear. Student attendance is low, with a school-wide rate of 92.4. In 2005, 33% of the 618 students were chronically absent, up 10% from the previous

two years. Student transience is also a destabilizing factor, with the school's BPS profile listing a rate of 19.6% during the 2005-06 school year; the principal reports that it was 27.2%. Teacher attendance has improved this year, but medical and maternity leaves during the past three years have been disruptive to the "family" structure and climate for learning. While the negative impact of teacher turnover and multiple leaves is felt across the school, the amplification of this effect on those students in particular "families" that have had especially unstable staffing across multiple years would be substantial.

The open-wall structure of the pods increases the noise level and broadens the impact of any disruption or behavioral episode to all of the adjacent classes. The district is addressing this problem with scheduled addition of walls over the next two years.

### **III. School Leadership**

The principal has been leading the school for 16 years. She has the full confidence and support of district leaders. The principal has participated in a number of professional development opportunities related to teaching mathematics and is an active participant in most of the teams. An Instructional Leadership Team (ILT), Math Leadership Team (MLT) and grade level teams are in place and meet regularly. While these essential components to provide solid leadership in mathematics instruction are in place, they require further strengthening and support, and better communication and coordination to make them effective.

### **IV. Organizational Structures and Management**

The organizational structures and management systems in place at the school appear to be adequate. Full implementation and effective coordination of each of these structural components into a coherent approach aimed at meeting specific goals for improving student achievement in mathematics will require changes in staffing practices, mathematics training and coaching support for teachers in the classroom and in grade level teams, and putting in place mechanisms for cross-grade and cross-"family" coordination and communication.

### **V. District Support**

The infrastructure in place in the Boston Public School System (BPS) to support mathematics instruction is considerable. The district has been implementing a district-wide plan for math reform in grades Kindergarten through 5 for the past six years. The centerpiece of the initiative is TERC Investigations in Number, Data, and Space. The district has been conducting Internal BPS implementation learning walks in superintendent schools, that is, schools with an NCLB AYP status of corrective action or restructuring, or a state accountability status of underperforming. The learning walks team the Deputy and Assistant Superintendents, BPS mathematics Program Directors, the principal and others to observe mathematics instruction in every classroom in order to gauge the level and quality of implementation of the math program. As a participant in the diagnostic fact-finding review, the Deputy Superintendent for the Triad in which the school is located concurred with the team findings and helped formulate priority recommendations to address them expeditiously this summer for the start of next school year.

## **John Marshall Elementary School Priority Recommendations**

**The diagnostic Fact-Finding Team recommends the following actions be undertaken prior to the start of the 2006-2007 school year to address key findings of the review.**

### **School**

- ✓ Pilot specialization in math and science instruction at the 4<sup>th</sup> and 5<sup>th</sup> grades in one family, beginning in September 2006.
- ✓ Enlist teachers with strong math content and pedagogy not currently serving on the Math Leadership Team to join the team in an effort to broaden initiatives designed to broaden efforts to strengthen math instruction and foster math leadership throughout the school.
- ✓ Work with teachers and coach to assess pressing individual training needs in order to differentiate where possible/necessary.

### **District**

- ✓ Grant the principal authority to refuse transfer of teachers who are not highly qualified, highly recommended, and appropriate to the role that needs to be filled.
- ✓ Increase time of mathematics coach currently working in the school to 4 days per week (.8), for a total of 1.5 math coaches.
- ✓ Convene a planning group in early summer--including the principal, math and science specialist(s), district administrators, and teachers--to create a detailed action plan to facilitate smooth implementation of the pilot in September. The plan should include benchmarks through the 2006-07 school year to measure implementation and impact of the pilot of specialization.

### **State**

- ✓ Provide school improvement grant of \$25,000 for work during the summer.
- ✓ Assign Department of Education Liaison to monitor and support the implementation of priority recommendations resulting from diagnostic fact finding review.
- ✓ Support granting certification waiver, only in the event a teacher volunteers to commit to serving in the specialization pilot by teaching in the SEI classroom in exchange for participation in the district's pilot of the streamlined SEI training and certification program.

## **Fact Finding Review Process**

The purposes of the Fact-Finding Review are to:

- Provide an in-depth diagnosis of the school's strengths and areas for improvement, including specific causal analysis.
- Use extensive observation (school and classroom) to build a knowledge base for the school's planning work.
- Make specific recommendations for priority actions to improve student achievement.

At the conclusion of the review process, the Fact-Finding Team's charge is to advise the Commissioner and Board of Education of its judgment on two key questions:

1. What are the reasons for the low levels of student performance in ELA and mathematics at this school?
2. What are the prospects for improved student performance at this school?

The Fact-Finding Team answers the key questions based on evidence collected through observations of teaching and learning, interviews of faculty, students, administrators, district personnel and other school stakeholders and through the review of documents, including the school improvement plan, student assessment information, curriculum documents and student work. The team's judgments must be robust and fully supported by evidence.

The Fact-Finding Team's judgments are guided by a protocol that requires the team to respond to the key questions in each of the following domains: curriculum and instruction; school culture and climate for learning; organizational structures and management; school leadership and district support. The Fact-Finding Team uses its professional judgment to focus on domains that reveal key strengths and areas for improvement in the school.

### **Diagnostic Fact Finding at the John Marshall Elementary School**

The John Marshall Elementary was referred for a School Panel Review in Winter 2004. At that time, the Panel found a school improvement plan in place as well as many of the conditions to implement the plan and improve student performance. Guided by the Panel Review Report, the Commissioner found the Marshall School not to be under-performing. The Mid-cycle IV (2005-2005) AYP Report issued in October 2005, however, showed that the school had not made Adequate Yearly Progress in the aggregate in mathematics for seven years, and had not made Adequate Yearly Progress in English language arts for three years, resulting in an NCLB accountability status of Restructuring in mathematics and Identified for Improvement in English language arts. Following discussion between Department of Education and Boston Public Schools district administrators, a diagnostic fact-finding review was scheduled to identify root causes for the persistently low performance and failure to improve in mathematics, and to make priority recommendations for immediate actions to address those causes.

A core team of three Department of Education evaluators teamed up with Boston Public Schools administrators and personnel, including the school principal, school support specialist, and the Deputy and Assistant Superintendents for Triad B. In addition, three BPS math program directors and three DOE math specialists paired up into three teams of two to conduct joint classroom observations of mathematics instruction.

The full team met at the outset of the review to examine available student performance data and other information relevant to mathematics instruction at the school and form some hypotheses to

help focus the inquiry. (See Appendix A for a list of team members and titles). A series of review activities were carried out by the core team of three DOE evaluators and the joint state and district math teams over a series of days from late March through April, including a mid-point check-in to summarize provisional findings and additional questions for the final stage of the review. (See Appendix D for the scheduled activities.) A final half-day meeting was held in early May to summarize the findings, strategize and formulate priority recommendations for immediate interventions to improve student achievement in mathematics at the school.

## **Marshall Elementary School Profile**

### **Enrollment**

The Marshall School serves students in grades K through 5. Enrollment at the Marshall School has decreased from 774 in 2003 to 622 in 2005. Between 2002 and 2005, student demographics have remained relatively stable. The proportion of Low Income students has risen slightly from 80 percent to 85 percent, and the proportion of Limited English Proficient students has risen slightly from 18 percent to 22 percent. Proportions of Marshall School student subgroups in 2005, as compared to state averages, are presented below:

<b>Subgroup</b>	<b>School's 2005 % Enrollment</b>	<b>State Average % in 2005</b>
Asian	1	5
Black	62	9
Hispanic	33	12
Native American	2	0.3
White	1	74
Low-Income	85	28
First Language Not English	28	14
Limited English Proficient	22	5
Special Education	16	16

In 2005, the attendance rate at the Marshall School was 92.8 percent, with students absent 11.1 days on average. These values reflect a lower attendance rate than the state average of 94.4 percent and the state average of 10.0 days absent. Attendance rates are somewhat higher in the upper grades, ranging from 91.3 percent in Kindergarten to 95.3 percent in fourth and fifth grade. Chronic absenteeism rates are correspondingly highest in the lower grades and lowest in the upper grades. Attendance rates are highest for Asian students (96.7 percent) and lowest for White students (89.4 percent). Although the White students have the second lowest average number of days absent (8.8), they have a chronic absenteeism rate of 76.5 percent, much higher than all other subgroups (18.2 to 33.6). The school's retention rate was 5.0 percent in 2004, the last year for which this data is available. The Marshall School's in-school suspension rate in 2005 was 0.3 percent, while out-of-school suspensions averaged 0.5 percent. Averages in 2005 for the state were 4.5 percent for in-school suspensions and 6.1 percent for out-of-school suspensions.

### **Staffing**

The 2005-2006 Marshall School staffing report indicates that the school is comprised of three administrators, forty-eight teachers, one librarian, four long-term substitutes, one nurse, eight teacher aides, and thirteen other staff. The principal has been at the school for sixteen years and

has a total of twenty years of administrative experience. There are also Assistant Principal and a LAB Cluster Coordinator. Of the teachers, approximately 34 percent have been at the school for more than ten years, 18 percent for between five and ten years, and 43 percent for less than five years. Seven teachers (15 percent) are new to the school this year and this information was not reported for two teachers (4 percent). On average, teachers have been at the Marshall School for 8.8 years. Twenty-six percent of the teachers have twenty years or more of overall teaching experience. Another 26 percent have between 10 and 19 years of teaching experience, 18 percent have between five and nine years of teaching experience, and 25 percent have less than five years teaching experience. Three teachers (6 percent) are in their first year of teaching and this information was not reported for one teacher (2 percent). On average, teachers at the Marshall School have 13.5 years teaching experience. Nearly 94 percent of teachers are reported as highly qualified and approximately 58 percent hold an advanced degree.

### **MCAS Overview**

Students at the Marshall School are assessed in Grades 3 and 4 in English language arts (ELA) and in Grade 4 in mathematics. The Marshall School's Adequate Yearly Progress (AYP) report for 2005 Mid-Cycle IV shows an accountability status of Identified for Improvement for English language arts (ELA) and Restructuring for mathematics. The school failed to make AYP in ELA in the aggregate and for all reported subgroups: Limited English Proficient, Low Income, African American/Black, and Hispanic.<sup>1</sup> The last year in which the school made AYP for ELA was 2002.

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<sup>1</sup> In accordance with the federal No Child Left Behind Act passed in 2001, student performance is disaggregated by the following subgroups: Limited English Proficient, Special Education, Low-Income, African-American/Black, Asian or Pacific Islander, Hispanic, Native American, and White. A minimum of 40 students (or 5% of the total number of students assessed, whichever is greater) per subgroup is required to issue a statistically sound rating or determination of Adequate Yearly Progress (AYP). The subgroups meeting the minimum sample size at Marshall Elementary School in 2005 were Limited English Proficient, Low Income, African American/Black, and Hispanic for ELA, and Low Income and African American/Black for mathematics.

In mathematics, the school failed to make AYP for students in the aggregate and for all reported subgroups: Low Income and African American/Black. The school has not made AYP for mathematics since it was first reported in 1999.

**GRADE 3**

**Reading MCAS Results**

Results of the 2005 Grade 3 Reading MCAS for students at the Marshall School are presented below:

2005 Reading	Percent			
	A	P	NI	W/F
Aggregate	N/A	10	62	28
Regular Education	N/A	13	64	23
Special Education	N/A	10	75	15
Limited English Proficient	N/A	0	42	58

Regular Education students performed somewhat better than Special Education students. However, Limited English Proficient students earned significantly lower scores, with zero percent of LEP students scoring Proficient and more than half scoring Warning/Failing. There has been a gradual decrease in student performance since 2001, as reflected in the aggregate Grade 3 Reading MCAS performance presented below:

Aggregate Reading	Percent			
	A	P	NI	W/F
2005	N/A	10	62	28
2004	N/A	15	57	28
2003	N/A	25	48	28
2002	N/A	22	61	16
2001	N/A	23	56	21

The percentage of students scoring Proficient has ranged from a high of 25 percent in 2001 to a low of ten percent in 2005, while the percentage of students scoring Warning/Failing dropped from 21 percent in 2001 to 16 percent in 2002, then rose to 28 percent from 2003 through 2005. The percentage of students scoring Needs Improvement also hit a high in 2005 with 62 percent of students scoring in this category. The following historical performance of selected subgroups shows an increase in overall performance for Special Education students but a decline in overall performance for Limited English Proficient students.

Special Education Reading	Percent			
	A	P	NI	W/F
2005	N/A	10	75	15
2004	N/A	17	26	57
2003	N/A	N/A	N/A	N/A
2002	N/A	6	47	47
2001	N/A	5	50	45

<b>Limited English Proficient Reading</b>	<b>Percent</b>			
	<b>A</b>	<b>P</b>	<b>NI</b>	<b>W/F</b>
2005	N/A	0	42	58
2004	N/A	0	63	38
2003	N/A	0	45	55
2002	N/A	73	27	0
2001	N/A	65	35	0

Since 2001, the percentage of Special Education students scoring Proficient has risen from five percent to ten percent, and the percentage scoring Warning/Failing has decreased from 45 percent to 15 percent. Simultaneously, the percentage of students scoring Needs Improvement has risen from 50 percent to 75 percent, indicating movement from Warning/Failing to Needs Improvement. However, during the same time period the performance of Limited English Proficient students has dropped significantly. In 2001, 65 percent of LEP students scored Proficient while zero percent scored Warning/Failing. In 2005, the numbers were almost completely reversed: zero percent scoring Proficient and 58 percent scoring Warning/Failing. Between 2001 and 2005, the percentage of students scoring Needs Improvement ranged between 27 percent (2002) and 63 percent (2004). Although the Marshall School does have a significantly higher LEP population than the state average (22 percent vs. 5 percent), the percentage of LEP students at the school has only risen four percentage points since 2002.

**GRADE 4  
ELA MCAS Results**

Results of the 2005 Grade 4 ELA MCAS for students at the Marshall School are presented below:

<b>2005 ELA</b>	<b>Percent</b>			
	<b>A</b>	<b>P</b>	<b>NI</b>	<b>W/F</b>
Aggregate	0	5	62	32
Regular Education	0	8	67	25
Special Education	0	0	62	38

As in Grade 3, Regular Education students performed somewhat better than Special Education students. There has been a slight decrease in student performance since 2001, as reflected in the aggregate Grade 4 ELA MCAS performance presented below:

<b>Aggregate ELA</b>	<b>Percent</b>			
	<b>A</b>	<b>P</b>	<b>NI</b>	<b>W/F</b>
2005	0	5	62	32
2004	1	17	46	37
2003	0	13	52	35
2002	0	12	64	24
2001	0	17	55	28

The percentage of students scoring Advanced/Proficient has ranged from a high of 18 percent in 2001 to a low of five percent in 2005, while the percentage of students scoring Warning/Failing

has ranged from a high of 37 percent in 2004 to a low of 24 percent in 2002. Performance has been variable from year to year, with no clear patterns within or between categories. The following historical performance of Special Education students shows improving but overall low performance.

<b>Special Education Reading</b>	<b>Percent</b>			
	<b>A</b>	<b>P</b>	<b>NI</b>	<b>W/F</b>
2005	0	0	62	38
2004	0	3	24	74
2003	0	0	28	72
2002	0	0	30	70
2001	0	8	21	71

The highest percentage of Special Education students scoring Proficient, eight percent, occurred in 2001, but 71 percent scored Warning/Failing that year as well. Since 2001, the percentage of Special Education students scoring Proficient has dropped to zero percent. The percentage scoring Warning/Failing stayed varied little through 2004, then dropped significantly to 38 percent in 2005. Correspondingly, the percentage scoring Needs Improvement rose to 62 percent, indicating movement from Warning/Failing to Needs Improvement.

#### **GRADE 4**

##### **Mathematics MCAS Results**

Results of the 2005 Grade 4 Mathematics MCAS for students at the Marshall School are presented below:

<b>2005 Math</b>	<b>Percent</b>			
	<b>A</b>	<b>P</b>	<b>NI</b>	<b>W/F</b>
Aggregate	0	4	57	39
Regular Education	0	7	61	33
Special Education	0	0	58	42

As in Grade 3, Regular Education students performed somewhat better than Special Education students. Student performance has been variable since 2001, with similar results in 2001 and 2005. This is reflected in the aggregate Grade 4 Mathematics MCAS performance presented below:

<b>Aggregate Math</b>	<b>Percent</b>			
	<b>A</b>	<b>P</b>	<b>NI</b>	<b>W/F</b>
2005	0	4	57	39
2004	0	5	48	47
2003	2	5	48	46
2002	0	2	45	53
2001	2	2	54	41

The percentage of students scoring Advanced/Proficient has ranged from a high of seven percent in 2003 to a low of two percent in 2002, while the percentage of students scoring Warning/Failing has fluctuated between 39 percent (2005) and 47 percent (2004). The following historical performance of Special Education students shows an increase in overall performance for Special Education students.

<b>Special Education Math</b>	<b>Percent</b>			
	<b>A</b>	<b>P</b>	<b>NI</b>	<b>W/F</b>
2005	0	0	58	42
2004	0	0	23	77
2003	0	0	24	76
2002	0	0	35	65
2001	0	0	33	67

Between 2001 and 2005, zero percent of Special Education students have scored Advanced/Proficient. However, the percentage of Special Education students scoring Warning/Failing has decreased from 67 percent to 42 percent, while the percentage scoring Needs Improvement has risen from 33 percent to a high of 58 percent, suggesting movement from Warning/Failing to Needs Improvement.

## **Key Domains of Inquiry**

As explained above in the description of the Fact-Finding Process, the diagnostic review at the Marshall Elementary School focused on identifying root causes for persistently low performance in mathematics. After meeting to review student performance, teacher professional development and other data and information on the school, the diagnostic fact-finding team formulated several specific questions to concentrate their inquiry (Appendix B). The evidence and findings gathered during the various activities and reported below are organized under the five domains that shape the standard independent fact-finding review conducted in underperforming schools: Curriculum and Instruction, Culture and Climate for Learning, School Leadership, Organizational Structures and Management, and District Support. Key findings are intended to guide the leadership team in developing a focused plan to improve teaching and learning in mathematics. The resulting recommendations respond directly to these key findings, and were developed by the consensus of the review team.

### **I. Curriculum and Instruction**

Boston Public Schools initiated a system-wide effort to strengthen mathematics teaching and learning in 1999. At the elementary level, the district adopted *Investigations in Number, Data, and Space* and other resource material developed by the Elementary Mathematics Office. The Investigations curriculum materials include a set of individual booklets for students, one for each unit, and a comprehensive teacher guide. There is a pacing guide that prescribes which unit teachers are teaching and how long teachers should spend on each unit in this spiraling curriculum. The guide functions as a scope and sequence for classroom instruction that should vertically align content by grade level at the Marshall school from Kindergarten through fifth grade. This year, in response to district-wide requests, the district has allotted several days for teachers to review more challenging concepts and revisit material covered early in the school year in preparation for mid-and end-of-year assessments.

*Investigations* is taught in a workshop setting. The emphasis is on students' developing higher order thinking through the exploration of the process of solving problems. Teachers are expected to emphasize the process and encourage multiple routes to a solution. The teacher's ability to model problem-solving by "investigation," and to make sense of students' alternate solutions is key to the successful implementation of the program. Both the material and the mode of the curriculum require strong content knowledge on the part of teachers, including a deep understanding of the underlying mathematical concepts that shape the units. For various reasons, many of the teachers at the Marshall do not demonstrate, or have yet to develop, adequate content knowledge and conceptual understanding to fully implement this curriculum.

#### *Preparation for Instruction*

The team found many of the structural elements supporting delivery of the *Investigations* math program in a workshop setting in place at the district and school levels. However, due to limited depth of understanding of mathematical concepts, the number of inexperienced teachers, and insufficient levels and variety of coaching activities to support the development of teacher knowledge and capacity in mathematics, many teachers continue to struggle with the full implementation of the curriculum. Many have difficulty pushing students to deepen mathematical thinking and discourse, and facilitating student investigation.

Teachers have access to student performance data from end-of-unit assessments and mid-and end-of-year district-wide assessments. Results of these assessments, as well as MCAS results are reviewed by the Instructional Leadership Team (ILT) to determine school-wide performance patterns and are then shared with grade level teams. These results are driving strategic conversations about mathematics in various team meetings.

There is a strong emphasis at the district level on teachers using team time to analyze student work in order to identify specific learning needs and to formulate strategies to address them in their own classrooms and across grade levels. Teachers at the Marshall are currently dedicating three out of their four monthly grade level team meeting times per month on mathematics instruction. During several meetings observed by the review team over a two-week period—of the MLT, GLT, ILT and CCL-M sessions—teachers were focused on looking at student work in math. In the meetings observed, there was a strong reliance on the coach to keep the conversation mathematically accurate and accountable to the big ideas. Teachers spent a lot of time at the beginning of each of these meetings engaged in solving the math problems themselves, before looking at the student work. Little time was allocated to developing instructional responses for what was seen in the student work.

#### *Delivery of Instruction*

The schedule now includes 60 minutes of mathematics instruction in the workshop setting per day at every grade level, and a 30-minute AYP period for grades 3,4, and 5. AYP packets are provided by the district math office, and contain work in areas of need identified from previous years' assessment results. In addition, all schools have been instructed to do 10-minute math, spending ten minutes per day in every class working on a problem of the day.

District monitoring reports, teacher responses on an instructional survey completed in preparation for the review, in teacher focus groups, and interviews with the principal, math program director, math coach all indicate that, with a few exceptions, teachers' have different levels of comfort with the mathematical concepts. Inability to model and elicit discourse around math is apparent. Novice teachers, in particular, reported struggling with the demanding pace and spiraling content of the math curriculum.

Three teams comprised of one Department of Education math specialist and one Boston Public Schools elementary math program director each observed eight full mathematics lessons (for a total of 24 lessons). Each of the paired teams met briefly after each lesson to form consensus about what they had seen. The three teams then met together as a group to process themes identified across classes, capture the findings, and formulate priority recommendations based on the findings. Appendix C provides a quantitative summary of the teams' findings.

#### Summary Findings from Classroom Observations

In keeping with the pacing guide, teachers across grade levels were teaching the same lessons or reviewing in preparation for assessments. Strong evidence of grade level collaboration was observed, particularly in the second grade review lessons, where observers saw clear commonality of focus across the lessons.

Observers reported several missed opportunities to explain, illustrate, or expand conceptual understanding of students. Several examples of mistakes or misconceptions that were undetected or unaddressed were observed. For example, a discussion of two and three dimensional figures in

which the teacher failed to make a distinction between squares and prisms, one in which square and cube were used as synonyms. Overall, observers reported a lack of precision and clarity about mathematical language.

Some teachers encouraged student thinking through struggle. Two teachers in particular, one in a special education class, demonstrated solid scaffolding to move the students to higher order thinking. More often, teachers were observed presenting specific strategies as the end rather than the means to solving a problem.

Examples of student work were seen in every classroom. Some observers saw teacher-generated exemplars, with student input. Students were respectful of each other. Observers reported hearing many students explaining their thinking; e.g., “I think this because,” “I disagree because.” In several other cases, observers heard students asking probing questions that suggested higher order thinking on their part. Teachers were not heard generating these kinds of questions.

Teachers seemed comfortable with the launching of the lessons. Observers reported seeing strong openings in many lessons. Observers reported very mixed responses to the way teachers guided group work. In some cases, it was unclear why students were being grouped in a particular way; in several cases, students were arranged into group seating, but not engaged in group work. Summary was in evidence in all classrooms; but this important aspect of *Investigations* was in an earlier stage of implementation across the classrooms observed. During the summary, teachers were tentative and many did not make connections between the big math ideas underlying the lesson, nor did they connect what they were doing to previous lessons. Not all students were still engaged in the lesson at this point.

### ***Key Findings***

- ✓ Structural components of the *Investigations* workshop model were in place in most classrooms. The duration of each component is appropriate; and transitions from one component to the next flow smoothly.
- ✓ With a few notable exceptions, the inadequate level of teacher knowledge of math content and depth of understanding of math concepts is preventing full implementation of the substance of the math program and impeding student progress, despite many teachers’ best efforts.

## **II. Culture & Climate for Learning**

The school schedule and practices support a collaborative work environment. Time is slotted for teachers to meet in GLTs weekly, and three of four meetings per month are now devoted to math. Teachers reported that they rely largely on the grade level teams for support around instruction. There is no common planning time for “families,” although families share a common lunch period, and teachers report that they sometimes use that time to talk about students. Effective implementation of the “spiraling” *Investigations* math curriculum demands ongoing alignment and coordination across grade levels, which is not currently part of the schedule. The

principal and coach report that cross-grade professional development is planned for the coming school year.

Student attendance at the Marshall School is low school-wide at 92.4%. In 2005, 33% of the students were chronically absent (that is, absent more than 10% of their days in membership). In the on-line BPS Profile, the Marshall School reports a 19.6% student mobility rate for 2004-05.

### ***Key Finding***

- ✓ The level of instability resulting from the combined effects of low student attendance, and high student and teacher mobility, constitutes a perennial challenge to establishing and maintaining a consistent climate of high expectations for learning.

### **School Leadership**

Leadership and management at the school is centralized and strong. The principal, who has been in this position for 16 years, has the complete confidence of district administrators. She is a Cluster Leader for Cluster 7, one of three clusters of 10-14 schools within Triad B. Cluster Leaders are principals or headmasters within the cluster who are responsible for providing support services, representing the cluster on the Superintendent's Leadership Team, and communicating to the principals and headmasters the priorities and direction of the Superintendent and his Leadership Team. In 1999, the Marshall School was one of 24 Boston Public Schools designated by the Boston Plan for Excellence and the Superintendent as an Effective Practice School. These 24 schools served as pilot locations for new initiatives, based largely on the presence of effective leadership in the building. The principal is an active leader who makes frequent visits to classrooms, and demonstrates a solid grasp of student academic and social needs by family, grade level, and in many cases, by individual student. The principal describes the Assistant Principal's role as focused on teaching and learning.

### ***Distributed Leadership for Raising Mathematics Achievement***

The principal and a core of teachers have demonstrated their willingness to help lead improvement efforts in mathematics through their involvement on the MLT, and voluntary participation in Developing Mathematical Ideas seminars. The principal has participated in principals' trainings on mathematics. She leads the Instructional Leadership Team (ILT), sits on the Math Leadership Team (MLT), and makes occasional visits to grade level teams. Each of these teams is intended to have a direct impact on instruction and provides an opportunity for the development of teacher leaders. The Principal appears to encourage teacher involvement in the teams, but suggests that not all teachers are able or willing to serve on the appropriate teams. As a result, the MLT may not include the teachers with the strongest math content knowledge or experience teaching *Investigations*.

The principal and coach attended the Math Leadership Team (MLT) meeting. The new Math Facilitator (MF) opened the meeting and shared information on the availability of assessment results. The coach carried the meeting, directing teachers' review of problems from the mid-year assessment that gave students the most difficulty, using a school-wide protocol for looking at student work (LASW). Teachers first did two of the problems, and then processed them in order to identify and understand the big mathematical ideas in the unit and how they link to previous

units. The MLT meeting ended without summary or next steps. Team members agreed to point their grade level teams to the assessment results on MyBPS. When asked to describe their role on the MLT, teachers reported that they took the information shared at MLT meetings back to their grade level teams.

In two grade level team meetings observed following the MLT and focused on math, teachers from the MLT took on responsibility for leading discussions of student work on the mid-year assessment. One team member did report on the availability of assessments and other information from the MLT. Both teams spent the time reviewing student work from the assessment and talked about using a new rubric in different ways. There was confusion among one team in recognizing levels of student understanding as demonstrated in the work in relation to the standard articulated in the rubric, suggesting more common training in using the rubric might be necessary. The discussion about the range of difference in scoring the work also suggested that the MLT members leading the discussions were not equipped to help build a shared understanding of standards of performance among the staff, and indicated fairly low expectations on the part of some teachers for student work.

The coach demonstrated deep knowledge of content and pedagogy. The CCL-M observed was well planned and facilitated. The unit documentation was the textual basis for the session. The coach modeled *Investigations* methods when conducting her discussions with teachers. During the group's observation of the teacher's demonstration of the lesson in the classroom, she directed teachers to think about student understanding of the concepts as demonstrated by the discussions. All teachers participated actively in the discussion. Gaps in teacher content knowledge were apparent in both the level and duration of discussions about their approaches to solving the problems. This was the first CCL-M attended by the 4<sup>th</sup> grade team this year. At the end of this CCL-M session, where the coach previewed an upcoming unit to facilitate teachers' presentation, some teachers were still struggling with the key concepts in the unit as they prepared to teach them.

During the 2005-2006 school year, all teachers participated in CCL-Ms. In addition, the special needs teachers had a math coach who was at the Marshall once a week. All of her work was in classrooms providing one on one coaching.

For the past five years, the principal reports that the coaching model had been one on one. The structure of coaching support available this year did not allow for time for the coach to follow up with the teacher who voluntarily demonstrated the lesson introducing the unit, although the demonstration and the subsequent discussion by teachers indicated a need for more individual support. Teachers reported they have interacted with the coach approximately once a month. She attends some LASW team meetings, runs PD sessions (CCL-M), and led a previewing units training at the beginning of the year. She is reportedly available by email and very responsive. She is not providing one-on-one coaching for teachers. When asked how often they would like to work with the coach, teachers attending the CCL-M agreed that two hours a week, one for a classroom visit and one hour of one-on-one coaching would be ideal. Teachers reported very little interaction with the coaches assigned to the school during the previous year.

A Math Facilitator, new to the role, attends district meetings and brings information, largely on assessments, back to the Math Leadership Team for dissemination to the grade level teams. The district also provides Math Leadership Institutes, which four Marshall teachers have participated in during the past two years. Two of those teachers currently serve on the MLT. There does not

appear to be a clear understanding by the teachers as to the purpose of the Leadership Institutes beyond providing them with three additional CCL-M sessions.

The math coach working in the school during this 2005-06 school year is experienced and skilled. She has established a good working rapport with the principal and staff. The decision was made by the principal, in conjunction with the ILT, to utilize the coach's 60 days this year primarily in leading CCL-M sessions by grade level, and during some team meeting times to support looking at student work. In response to this need, the coach's time will be increased next year (2006-07) to 80 days.

Given the demonstrated and expressed needs of many teachers—who indicated in focus groups a need for more coaching support, particularly follow-up one-on-one support in their classrooms—this is clearly inadequate. The need for not only more coaching time per week, but also for a fuller range of coaching activities, was apparent to the team in their observations of the MLT's session led by the coach, and the subsequent follow-through of that work by the MLT members in their grade level teams. The MLT relied heavily on the coach's direction and instruction during the MLT meeting

### ***Key Findings***

- ✓ The existing structures for distributed leadership for improving student achievement in mathematics through the ILT, MLT and grade level teams are not presently working together effectively to improve student performance.
- ✓ To build the needed leadership capacity among the staff, enhance the caliber of work done in each of the teams, and strengthen the school-wide coordination of their efforts, substantial coaching support and regular and clear communication between the teams will be essential.

### **III. Organizational Structures and Management**

The Marshall School schedule allows adequate time for teacher collaboration and planning for improved student achievement. The Instructional Leadership Team (ILT) meets twice a month, the Math Leadership Team (MLT) meets monthly, and grade level teams meet weekly. A Student Support Team (SST), including the principal, adjustment counselor, and several teachers meets regularly to discuss possible intervention for students who are not coming to school or who appear to be struggling. When asked in focus groups, teachers consistently identified their grade-level team as their primary source of support for teaching.

#### ***Professional Development – Mathematics***

The Boston Public School district offers a wide range of professional development opportunities for its teachers in the area of mathematics. Teachers are reportedly required to take three of the five Developing Mathematical Ideas (DMI) modules available: *Building a System of Tens* (BST); *Making Meaning for Operations* (MMO); *Examining Features of Geometric Shape* (EFG); *Measuring Space in One, Two, and Three Dimensions* (MS); and *Working With Data* (WWD). It is unclear how teachers' completion of these required three modules is monitored by the district and/or school, or the timeframe or implications for that completion.

According to district administrators, teachers at the Marshall have availed themselves of district and school-based professional development more than do teachers from other BPS schools. Data provided by the district math office and by the school shows that while some teachers at the Marshall have participated in a number of the DMI seminars, math Leadership Institutes, and school-based trainings since 1999, there is great variation in teacher participation.

Most veteran classroom teachers have taken the first two DMI seminars (BST, MMO), many of those have gone on to take EFS, and a subset of these went on to take several remaining offerings, including Curriculum Institutes, Advanced Curriculum Institutes. Five teachers have also participated in a two-day special education workshop. However, seven of the new teachers (one or two years) have participated in none of these offerings. The impact of these combined factors is most obvious at the fourth grade, where four of the seven teachers are new and have received no content training in math.

Some changes to the curricula for the seminars, as well as probable variability in provider quality across the seven seminars and across the seven years from 1999 to 2006 have no doubt contributed to a less-than-coherent understanding on the part of current staff about how to teach the program.

A central component of the district's math plan is school-based training and ongoing support for implementing the math curriculum in the classroom through Collaborative Coaching and Learning Mathematics (CCL-M). The CCL model was designed to support literacy instruction in the Boston Public Schools and was piloted in the Marshall School as an Effective Practice School. In the literacy model, teachers and the coach identify a course of study, and then meet weekly for eight weeks, including a shared lab site experience. The group, typically by grade level, conducts research and an inquiry around strategies that may improve practice in the identified area, and one-on-one coaching is used to support implementation of newly learned strategies into each participant's practice.

Based on the success of the model for literacy, the district has adopted a modified version to support math instruction, CCL-M. Unlike the eight-week sessions in literacy, the CCL-M is one half-day session focused on an upcoming *Investigations* unit. Teachers spent the first part of the session doing the math, and then worked with the coach to identify and understand the big ideas underlying the unit, how they connect to previous units, and how to anticipate and deal with student difficulties that may arise when they teach the unit. A teacher volunteers to model the lesson, while her/his colleagues observe and participate in the explore segment of the lesson. The group then meets to debrief with the coach on what happened during the lesson. At the end of the session, teachers who were still struggling with understanding the concepts were left to implement the unit on their own, without any follow-up support from the coach in the classroom.

The Marshall staff was scheduled to participate in two or three CCL-Ms per grade level from grades K-5 during the 2005-06 school year. The math coach led sixteen of those sessions at the Marshall School and four sessions at the McKay School in East Boston, a district Learning Site. Both of the second grade CCL-Ms took place at the McKay School in February 2006, the fourth and fifth grade teams also spent a day at the learning site as part of their CCL-M training.

In addition, teachers in Sheltered English Instruction (SEI) classrooms participated in a CCL-M on supporting math instruction for second language learners, and two of those teachers participated in a CCL-M at the McKay School for SEI. Three teachers took a two-day special education math seminar. Two grade five, one grade four, and one grade three teacher took a Knowing Math Intervention training.

Attempts to correlate the available information into a coherent picture of the relationship between participation in professional development and teacher content knowledge and pedagogical skill in teaching the *Investigations* curriculum (as evidenced by increased student achievement) are difficult. The picture is complicated by the high rate of teacher turnover during the past few years, the variability in the content and quality of district offerings since 1999, and by the level and quality of coaching support for follow-through during implementation in the classroom. Classroom observation and attendance at meetings with the MLT and grade level teams, as well as follow-up interviews, did not suggest a high level of confidence in, or comfort with, the curriculum on the part of many teachers. In focus groups, teachers expressed a need for more individual coaching support to implement the curriculum and keep up with the pacing guide.

Despite what appears to be a substantial amount teacher training, five years into implementation of the math plan there is strong evidence that insufficient math content knowledge is limiting teacher capacity at the Marshall School. Many teachers have not been modeling multiple approaches to problem-solving and facilitating the higher order thinking that is central to the district's chosen mathematics curriculum.

#### *Behavior/Discipline*

There was some inconsistency in the extent to which teachers perceive disruptive behavior as an impediment to instruction. Student behavior is a recurring theme in teachers' narrative responses to Question 13 of the survey, with over half of the respondents citing poor student behavior and inconsistent consequences as the most significant causes for low student performance and barriers to improvement. Only 20% of the staff listed classroom organization and management as one of their top three needs for additional professional development. In focus groups, teacher's responses were also mixed; some teachers reported that student behavior had a negative impact in their classrooms, while others did not believe it was a factor. Of the 24 math lessons observed, the disruption effectively sidetracked instruction in only two. There is currently a teacher on assignment who functions primarily as the Dean of Discipline. She is responsible for assisting teachers with classroom climate issues, lunch duty, student and family support, suspension hearings, in-house suspensions, and detentions. In addition, the Dean assists the principal with the Saturday School initiated this year as a consequence for disruptive behavior. The Dean of Discipline also supervises the students while the principal meets with families to develop behavioral plans.

#### *Instructional Materials/Resources*

On the DOE Instructional Staff Survey completed by teachers prior to the on-site review, the 56 respondents split on the availability and adequacy of resources and materials, with 41% reporting that they are "available and adequate," 46% reporting "available but not adequate," and 13%

responding “not available, but needed.” In focus groups, newer teachers tended to feel that they did not have basic supplies like scissors. One teacher reported buying her own paper. Veteran teachers tended to report that the principal gets you what you need. When the availability of particular math manipulatives that will be needed to teach upcoming units was raised at an MLT meeting by teachers, the principal reported that the manipulatives had arrived at the school. While this does not rise to the level of a key finding, there does appear to be confusion on the part of some teachers as to the systems and practices for teacher requests and distribution of materials required to teach the Investigations curriculum. This could be a problem with communication.

### ***Key Finding***

- ✓ A coherent and strategic plan for using district and school-based mandatory training time (including 20 hours for Superintendent School status) and maximizing coaching time and activities to develop higher levels of shared learning and understanding among the staff about mathematics needs to be devised.

### **IV. District Support**

District infrastructure for supporting standards-based math instruction is substantial. There is a collaborative relationship between the Principal and district administrators. The district’s confidence in the principal is reflected in her appointment as one of nine cluster leaders in the Boston Public School system.

The Boston Public Schools Elementary Math Plan outlines several key elements intended to support math reform, including:

- District formative assessments in grades 1-5 at the end of curriculum units, mid-year, and at the end of the year designed to provide samples of student work and information about what students are learning;
- Developing Mathematical Ideas Seminars designed to deepen teachers’ content knowledge in the different mathematical strands and how to help student think about that content;
- Lenses on Learning and professional development designed to address site-specific issues and help administrators develop new visions of math teaching and learning and how to support this vision in their schools;
- Math Leadership Team (MLT) in each school to provide additional training and build teacher leaders;
- Collaborative Coaching and Learning (CCL-M) Leadership Institutes to develop teacher leaders for math instruction; and
- Learning Site Schools which serve as resources to other schools in the district.

The district monitors the school’s implementation of improvement plans and initiatives. There have been two district level monitoring visits to check in on the implementation of the district math program. The visits involve large teams of administrators, including the principal, 3 math coaches, math program director, math assistant program directors, program and assistant program directors from Unified Student Services, school support specialist, language acquisition coach, and senior program coordinator from Kindergarten/Early Childhood pairing into teams to

observe all of the math lessons. According to the report on the monitoring visit of February 2, 2006, the team of 15 found the structural elements of the *Investigations* program in place for the most part, and some progress on problem-solving strategies and pushing student thinking. Each monitoring visit concludes with recommendations for actions aimed at improving instruction.

Because of its AYP status, the Marshall was designated a Superintendent's School. This designation brings additional resources and requirements, including teacher participation in an additional 20 hours of mandatory school-based professional development per year. This designation also allows the principal to hire outside the system for 50% of the vacancies. The principal can choose which vacancies go to these outside postings. This year, the principal sent the following five positions to the pool: science specialist, 2 Kindergarten (new positions), and an SEI position. The principal also attends monthly AYP principal breakfasts, facilitated by the Senior Program Director and Assistant Program Director for elementary Mathematics, which are typically dedicated to looking at assessment data and student work.

***Key Finding***

- ✓ The rate and patterns of teacher turnover during the past three years raise serious questions about the appropriateness of the staff who have been placed in the building over the last few years, and more broadly about district procedures for staffing and hiring.
- ✓ Coaching resources allotted by the district are insufficient to support needed changes to instruction in mathematics.

## **APPENDIX A TEAM MEMBERS**

### **Team Members**

**Dr. Denise Delorey**, School Performance Evaluation, Massachusetts Department of Education

**Rebecca Talbot Driscoll**, School and District Improvement Support, Massachusetts Department of Education

**Kate Carbone**, School and District Improvement Support, Massachusetts Department of Education

**Dr. Muriel Leonard**, Deputy Superintendent, Boston Public Schools

**Nancy Zamierowski**, Assistant Superintendent, Boston Public Schools

**Teresa Harvey-Jackson**, Principal, John Marshall Elementary School, Boston

**Catherine Carney**, School Support Specialist, Boston Public Schools

### **Mathematics Specialists**

**Linda Ruiz Davenport**, Program Director for Elementary Mathematics, Boston Public Schools

**Mary Alice Murdoch**, Mathematics Specialist, MA Department of Education

**David Parker**, Mathematics Specialist, MA Department of Education

**Egbert Personnat**, Mathematics Specialist, MA Department of Education

**Sherry Sajdach**, Assistant Program Director for Elementary Math, Boston Public Schools

**Andrew Tuite**, Assistant Program Director for Secondary Math, Boston Public Schools.

## **APPENDIX B**

### **Initial Team Questions**

1. How does the “family” organization impact student achievement?
2. How does variation in teacher content knowledge affect student performance? Are teachers sufficiently comfortable with content/curriculum/pedagogy to support, develop, and encourage mathematical thinking in their students?
3. How have the long-term substitutes in grade 2 affected student performance?
4. Are teacher implementing the full curriculum (including 60 minutes of Investigations, AYP math, 10-minute math, math language, and homework)?
5. Is instructional time honored, well-used and sufficient?
6. What is the role of the ILT, MLT and Math Facilitator? Are they fulfilling those roles?
7. How does the school build capacity for teacher leaders?
8. How are new teachers supported to deliver math instruction?
9. Do teachers differentiate instruction for student ready to move ahead?
10. How are teachers using data to adjust instruction for the whole class and for individual students? Are students flexibly grouped based on data and other student information?
11. How are teacher and student absenteeism dealt with in order to minimize the negative impact on teaching and learning?
12. Are there sufficient human and financial resources to support the special programs in the building?
13. Are interventions for struggling students available, well used, and sufficient?

**APPENDIX C**  
**Classroom Observation Rubric Ratings**  
**24 Classrooms Observations (May 30 and June 9, 2006)**

	<b>Rubric Criterion</b>	<b>Implementing</b>	<b>Partially Implementing</b>	<b>Not Implementing</b>	<b>Not Sure</b>
<b>1.</b>	<b>Lesson Well-Planned and Organized</b>	21	3		
<b>2.</b>	<b>Multiple Grouping Strategies in Use</b>	17	7		
<b>3.</b>	<b>Student engaged in learning in various ways</b>	15	8	1	
<b>4.</b>	<b>Students examine their thinking and support their reasoning</b>	10	8	1	
<b>5.</b>	<b>Depth of content knowledge evident; explanations accurate</b>	8	11	3	1
<b>6.</b>	<b>Probing questions are used</b>	14	9	1	
<b>7.</b>	<b>Student misconceptions are identified and addressed</b>	10	8	2	4
<b>8.</b>	<b>Classroom strategies incorporate multiple forms of representation</b>	16	8		
<b>9.</b>	<b>High learning expectations for ALL students; effective effort encouraged</b>	14	8	2	
<b>10.</b>	<b>Exemplars demonstrate expectations of student achievement</b>	17	2		5

**APPENDIX B: SCHEDULE OF ACTIVITIES**  
**Diagnostic Fact Finding Review Marshall Elementary School**  
**Boston Public Schools, May-June 2006**

**Diagnostic Team Meeting 1:** April 6, 2006 @ Department of Education, Malden, 12-4pm

**Diagnostic Team Meeting 2:** May 17, 2006 @ Triad B Office, Lewenburg MS, Mattapan, 11-1pm

**Diagnostic Team Meeting 3:** June 16, 2006 @ Triad B Office, Lewenburg MS, Mattapan, 8:30am-1:30 pm

<b>Activity</b>	<b>Participant(s)</b>	<b>Date</b>	<b>Time</b>
Observe Early Intervention Team Meeting	Driscoll, Delorey	4/12/06	8:30-9:30
Interview EIT	Driscoll, Delorey	4/12/06	
Observe CCLM (4 <sup>th</sup> grade team) w/math coach	Driscoll, Delorey	4/12/06	9:30-2:00
Interview 4 <sup>th</sup> grade team	Driscoll, Delorey	4/12/06	
Observe Grade Level Team Meetings- grades 4, 5 and Specials	Driscoll	5/3/06	10:25-2:55
Shadow Principal	Carbone	4/25/06	
Interview with Principal	Carbone	4/25/06	
Interview teams	Driscoll	5/3/06	
Walk Building, Interview Student Support Personnel	Driscoll	5/3/06	
Observe Math Leadership Team	Carbone, Delorey, Murdoch	5/4/06	8:00-9:00
Interview Math Leadership Team	Carbone, Delorey, Murdoch	5/4/06	9:00-10:00
Observe Grade Level Team Meetings (grades 1 & 2)	Carbone, Delorey	5/4/06	10:25-12:40
Teacher Focus Group (teachers in the building 1 year)	Delorey, Carbone	5/4/06	12:45-1:30
Teacher Focus Group (teachers in the building 2 years)	Delorey, Carbone	5/4/06	2-3
Walk the building	Carbone, Driscoll	5/8/06	11:45-12:45
Observe ILT and Interview ILT	Carbone, Driscoll	5/8/06	12:45-2:10
Observe Math Coach w/ Teachers on site visit	Delorey, Murdoch	5/9/06	8:30-2:30 @McKay School
Interview Math Coach	Delorey, Murdoch	5/9/06	After visit @McKay School
Interview School Support Specialist	Carbone, Driscoll	5/16/06	@ DOE
Math Lesson Observations	DOE Math Specialists; BPS math program directors	5/30/06	@ Marshall
Math Lesson Observations	DOE Math Specialists; BPS math program directors	6/9/06	@Marshall