

# Evaluation of the International Math Pilot: Exploring the Effectiveness of Singapore Math Year 2

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# Executive Summary

This document reports second-year mathematics test results for students participating in a three-year pilot for Singapore Math in two public schools. Greater than 84% of students at Kuumba Academy (~100% African American, low-income students) met or exceeded standard proficiency on the Delaware Student Testing Program. This compares with the Delaware state average of 80% for similar grades. Austin D. Baltz Elementary School (Red Clay District, 79% minority students, 33% English Language Learners, >70% low income) averaged 62% proficient. Key elements of the pedagogy are presented, as is a discussion of the fidelity of implementation.



## Contents

<b>Executive Summary</b> .....	<b>iii</b>
<b>List of tables</b> .....	<b>vi</b>
<b>List of Figures</b> .....	<b>vii</b>
<b>Introduction</b> .....	<b>1</b>
<b>Student Performance</b> .....	<b>1</b>
Measures.....	1
Research Questions .....	2
Demographic information.....	3
<b>Results</b> .....	<b>3</b>
DSTP Scores Comparison .....	3
Students' MAP scores .....	10
<b>Curriculum and lesson description</b> .....	<b>18</b>
Singapore Math curriculum .....	18
Singapore Math lesson .....	19
<b>Segment description and classroom observation results</b> .....	<b>19</b>
General information .....	20
Sprints .....	21
<i>Sprint 1</i> .....	22
<i>Sprint 2</i> .....	22
Skip Counting .....	23
Problem of the Day .....	24
Direct instruction .....	25
Problem Practice.....	28
<b>Summary and conclusion</b> .....	<b>29</b>
<b>Appendix A: Observation Instrument</b> .....	<b>33</b>

## List of tables

Table 1. Average DSTP Scale Scores and Percentage Meeting or Exceeding the Standard in 2010.....	4
Table 2. Average DSTP Scale Scores and Percentage Meeting or Exceeding the Standard in 2009.....	6
Table 3. Average DSTP Scale Scores and Percentage Meeting or Exceeding the Standard in 2008.....	6
Table 4. Mathematics MAP scores by school, grade, and period .....	10
Table 5. Observed growth and growth index by grade and school.....	11
Table 6. Percentage of students meeting the expected growth in the last three years by grade and school.....	12
Table 7. Observed and VCG growth by grade and school.....	17
Table 8. Mathematics MAP VCG Z-scores by grade and school.....	18

## List of Figures

Figure 1. Percentage of students meeting or exceeding the standards in 2010 .....	4
Figure 2. Percentage of students meeting or exceeding the standards in Baltz Elementary by grade in the last 3 years .....	7
Figure 3. Percentage of students meeting or exceeding the standards in Kuumba Academy by grade in the last 3 years.....	7
Figure 4. Percentage of students meeting or exceeding the standards in the last 3 years by grade .....	9
Figure 5. Percentage of students meeting or exceeding their expected growth In Baltz Elementary in the last 3 years .....	14
Figure 6. Percentage of students meeting or exceeding their expected growth In Kuumba Academy in the last 3 years .....	14
Figure 7. Percentage of students meeting or exceeding their expected growth in 2010 by school.....	15

## Introduction

This evaluation report, prepared by the Delaware Education Research and Development Center, describes the performance of a group of students and teachers in two Delaware schools who participated in the International Math Pilot: Exploring the Effectiveness of Singapore Math in the school year 2009-2010. This is the second of a three-year evaluation.

The Delaware Foundation for Science and Math Education is piloting an international mathematics curriculum, *Singapore Math*, in two of Delaware's elementary schools: Austin D. Baltz Elementary and Kuumba Academy. A third school, Academy of Dover, participated last year but it is no longer part of the pilot. Approximately 558 students and more than 25 teachers are involved in the program.

This report presents results from the second year of this project and evaluates the adoption of the "Primary Mathematics Series" curriculum and student achievement. The results are reported in 4 sections. First, the analysis and results from the students' achievement scores is presented. Second, the description of the program and the results from classroom observations is described. Third, the results of a teacher survey taken from a small sample of teachers are described. Finally, I close this report with a brief conclusion and description of next year's evaluation plan.

## Student Performance

### Measures

Student performance was assessed by the Delaware Student Testing Program (DSTP) and the Measures of Academic Progress (MAP).

Delaware educators developed the DSTP that served from 1998 to 2010 as a measure Delaware students' performance. The tests are tied to the Delaware content standards that define the knowledge and skills required for students to succeed beyond high school. The

mathematics section of the DSTP assesses a student's ability to grasp key concepts and solve realistic problems. Multiple choice, short answer, and extended response questions are used to assess students' conceptual knowledge, procedural knowledge, and knowledge of mathematical processes. Scale scores range from 150 to 800 points and DSTP scores are categorized into five performance levels: "Well below the standard," "Below the standard," "Meets the standards," "Exceeds the standards," and "Distinguished."

MAP scores are a measure provided by the Northwest Evaluation Association (NWEA). NWEA is a nonprofit organization that partners with more than two thousand school districts to provide measures of academic growth. NWEA's tests are called Measures of Academic Progress (MAP) and are an estimation of students' achievement levels. The scores are about 80% aligned with the state standards. They can still be used for comparative purposes. MAP scores are given in Rasch units (RIT) which allow us to monitor progress within and across school years. To examine growth during a school year, expected growth measures are calculated based on students' fall performance as an indicator of what their spring performance should be based on national performances.

### Research Questions

We used DSTP and MAP scores to answer the following research questions:

#### School and state comparison

- a. Are there differences in student mathematics DSTP scores between the two pilot schools and the state average (including all schools in Delaware)?
- b. Are there differences in percentage of students meeting or exceeding the state standards in the last 3 years between pilot schools and the state?
- c. Are there differences in student mathematics MAP scores between the two pilot schools?
- d. Are there differences in student mathematics MAP score growth between the two pilot schools?
- e. Are there differences in student mathematics MAP score growth from 2007-2008 to 2009-2010 between the two pilot schools?

Virtual group comparisons (national sample)

- a. Are there differences between the Delaware pilot school students' growth and a national virtual comparison group? By school, by grade?

## Demographic information

Two schools were included in this pilot. Data from 366 Baltz Elementary School students were included in the analysis. In this school in 2009-2010, 51% were female, 22% were African American, 2% were Asian, 29% were Hispanic, and 46% were White. Also, 27% were English language learners (ELL). Twenty-two percent of the 366 students were in first grade, 22% in second grade, 18% in third grade, 23% in fourth grade, and 15% in fifth grade. In that same year, Kuumba Academy had 192 students from first to fifth grade; 58% were female. Most of the students were African American, 96%, 4% were Hispanic and only one student was White. Also, there was only one ELL student. In this school, 22% were in first grade, 16% in second grade, 25% in third grade, 21% in fourth grade, and 16% in fifth grade.

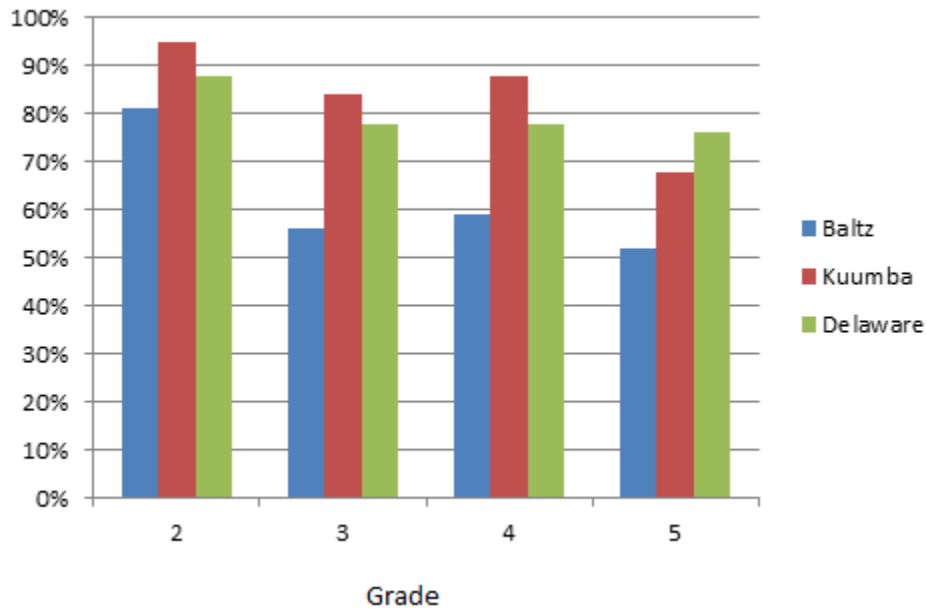
## Results

### DSTP Scores Comparison

First, let us look at the student's DSTP scores for the pilot schools and the average across the state. The year 2010 was the last year the state of Delaware used DSTP scores as the state measure to assess whether students were meeting the state standards. Table 1 shows the average DSTP scale scores for second to fifth grade in Baltz Elementary, Kuumba Academy and the state. This table also includes the percentage of students meeting or exceeding the Delaware standards based on their scale score.

**Table 1. Average DSTP Scale Scores and Percentage Meeting or Exceeding the Standard in 2010**

Grade	Baltz Elementary		Kuumba Academy		Delaware	
	Average score	% M/E	Average score	% M/E	Average score	% M/E
2	381.53	81%	415.21	>95%	403.94	88%
3	411.16	56%	437.86	84%	439.01	78%
4	436.34	59%	474.32	88%	462.97	78%
5	457.14	52%	437.87	68%	479.71	76%



**Figure 1. Percentage of students meeting or exceeding the standards in 2010**

Are there differences in percentages of students meeting or exceeding the standards between schools?

Figure 1 is a graphic representation of the percentage of students meeting or exceeding the Delaware standards (see Table 4). In 2010, Kuumba Academy students performed better than Baltz Elementary School in their mathematics DSTP scores. In second grade, 81% of students at Baltz Elementary met the standards, while more than 95% of students at Kuumba did (“>95%” is how the percentage is reported by the state Department of Education). In third grade, 56% of students at Baltz Elementary met or exceeded the standards, while 84% of students at Kuumba did. In fourth grade, 59% of students at Baltz Elementary met the standards, 88% of students at Kuumba did. Fifth grade proved to be the most difficult for both schools, at Baltz Elementary 52% and at Kuumba Academy 68% of the students met the standards.

When we compare these percentages to the percentage of students who met the standards in the whole state, Kuumba Academy had encouraging results. In second, third and fourth grade Kuumba Academy outperformed the state of Delaware in 2010. Only in fifth grade was the percentage of students meeting or exceeding the standards at Kuumba Academy lower than the state. However, the case of Baltz Elementary did not look as promising. In every single grade Baltz elementary was outperformed by the state and Kuumba Academy. The gap between the two pilot schools is wider at second and third grades. The difference at these grades is about 28 percentage points.

Are there differences in percentage of students meeting or exceeding the standards from 2008 to 2010 between schools?

Another way to look at these differences is considering how the schools have performed across time according to the DSTP scores. We include data from 2008 and 2009. In 2008 (Table 3) the Singapore Math curriculum had not been introduced in these schools, therefore 2008 serves as a baseline for comparisons. The first year of the pilot was 2009 (Table 2). This year was considered as a period of adjustment and we would expect it to be a very challenging year for both teachers and students. The more recent year is 2010 (Table 1; page 4). This is the second year in the pilot and we expected teachers and students to be used to the curriculum and teaching techniques at this point.

**Table 2. Average DSTP Scale Scores and Percentage Meeting or Exceeding the Standard in 2009**

Grade	Baltz Elementary		Kuumba Academy		Delaware	
	Average score	% M/E	Average score	% M/E	Average score	% M/E
2	389.57	79%	404.6	89%	401.25	88%
3	403.96	53%	437.2	93%	439.60	79%
4	441.05	59%	459.85	74%	461.90	77%
5	461.28	65%	451.94	47%	479.86	77%

**Table 3. Average DSTP Scale Scores and Percentage Meeting or Exceeding the Standard in 2008**

Grade	Baltz Elementary		Kuumba Academy		Delaware	
	Average score	% M/E	Average score	% M/E	Average score	% M/E
2	375.73	77%	400.1	78%	400.85	87%
3	414.84	61%	430.21	76%	439.12	77%
4	446.86	64%	441.85	58%	461.97	77%
5	465.88	61%	469	61%	479.67	76%

Figure 2 presents the math DSTP performance of students at Baltz Elementary from 2008 to 2010 across grades. Notice that 2008 was prior to the pilot. In second grade the percentage of students meeting or exceeding the standards has remained constant (77 to 81%) across years. In third grade relatively low percentage of students has met the standards in the last three years. The years 2009 and 2010 presented even lower percentages than 2008. In fourth grade we saw a small drop in the percentage of students meeting the standards after the new curriculum was introduced, and this percentage has not improved. Finally in fifth grade we saw the biggest changes. In 2008 61% of fifth grade students met the standards, after the

introduction of Singapore Math 65% of students did, however this last year the numbers dropped to just 52% of fifth grade students meeting or exceeding the math standards.

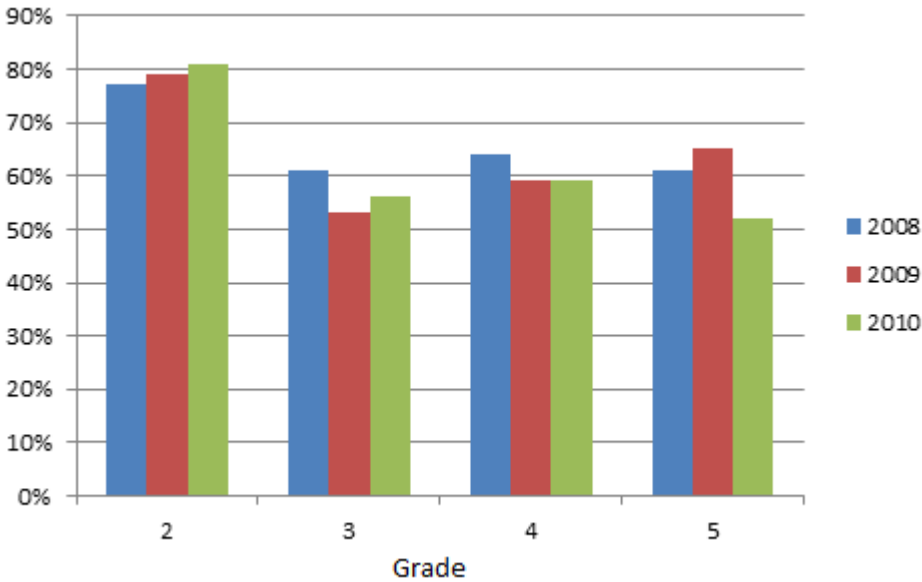


Figure 2. Percentage of students meeting or exceeding the standards in Baltz Elementary by grade in the last 3 years

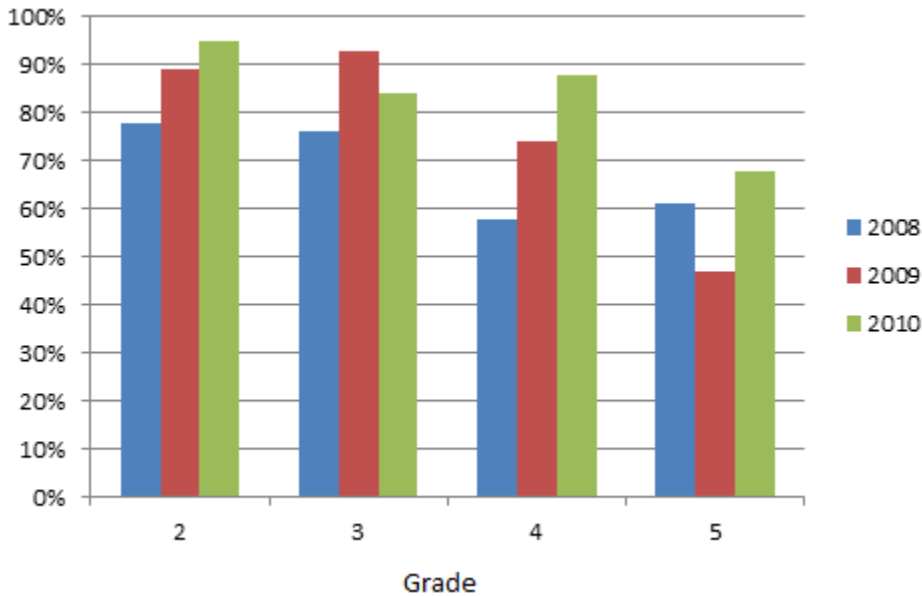
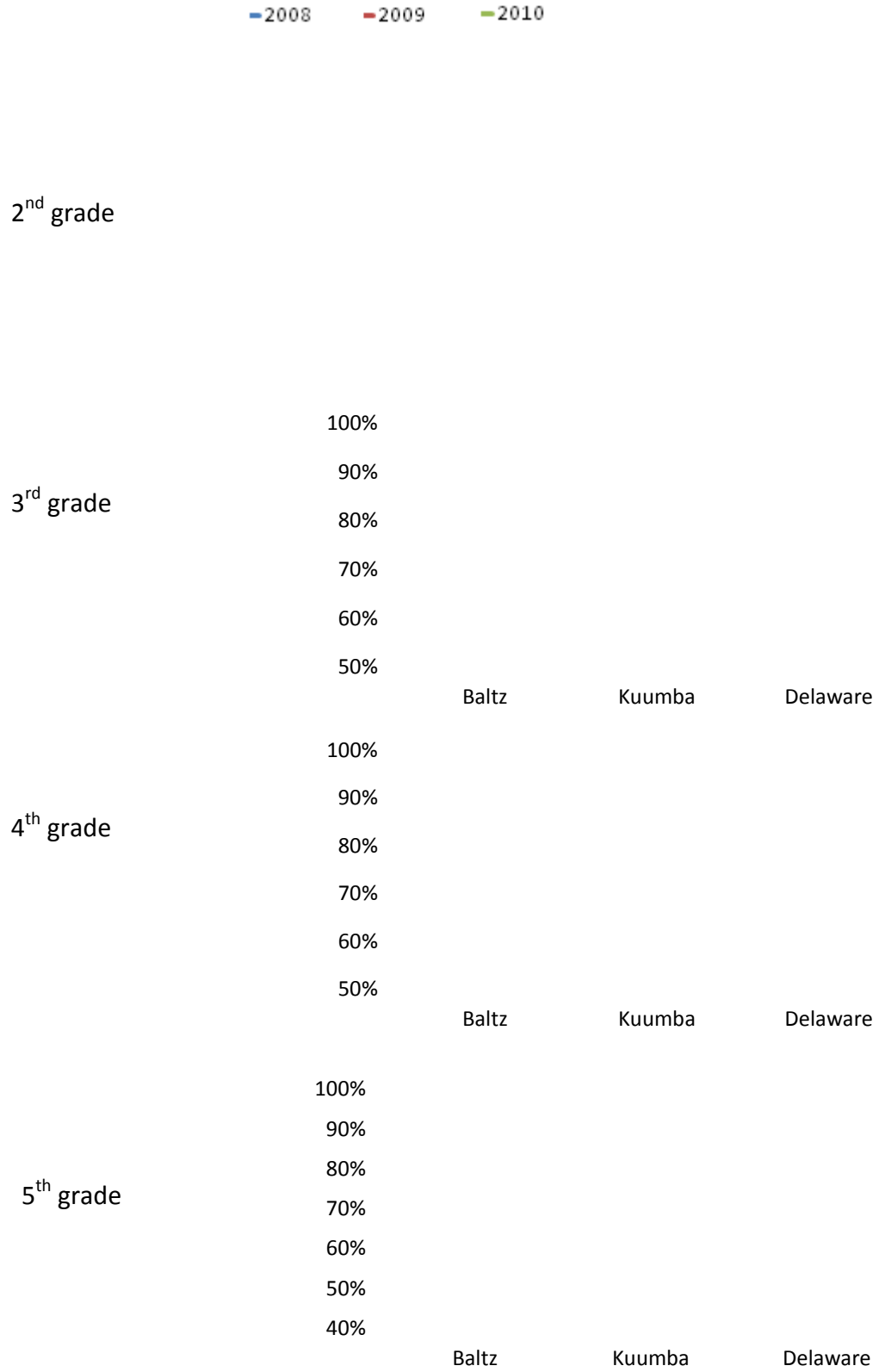


Figure 3. Percentage of students meeting or exceeding the standards in Kuumba Academy by grade in the last 3 years

Figure 3 presents the math DSTP performance of students at Kuumba Academy from 2008 to 2010 across grades. There has been a general improvement across grades since the introduction of the Singapore Math curriculum and new teaching techniques. In second grade there has been year after year improvement in the percentage of students meeting or exceeding the standards. In third grade 2009 presented a higher percentage than 2010, but still both marks are better than the baseline in 2008. In fourth grade we saw again year after year improvement. In this case the percentage has been improving not only constantly, but also greatly. In 2008 58% of fourth grade students at Kuumba met the standards, a year later 74% did. In 2010 88% of fourth grade students met or exceeded the standards. Finally in fifth grade we saw the percentages going down and up. In 2008 61% of fifth grade students met the standards, after the introduction of Singapore Math only 47% of students did, however this last year the numbers increased to 68% of fifth grade students meeting or exceeding the math standards.

We can look at the same data from a different perspective. Figure 4 (see next page) shows the percentage of students meeting or exceeding the standards in the last three years by grade. Please notice that the scale on the vertical axis has been modified and it is not from zero to 100%. We can see that across the years and in every grade the percentage for the state of Delaware has remained constant. This is a good indication that changes in the pilot schools could be due to the pilot and rather than state wide factors.

Notice how Baltz has shown the least amount of change across years at every grade. If any, the larger change has occurred in fifth grade where the percentage has dropped from 61% in 2008 to 52% in 2010. The impact of the pilot has been greater and more positive for Kuumba Academy. There has been improvement at each grade level (see Figure 4).



**Figure 4. Percentage of students meeting or exceeding the standards in the last 3 years by grade**

## Students' MAP scores

Table 4 shows the number of students, the mean MAP scores and the standard deviations for testing in Fall 2009 and Spring 2010 by grade for both schools. Scores from Kuumba Academy were always higher than the scores from Baltz Elementary. However, the differences were significant in only four instances—spring 2010 in the second, third, and fifth grades and fall 2009 in third grade.

**Table 4. Mathematics MAP scores by school, grade, and period**

Grade	School	n	Fall 2009	Spring 2010
			mean (std dev)	mean (std dev)
1st	Baltz Elementary	81	154.43 (10.28)	174.51 (10.65)
	Kuumba Academy	42	156.14 (11.42)	175.55 (10.89)
2nd	Baltz Elementary	81	168.72 (10.42)	184.12 (9.69)
	Kuumba Academy	31	172.13 (12.01)	191.23 (9.79)**
3rd	Baltz Elementary	66	185.39 (10.78)	196.06 (11.17)
	Kuumba Academy	48	187.98 (10.56)	203.98 (11.19)***
4th	Baltz Elementary	84	193.92 (10.81)	202.71 (12.83)
	Kuumba Academy	40	200.75 (10.05)**	206.75 (12.43)
5th	Baltz Elementary	54	204.37 (11.11)	212.81 (11.01)
	Kuumba Academy	31	205.94 (11.19)	219.77 (14.79)*

\*significant at .05, \*\* significant at .01, \*\*\* significant at .001

Table 5 shows the observed and expected growth from fall to spring in both schools by grade. Growth is the difference between the spring 2010 score and the fall 2009 score in RIT points. In other words, growth indicates the increment in achievement level from the beginning to the end of the school year. The expected growth for first grade was not available.

Results in Table 5 indicate that Kuumba Academy generally met the expected growth, except for fourth grade. This was not the case for Baltz Elementary where the growth index was always negative. More about the growth index below.

**Table 5. Observed growth and growth index by grade and school**

Grade	School	n	Observed growth	Expected Growth	Growth Index
			mean (std dev)	mean (std dev)	mean
1st	Baltz Elementary	81	20.07 (7.75)	N/A	N/A
	Kuumba Academy	42	19.40 (9.17)	N/A	N/A
2nd	Baltz Elementary	81	15.41 (8.30)	15.57 (2.42)	-0.16
	Kuumba Academy	31	19.10 (10.59)	14.77 (16.55)	4.32
3rd	Baltz Elementary	66	10.67 (6.70)	11.58 (2.10)	-0.91
	Kuumba Academy	48	16.00 (8.99)	11.25 (1.87)	4.75
4th	Baltz Elementary	84	8.93 (7.37)	12.49 (3.55)	-3.69
	Kuumba Academy	40	6.00 (7.45)	10.71 (2.00)	-4.93
5th	Baltz Elementary	54	8.23 (7.38)	10.93 (2.41)	-2.59
	Kuumba Academy	31	13.84 (5.66)	10.87 (1.41)	2.97

Table 6 displays the percentages of students meeting the expected growth for both schools for the 2009-2010 and the two previous years. According to NWEA, setting a goal of having 50 percent of students meeting or exceeding their typical targeted growth is a recommended target. Based on this parameter, we can see that in both schools more than 50% of the students met their expected growth in MAP scores in second and third grade in 2009-2010. Neither school reached 40% of students meeting the expected growth in fourth grade and only Kuumba exceeds the 50% mark in fifth grade this last year. Information about previous years is discussed below.

**Table 6. Percentage of students meeting the expected growth in the last three years by grade and school**

Grade	School					
	Baltz Elementary			Kuumba Academy		
	2008	2009	2010	2008	2009	2010
1	NA	34%	NA	NA	NA	NA
2	31%	46%	52%	79%	63%	74%
3	30%	44%	53%	73%	60%	69%
4	63%	56%	37%	NA	37%	33%
5	NA	56%	39%	NA	NA	68%

**MAP Scores School comparison**

Are there differences in students' mathematics scores between pilot schools?

Table 4 displays the mathematics MAP scores for fall 2009 and spring 2010. Scores from Kuumba Academy were always higher than the scores from Baltz Elementary. However, the difference was not always significant. In second grade, T test results indicate that Kuumba Academy's performance in spring 2010 ( $m = 191.23, sd = 9.79$ ) was significantly higher ( $t = 3.46, p < .01$ ) than Baltz Elementary's ( $m = 184.12, sd = 9.69$ ). In third grade there was no score difference during fall between schools, but the difference during spring was significant. T test results indicate that Kuumba Academy's performance ( $m = 203.98, sd = 11.19$ ) was significantly higher ( $t = 3.73, p < .001$ ) than Baltz Elementary's ( $m = 196.06, sd = 11.17$ ) for spring in third grade. In fourth grade there was a significant difference between schools' scores during fall. T test results indicate that Kuumba Academy's performance ( $m = 200.75, sd = 10.05$ ) was significantly higher ( $t = 3.36, p < .01$ ) than Baltz Elementary's ( $m = 193.92, sd = 10.81$ ) during fall in fourth grade. Finally in fifth grade, T test results indicate that Kuumba Academy's performance during spring ( $m = 219.77, sd = 14.79$ ) was significantly higher ( $t = 2.47, p < .05$ ) than Baltz Elementary's ( $m = 212.81, sd = 11.01$ ).

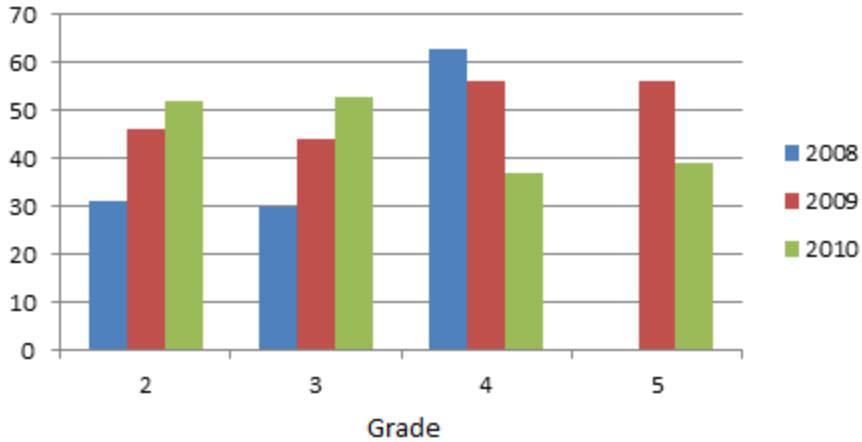
### Are there differences in mathematics MAP score growth between schools?

Table 5 shows the growth and the growth index in both schools by grade. The growth index represents the difference between students' actual growth and their expected growth as determined by the RIT point growth norms. A positive growth index represents the RIT points students exceeded the average growth. A negative growth index indicates the number of RIT points students fell short of the average growth. A growth index of zero indicates students equaled the average growth.

Expected growth for first grade was not available; first grade growth indices were not calculated. In the case of Baltz Elementary, the growth index for second and third grade is very close to zero. This means that on average, the growth of second and third grade students in Baltz Elementary equaled the expected growth. However in fourth and fifth grade, Baltz Elementary students' growth indices were negative, -3.69 and -2.59 respectively. Kuumba Academy obtained positive growth indices except in one grade. In second grade the growth index was 4.32, in third grade the growth index was 4.75, and in fifth grade the growth index was 2.97. In fourth grade Kuumba Academy had a negative growth index of -4.93. Based on growth indices the grades having trouble meeting the expected growth were fourth and fifth grade in Baltz Elementary and fourth grade in Kuumba Academy.

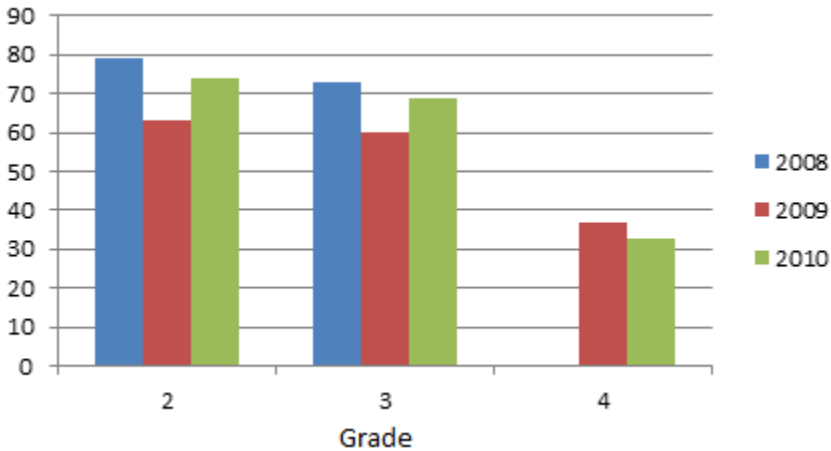
### Are there differences in MAP score growth from 2008 to 2010 between schools?

Besides looking at the growth index, we can also look at the number of students meeting or exceeding the expected growth. Table 6 presents the percentages of students meeting their expected growth for the past three years in both pilot schools. These data are represented in Figure 5 for Baltz Elementary and in Figure 6 for Kuumba Academy.



**Figure 5. Percentage of students meeting or exceeding their expected growth In Baltz Elementary in the last 3 years<sup>1</sup>**

In Baltz Elementary School the percentage of students meeting the expected growth constantly increased from 2008 to 2010 in second and third grade. In second grade it increased from 31% to 52% and in third from 30% to 53%. This is an indication of general improvement in mathematics taught in these classrooms. However, in fourth and fifth grade there was a decrease in the percentage of students meeting their expected growth from 2008 to 2010. In fourth grade it decreased from 63% to 37% and in fifth from 56% in 2009 to 39% in 2010.



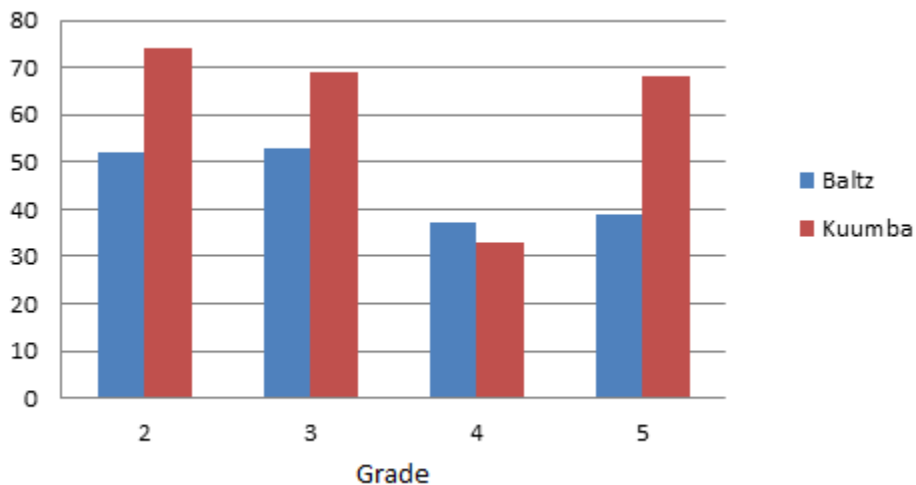
**Figure 6. Percentage of students meeting or exceeding their expected growth In Kuumba Academy in the last 3 years<sup>2</sup>**

<sup>1</sup> No MAP scores were available at Baltz Elementary for fifth grade in 2008.

<sup>2</sup> No MAP scores were available at Kuumba Academy for fourth grade in 2008 and for fifth grade in 2008 and 2009..

In Kuumba Academy the percentage of students meeting the expected growth increased in the past year in second and third grade. In second grade it increased from 63% to 74% and in third grade from 60% to 69%. These numbers are approaching the percentages obtained in 2007-2008. Only in fourth grade we observed a small decrease from 37% to 33%. Finally, in Kuumba Academy, 68% of fifth grade students met their expected growth in 2010 (not included in Figure 6); data for the previous years were not available.

Keep in mind that setting a target of 50% of students meeting or exceeding their typical targeted growth is what NWEA recommends. Figure 7 shows the comparison of percentage of students meeting or exceeding their expected growth in the two schools in the pilot. Based on this 50% mark, the grades where students are having more difficulties meeting the expected growth in 2010 were grades fourth and fifth at Baltz Elementary and fourth grade at Kuumba Academy.



**Figure 7. Percentage of students meeting or exceeding their expected growth in 2010 by school**

### *MAP Scores: Virtual group comparisons*

Are there differences between the Delaware pilot schools' MAP Scores growth and the national virtual comparison group? By school, by grade.

To evaluate the performance of students in the Delaware Singapore pilot relative to students in the United States, we used data from NWEA. NWEA provided a Virtual Comparison Group (VCG) for individual students in each of the schools. Each VCG was constructed based on critical district, school and student characteristics. To create the VCGs, NWEA applied general, school and student filters. General filters included considering only students who had valid test scores and those who had both fall and spring RIT scores. School filters consisted of considering that the percentage of students who qualified for free and reduced lunch was within 5 percentage points of the school being studied and considering schools with the same urban/rural classification (based on the National Center for Educational Statistics Common Core of Data Survey). Student filters included selecting students who were at the same grade level, students beginning (fall) RIT math scores were within 2 RIT points of the student being studied, and students' beginning (fall) testing within 7 days of the student being studied.

Once all of the matching students were identified (VCG qualified candidates), a random sample of 50 students was drawn to form the final VCG for each student. If fewer than 50 students were identified in the initial VCG candidate group, the free and reduced lunch percent, the initial RIT score and/or the fall testing time criteria were slightly relaxed until there were at least 50 students in the VCG qualified group. Finally each student's scores are compared to the average of the scores of 50 students in the virtual group.

Table 7 displays the aggregated growth values for the pilot students against the virtual group comparison that served as control.

**Table 7. Observed and VCG growth by grade and school**

Grade	School	n	Observed growth	VCG growth
			mean (std dev)	mean (std dev)
1st	Baltz Elementary	81	20.07 (7.75)	19.05 (8.63)
	Kuumba Academy	42	19.40 (9.17)	19.83 (8.29)
2nd	Baltz Elementary	81	15.41 (8.30)	15.39 (7.99)
	Kuumba Academy	31	19.10 (10.59)	15.00 (8.08)
3rd	Baltz Elementary	66	10.67 (6.70)	12.49 (7.83)
	Kuumba Academy	48	16.00 (8.99)	13.62 (7.99)
4th	Baltz Elementary	84	8.93 (7.37)	9.64 (7.96)
	Kuumba Academy	40	6.00 (7.45)	9.82 (7.57)
5th	Baltz Elementary	54	8.23 (7.38)	8.29 (7.92)
	Kuumba Academy	31	13.84 (5.66)	9.43 (8.52)

**VCG Z-Scores**

The VCG z-score (see Table 8) is a number that shows how many standard deviations a student grew above or below their comparison group. The z score typically ranges from -3 to +3, a range that describes 99% of a given population for a given characteristic. Positive z-core values indicate students grew more than their comparison group. Growth z-scores between -0.5 and 0.5 are considered average and do not differ meaningfully from the comparison group. The results for Baltz Elementary for all grades were not significant (see Table 8). In other words, the growth from fall 2009 to spring 2010 of Baltz Elementary students did not differ meaningfully from the national comparison group. The results for Kuumba Academy in first, second, and third grade were not significant; however, in fourth and fifth grade significant differences were found. The z-score is negative for fourth grade students in Kuumba, showing less growth than the national VCG. Fifth grade students showed more growth than the national VGC, evidenced by the positive z-score.

**Table 8. Mathematics MAP VCG Z-scores by grade and school**

Grade	School			
	Baltz Elementary		Kuumba Academy	
	N	VCG Z-Score	N	VCG Z-Score
1	81	0.13	42	-0.13
2	83	-0.01	30	0.41
3	68	-0.27	45	0.37
4	84	-0.07	39	-0.54
5	56	0.01	30	0.53

## Curriculum and lesson description

### Singapore Math curriculum

This evaluation component assesses the degree of adoption of the “Primary Mathematics Series” as part of the Singapore Math project. The series’ main characteristics are (1) an approach that moves from the concrete to pictorial to the abstract on every topic and level, builds succeeding levels, and assumes that, by teaching to mastery and providing continual practical use of learned concepts, what was taught need not be taught again; (2) early introduction and frequent use of multi-step word problems, and the strategies towards solving them; and (3) the use of bar models in teaching problem-solving (a form of pre-algebra).

The Singapore Math curriculum uses focused, rigorous, and coherent sequencing of topics, and teaching to understanding. Concrete examples move to a pictorial organizing tool that is supposed to be easy to remember, and finally to the abstract representations to be used at higher levels. Such sequencing gives students a solid understanding of basic and fundamental mathematical concepts. Students work with these concepts and relationships to later work them in an abstract level. Word problems are used extensively, progressing to multi-step

problems much earlier than other curricula. In Singapore Math curriculum multi-step problems start in second grade while in traditional curricula start at fourth grade. This will change with DCAS and the adoption of the common core, with its more rigorous requirements. Drill is used to teach mental math skills. This curriculum puts emphasis not only on the development of strong mental math skills and number sense; it also stresses the importance of place value.

The adoption of new curriculum denotes big changes for students and especially for teachers. In this case, teachers needed to completely change both the structure of their lessons and how they present the content. Last year, the first year of implementation, was an adjustment period. For the second year (2009-2010) all changes and practices were intended to be in place.

### **Singapore Math lesson**

A lesson is divided into several distinct segments. It can include all segments and be completed in 60 minutes, however not all the teachers choose to cover all segments every day. The segments of a lesson are: Sprints, skip counting, problem of the day, direct instruction, problem practice, and lesson debrief.

### **Segment description and classroom observation results**

Observations were based on the “Lesson Observation Instrument” (see Appendix A) developed last year as part of this evaluation. The instrument is divided in seven sections. It includes a page for general information, each section of the lesson (sprints, skip counting, problem of the day, direct instruction, and problem practice), and a section for lesson debrief. Lesson debrief was introduced late in the training and it is an area that has not been developed or explored by teachers. Since I did not observe teachers debriefing their lessons, this section is omitted in the results. One possible explanation for not seeing teachers during debrief could be due to time constraints. We did not always observe complete lessons because of a tight schedule.

## General information

The observations included 36 lessons during the 2009-2010 school year. Of those, 21 lessons took place at Kuumba Academy; ten during winter and 11 more during spring. Fifteen lessons took place at Baltz Elementary; 2 during winter and 13 during spring. Out of the 36 observed lessons, 19% occurred in kindergarten, 31% in grade 1, 14% in grade 2, 11% in grade 3, 11% in grade 4, and 15% in grade 5. The lesson times ranged from 20 to 80 minutes, with the majority of lessons lasting 45 minutes. The class size varied from 6 to 27 students, with an average of 15 students per classroom.

During the original training on Singapore math techniques in 2008 and 2009, the importance of the classroom physical structure was emphasized. The trainer recommended that all students face the teacher. During this school year almost half of the teachers have this kind of seating arrangement. A few classrooms were arranged so that a handful of students were seated close to the board with the teacher actually behind them. In about a third of the classrooms visited, students were seated facing each other at a round table.

Another recommendation was that the teachers stay at a consistent place when addressing the class. In 15% of the lessons observed, the teachers failed to do so. Most teachers remained at a consistent place during the lesson.

The third and final recommendation about the classrooms was that the front wall should not be distracting. The teacher should be the focal point. I found that 20% of the lessons observed had bare walls, 40% were somewhat distracting, and 40% were distracting. The objects on the wall included calendars, visual aid posters, pictures, and students' worksheets.

The pace of the lesson is considered an important aspect of a Singapore Math lesson because the lesson encompasses many sections and it focuses on dynamic time managed activities. For example, sprints are not only timed with a stopwatch, but the time spent on skip counting activities in between sprints should also be closely monitored. Time spent on the whole sprints process should be limited to ten to 12 minutes so it does not take up lesson time. Similarly, direct instruction should be done in about 10 minutes. This can only be achieved if the lesson is well planned, often scripted. This year, about 50% of the lessons were considered as having the right pace. About 25% of the lessons were considered slower pace. In these lessons

teachers took longer to explain things and to focus students. The remaining 25% were considered far too slow. In these cases teachers lost track of time, students manipulated the pace of the lesson, and lesson procedures were not established. Some of the considerations suggested by the trainers to achieve the right pace were speaking briefly and clearly, using the whiteboards, and using choral reading and response.

## Sprints

Sprints are considered an essential aspect of the lesson. During this activity, students practice previous topics and have the chance to improve their own scores in a fun, non-threatening way. Sprints are designed to develop automaticity and improve math fluency. A sprint is a page with math items. The number of problems depends on the grade level, but the standard is 44 exercises per page. Students have 60 seconds to do as many problems as they can. Then, with the teacher guiding, students review and score the problems. Sprints are not graded or collected but the teacher gets feedback by giving correct answers, asking the students to count the number of correctly answered, have students raise their hands until the teacher, counting from one, reaches the number they have correct. Thus, the teacher can assess individual and group fluency in this math skill. The entire activity includes two sprints with a physical activity combined with skip counting in between. The objective is to improve mental math and to review a previously taught topic. The intervening physical activity consists of a high energy exercise such as jumping jacks followed by a cool-down activity (lighter physical activity) paired with more skip counting. The purpose of the physical activity is to increase adrenaline which is believed to improve mental activity. The aim of the second sprint is to have students increase their first score. Sprints are presented as a personal challenge for the students rather than a test.

Sprints were the most frequent Singapore Math piece done in lessons. The time recommended for both sprints and activity in between in 10 to 12 minutes. The sprints were generally performed well. All sprints were done on a previously taught topic. More than 90% of the pairs of sprints were similar in content and more than 95% were similar in difficulty. Eighty-five percent of the sprints had a pattern. The number of exercises in sprints varied from 20 to

60, with an average of 32 exercises per sheet. The time allowed to answer them varied from 60 to 105 seconds, with most of them being 60 seconds.

### **Sprint 1**

In almost all cases the teacher gave short and concise instructions and reviewed the answers after students were done. Three quarters of the teachers asked for number of correct answers. One third of the teachers failed to praise students and did not allow students to finish their sprint. Eighty percent of the teachers had their students skip counting while exercising; and 70% had them do a cool-down activity.

### **Sprint 2**

The performance of the second sprint was very similar to the first one. However, in the second sprint teachers were less likely to praise students. Two thirds of the teachers took the time to look for improvement from the first to the second sprint yet less than half praised the students with the highest difference.

In general, students and most of the teachers were enthusiastic about doing sprints. They seemed used to the activity. Procedures were in place; students knew what to do. In most cases teachers were very confident conducting the sprints. Time spent during the sprint was in the range of seven to 20 minutes, with an average of 14 minutes.

Some areas could be improved. In some instances, teachers asked their students to count the number of items answered (before reviewing the answer) instead of counting the number of correct answers. Also, a few teachers skipped the cool-down activity, which causes very active, unfocused students. Finally, some teachers have posters on the walls displaying skip number series; in many of these cases students read the numbers on the wall. This is a viable strategy when students are young and they are learning to skip count, but they should not read the numbers during the whole school year.

One nice feature observed in a couple of lessons was students having back-up work if they finished their sprint before the time was up or when given time after a sprint to complete the page. One of the teachers had a word problem printed on the back of the sprint. Another

strategy is to have students skip count in writing on the back. One teacher suggested her grade 3 students skip-count by 7, 8, and 9.

### Skip Counting

In this activity students pay close attention to the teacher as they count by 2s, 3s, 4s, etc. Other actions could take place in skip counting, for example the direction of the counting can change (up or down) or the volume of their voices (whisper, silent, loud, etc.) as indicated by the teacher. In this activity students' concentration is high and more mental math is put into practice.

The objective of skip counting is to improve students' automaticity and ability to do mental math. It is believed that practices like this will help develop students' mathematical skills. More specifically, the goal is to make these calculation processes automatic, almost as automatic as reading text. Automaticity will allow students to focus on higher-order mathematical processing, instead of thinking of calculations. The time recommended for skip counting is under five minutes.

Some teachers confused this section with the exercises done in between sprints. Both activities involve skip counting, however, in this section teachers make it more interesting, indicating to skip count forward or backward and combining other approaches, such as voice volume. In this activity the teacher has an opportunity to notice who answers correctly and who does not. Only half of the lessons observed included skip counting.

In the lessons where skip counting was done, an array of activities was paired with it. In all instances the time allocated to the activity seemed appropriate. Students showed medium and high enthusiasm when skip counting. Most teachers appeared to be enthusiastic as well. In some cases students stopped participating after a while. Teacher's engagement and enthusiasm appeared key to motivate students. Time spent on skip counting in the lessons varied from two to eight minutes, with an average of four and a half minutes. Two recommendations to improve this activity are (1) to challenge the students to be good at skip counting, and (2) to monitor students' enthusiasm and participation.

## Problem of the Day

In this segment all students are presented with the same problem, which is usually a word problem. This is done as a group activity. During this time the teacher has an opportunity to evaluate the knowledge and strategies of the students.

The problem of the day is the first section of the lesson where students sit down to think and analyze content. Sprints and skip counting are intense and predetermined activities that involve mental math. With the problem of the day, the intensity decreases and analytic processes follow. It is an excellent way to start students thinking about the topic of the day, almost like an introduction. However only a third of the lessons we observed included a problem of the day. During the trainings, three elements were recommended as part of a Singapore math lesson. Choral reading, choral response, and signal to answer help teachers keep all students on the same page. By doing choral reading, the teacher assures all students have read the problem. Having a signal to answer, gives the teacher the ability to manage time better and keep students focused. Before giving the signal to answer the teachers needs to make sure students have thought and worked out the answer. Choral response tells the teacher who is right and who is wrong. Depending on the answers the teacher could consider breaking up questions with simpler ones to bring together the whole class. More than one problem can be included.

In the classrooms where a problem of the day was performed, almost two thirds of the time students waited for a signal to answer, read chorally, and responded as a group. The actions the teachers take after the choral response are central to the effectiveness of the lesson. Teachers need to address students who do not participate and students whose answers are wrong. During training sessions teachers were instructed on how to address students correctly. First they have to be addressed in general as part of the group, the teacher should break the question into simpler ones, and only then address a student individually. In the lessons we observed, a third of the teachers did not address students appropriately when mistaken, and more than half of the time did not address students when they were not participating.

There are some strategies to improve this section of the lesson. The use of whiteboards is a good strategy during problem of the day. This way the teacher can monitor students'

progress and accuracy. We observed a couple of lessons with a very effective use of whiteboards during problem of the day. But generally, white boards were underused. Another strategy is to ask students to present the solution in a consistent manner every day, for example, with word problems, a graphical description, labels, number sentence, and written solution. It is important that the teacher emphasizes all these items. A handful of classes wrote the problem of the day in their journals; this could also be an effective strategy. Also, it is important that teachers guide students during the thinking process without giving the answers. In a few occasions we saw teachers drawing the problem and writing the number sentence and the solution without students' input. Finally, it is important to keep track of time, since problem of the day should be an activity designed to be done in five to seven minutes as it is supposed to be a review. In the lessons we attended, working on the problem of the day took anywhere from one to 30 minutes, with an average of 12 minutes.

### **Direct instruction**

In traditional curricula, direct instruction could be considered the core of the lesson. In this program direct instruction is equally important but it should be done in only ten minutes. This is the segment of the lesson where the teacher introduces a new topic. Following a quick review, the teacher uses simple questions to build knowledge. The language the teacher uses should be clear, concise, and consistent throughout the lesson. It is here where a script of the lesson plays an important role. If the teacher plans ahead with a scripted lesson it is more likely that the lesson will develop smoothly. It helps to keep teachers on track and it provides teachers with the exact language to use during the lesson.

The idea is that teachers prepare a lesson using the textbook and the teacher's guide. The trainers recommended that teachers complement the exercises in the books with problems of intermediate difficulty. Trainers strongly advised a scripted lesson where the sequence of problems is well thought. This language needs to be consistent with other problems and the books.

During the visits direct instruction lasted anywhere from 5 to 50 minutes, with an average of 18 minutes. Direct instruction was present in two thirds of the classrooms visited. Most of the teachers started their instruction reviewing a topic. Likewise, most of them started

with simpler questions and built up knowledge exercise by exercise. Usually, teachers broke down a question into simpler ones when necessary; only 30% of them did not do this.

As stated before, trainers suggested a few strategies to achieve the right pace and keep track of students' understanding: speaking shortly and clearly, using the whiteboards, and using choral reading and response. During the training, teachers were advised to use a consistent physical signal to have students answer questions or read as a group. We observed three quarters of the teachers using a signal. Waiting for a signal to answer and choral response go hand in hand. It is not surprising that we observed the same three quarters of teachers using choral response during direct instruction. Choral reading is different. A third of the teachers did not have any reading during direct instruction. For the rest, more than half never used choral reading. Teachers read the problems themselves or they ask an individual student to read the problem out loud. We observed a few teachers using choral reading to keep students on the same page. Some of the advantages of choral reading are to capture students' attention and assure all students know what the problem says.

This is why addressing students when they are not participating is important. In the observed lessons, about half of teachers addressed students appropriately when they were not participating. Under these teaching techniques, proper addressing is described as follows. If the group is answering together as a group and one or more students are not participating, the teacher should repeat the question. If a student still does not participate the teacher can directly ask the student the same question. Teachers can praise the student after answering correctly.

Similarly, more than half of the teachers addressed students properly when mistaken. Under these teaching techniques, proper addressing is described as follows. There are two ways of realizing a student is mistaken. The first and most common way is in the choral response. When students are responding to the teacher at the same time, and one student says the answer wrong, the teacher can repeat the question for everybody and see if this time the student got it right. Also, the teacher can step back and ask a simpler question and then try the original question again. If the student still does not answer correctly, the teacher can ask the student directly. The second way is when a student writes down an incorrect answer on the

white board (or piece of paper) and holds it up. In this case the teacher can ask the student to rethink his or her answer.

In general, addressing a mistake should start in a discrete way. Teachers should not tell the student the right answer. Instead, the teacher should use the same language used in the lesson and guide the student by questioning. Teachers should praise the student once he or she answers correctly. Not too much time should be spent addressing the mistaken student when working with the group. Teachers can spend more time with the student one-to-one when students work on their own (problem practice).

Teachers often followed recommendations such as speaking concisely and clearly (84% of teachers did it “often” to “almost always”), using consistent language throughout the lesson (63% of teachers did it “often” to “almost always”), and praising students (75% of teachers did it “often” to “almost always”).

We also considered the level of preparedness of the teachers. We looked for indications of a lesson script, meaningful sequence of exercises in addition to the ones on the book, and/or any other indication of previous practice that could improve teachers’ performance. More than half of the teachers appeared to be highly prepared. These teachers went through a succession of exercises or ideas that made the lesson run smoothly. Another 30% of teachers were classified as having a medium level of preparedness. For teachers in this category, an exercise reinforcing a concept or serving as a bridge between two consecutive exercises on the book was often missing. However, we believed there was some previous practice based on the teachers’ language and confidence. The other 20% did not seem prepared. It did not seem these teachers prepared the lesson with a script or in any other way. The fact that some of them read the lesson exactly as stated on the textbook, or that they seemed to be figuring out the right answers at the same time their students did, led me to believe there was no lesson preparation. With these teachers, students often dictated the pace of the lesson, teachers seemed to make up exercises on the fly, and the sequence of difficulty and complexity of exercises did not follow a particular order.

Finally, I considered students’ behaviors like attention, engagement, and understanding. Attention means students listen carefully to what the teacher has to say. Most of the students

paid attention during direct instruction. Sixty-eight percent of the lessons observed were rated as having high student attention and 28% as medium attention. But attention is only one factor on involving students in a lesson. We also looked at students' engagement. For engagement we looked for signs of students' connections with the lesson. Do they seem to follow the logic of the lesson? Are they participating, answering teacher's questions? Results for engagement were very similar to attention. Sixty-four percent of students were rated as having high engagement and 24% as medium level of engagement. Attention and engagement seemed to be happening together. The most important trait for the students in direct instruction is understanding. Understanding was evident when students raised their hand, participated in choral response, wrote answers in their white boards, etc. It was encouraging to see that 86% of the lessons were rated as having high understanding, 9% as medium, and only 5% as low.

### **Problem Practice**

This is usually the last segment of a lesson. It is here where students apply the knowledge they acquired during direct instruction and work some problems on their own. During this time the teacher has another chance to evaluate students, address individual misunderstandings or mistakes, and provide differentiated instruction.

During our visits problem practice lasted anywhere from three to 45 minutes, with an average of 13.5 minutes. We observed problem practice in 80% of the classrooms we visited. Most of the teachers started this segment of the lesson with short and clear instructions. Students started working immediately without further questions. In very few cases teachers' explanations were diffuse and wordy. In these cases teachers did not use the lesson language consistently.

Assessing the performance of students is usually followed by one of two actions: addressing mistakes or praising. Eighty-five percent of the teachers checked students' work often during problem practice, and more than half of the teachers addressed students properly when mistaken during problem practice. Again teachers should not tell the student the right answer. Instead, the teacher should use the same language used in the lesson and guide the student by questioning. More than two thirds of the teachers correctly guided student thinking. Some teachers gave out the answers. During problem practice (and throughout the lesson)

praising students encourages them to perform well. Three quarters of the teachers praised their students during problem practice.

One way to keep students occupied once they complete their practice problems is to have back-up work. This prevents students who finish their problems earlier from distracting or disrupting the rest of the class. Only 10% of the teachers visited assigned back-up work.

I considered students' concentration, frustration, perseverance and accuracy in problem practice. Most of the students appeared to be concentrating. They read the problems and worked on their own. Forty percent of classes were rated with high concentration and 55% with medium concentration. Regarding students' level of frustration, 80% of the classes I watched were classified with low levels of frustration. We considered frustration to be any negative emotion aroused upon encountering difficulty working on a problem. On the contrary perseverance is not only not being frustrated and letting emotions interfere with performance, it is also a wish to keep working even when difficulties arise. Students tried to find the solution of the problem most of the time. Seventy percent of classes were rated with high perseverance and 25% with medium. This means that even in the cases when students showed frustration, they were usually able to overcome it and keep trying.

## **Summary and conclusion**

This second year of Singapore Math in the pilot schools presented itself as an interesting challenge for teachers and students alike. With more training and experience on their side, most teachers were adjusting relatively well to the new curriculum. Students were becoming more and more familiar with the Singapore Math techniques and way of thinking.

We learned from the first year's evaluation that most teachers did not have strong mathematical skills. This is in and of itself a fundamental challenge to overcome. For Singapore math - or any other mathematics curriculum for that matter- to succeed, teachers must possess a solid understanding of the mathematical material. Teachers with strong mathematical skills are simply more apt to teach better. This year's evaluation did not include the teachers' content knowledge piece. We will not know for sure if teachers improved their content knowledge until

the end of the third year, but from what was observed in the classrooms during this school year (2009-2010) teachers appear to have a deeper understanding than at the beginning of the pilot.

Regarding DSTP scores comparisons, we observed that the average percentage of students meeting or exceeding the standards for the state of Delaware has remained constant from 2008 to 2010. However, we noticed changes in both of the pilot schools. First, the impact of the pilot has been greater and more positive for Kuumba Academy. There has been an increment in the percentage of students meeting or exceeding the standards from 2008 to 2010 at each grade level (second through fifth grade). However, in Baltz an increment on this percentage has only occurred in second grade. Third, fourth and fifth grade percentages of students meeting or exceeding the standards in Baltz are lower in 2010 than they were in 2008.

Also, in the first year's evaluation we did not observe any differences between performances from students in the pilot and their virtual comparison groups (VCG) based on the MAP scores. We did not expect to see differences in math scores in the first year; those results did not surprise us. However, during the second year, we started to see significant differences between students in the pilot and their virtual comparison groups. More specifically, these differences were observed in Kuumba Academy. Fifth grade students in Kuumba Academy are doing better than their VCG, however fourth grade students are doing worse than their VCG. The rest of the grades in Kuumba and all grades in Baltz do not differ considerably from their VCG.

Regarding differences between schools in the pilot, we found that during the testing period of spring 2010, Kuumba had significantly higher MAP scores than Baltz in second, third, and fifth grade. Interestingly, during fall 2009 Kuumba fourth grade students outperformed Baltz students, but this difference disappeared by spring. We also noticed this fourth grade discrepancy in Kuumba Academy when we looked at the percentage of students meeting or exceeding their expected growth in MAP scores. Fourth and fifth grade proved challenging in Baltz Elementary with only 37% and 39% of students meeting the expected growth, compared to 52% and 53% in second and third grade.

This year we had the opportunity to observe 36 lessons. We learned that most teachers are doing sprints during their lessons. Although some teachers confused the exercises with skip counting between sprints with the speed skip counting, in general teachers are doing a good job. Only a few teachers missed the purpose of doing sprints or did not do it as a challenging and fun activity.

During the lesson, there was not enough use of white boards, choral reading and choral response. These techniques capture students' attention, and assess students' understanding. Some teachers were effectively complementing the lessons provided by using the teacher guide and the textbooks. They created exercises that would reinforce the concept of an exercise from the book or serve as intermediate steps between exercises in the book. Nevertheless, not all teachers seemed to have prepared lessons. Many of those teachers used exercises that were not arranged in terms of difficulty. But even when teachers did not prepare a lesson, if they mostly followed the exercises in the textbook, students' understanding and their accuracy rate were high, and their frustration levels were low.

On a last note about the lesson structure, some teachers had time management issues. In some lessons the pace was definitely slow; some sections of the lesson took up to 50 minutes instead of just 10. The pace of the lesson was very good in half of the lessons observed.

About five of the teachers were doing a very good job managing time, students, and the materials of a Singapore Math lesson. These teachers managed to incorporate all sections into the lesson. The pace of their lessons was perfect. Students were engaged and attentive. There was no room for disciplinary disruptions. It was evident teachers planned the lesson and had all the materials ready. Math coaches could rely on these teachers to show the others what can be accomplished in their own schools with the resources they have.

The school year 2010-2011 will be the last year of this three-year pilot. As part of the final year evaluation, we will analyze students' outcomes and visit classrooms to observe teachers. Teachers will take the mathematics content knowledge test and the attitude survey. During the last year of the pilot, we would recommend reminding teachers of the basics of a Singapore Math lesson. There are many and very specific steps to perform during an ideal Singapore Math lesson. If teachers do not follow the original recommendations from the

trainers and put them into practice often, they will forget and the lessons will change into a different kind of lesson. Teachers need to remember that exercises both in the books and supplementary materials are there for a reason. Exercises should follow a sequence and introduce students to different levels of complexity. If teachers are not aware of this, the pedagogical strength of the curriculum could be weakened.

## Appendix A: Observation Instrument

### Lesson Observation Instrument

#### SINGAPORE MATH - DELAWARE PILOT LESSON OBSERVATION INSTRUMENT

Date: \_\_\_\_\_  
 School: \_\_\_\_\_  
 Grade: \_\_\_\_\_  
 Teacher: \_\_\_\_\_  
 Book: \_\_\_\_\_  
 Topic: \_\_\_\_\_  
 Observer: \_\_\_\_\_  
 Number of students: \_\_\_\_\_

#### GENERAL INFORMATION

##### Seating Arrangements

1. Are all students facing the teacher?	A few	Some	Most	All
2. Is the front wall distracting?	Yes	Somewhat	Not at all	
3. Does the teacher stay at a consistent place when addressing the class?	Yes	Somewhat	Not at all	

##### Time Management

Lesson started at: \_\_\_\_\_

Lesson ended at: \_\_\_\_\_

Total minutes: \_\_\_\_\_

Pace of the lesson:    TOO SLOW    SLOW    ABOUT RIGHT    FAST    TOO FAST

##### Time per section:

Sprint: \_\_\_\_\_

Skip counting: \_\_\_\_\_

Checking homework: \_\_\_\_\_

Direct instruction: \_\_\_\_\_

Problem practice: \_\_\_\_\_

##### General Comments:

## SPRINTS

Starts: \_\_\_\_\_ Ends: \_\_\_\_\_

1. Sprints are on a previously taught topic.	<input type="checkbox"/>	<input type="checkbox"/>	
2. Two sprints similar in content.	<input type="checkbox"/>	<input type="checkbox"/>	
3. Two sprints similar in difficulty.	<input type="checkbox"/>	<input type="checkbox"/>	
4. Do sprints have a pattern?	<input type="checkbox"/>	<input type="checkbox"/>	
5. How many exercises in each sprint?	1 <sup>st</sup> : _____	2 <sup>nd</sup> : _____	
6. Time per sprint?	1 <sup>st</sup> : _____	2 <sup>nd</sup> : _____	
***** First Sprint *****			
7. Short and consistent instructions.	<input type="checkbox"/>	<input type="checkbox"/>	
8. Answer review: teachers stops when students stop getting them right.	<input type="checkbox"/>	<input type="checkbox"/>	
9. Students count right answers and write the number on the page	<input type="checkbox"/>	<input type="checkbox"/>	
10. Teacher sees how the class did.	<input type="checkbox"/>	<input type="checkbox"/>	
11. Teacher praises the children.	<input type="checkbox"/>	<input type="checkbox"/>	
12. Teachers allows students to finish the sprint.	<input type="checkbox"/>	<input type="checkbox"/>	
13. Speed-skip counting.	<input type="checkbox"/>	<input type="checkbox"/>	
14. Cool down activity.	<input type="checkbox"/>	<input type="checkbox"/>	
***** Second Sprint *****			
15. Short and consistent instructions.	<input type="checkbox"/>	<input type="checkbox"/>	
16. Answer review: teachers stops when students stop getting them right.	<input type="checkbox"/>	<input type="checkbox"/>	
17. Students count right answers and write the number on the page	<input type="checkbox"/>	<input type="checkbox"/>	
18. Teacher sees how the class did.	<input type="checkbox"/>	<input type="checkbox"/>	
19. Teacher praises the children.	<input type="checkbox"/>	<input type="checkbox"/>	
20. Students look for improvement from sprint to sprint.	<input type="checkbox"/>	<input type="checkbox"/>	
21. Teacher praises children with the highest difference	<input type="checkbox"/>	<input type="checkbox"/>	

Content: \_\_\_\_\_

Level of students' enthusiasm:    LOW    MEDIUM    HIGH

Level of teacher's enthusiasm:    LOW    MEDIUM    HIGH

Students seem used to doing sprints:                    YES                    NO

If no, why do you think so: \_\_\_\_\_

Additional comments: \_\_\_\_\_

## SKIP COUNTING

Starts: \_\_\_\_\_ Ends: \_\_\_\_\_

List the numbers by which they counted: \_\_\_\_\_

Was there any other activity while skip counting (e.g. voice volume)? If yes, what? \_\_\_\_\_

Time for the activity seemed appropriate (e.g. stop skip counting before it gets frustrating) \_\_\_\_\_

Level of students' enthusiasm:    LOW    MEDIUM    HIGH

Level of teacher's enthusiasm:    LOW    MEDIUM    HIGH

Students seem used to doing skip counting:    YES    NO

If no, why do you think so: \_\_\_\_\_

Additional comments: \_\_\_\_\_

Starts: \_\_\_\_\_ Ends: \_\_\_\_\_

	Almost always	Very often	Often	Sometimes	Almost never
1. Students wait for signal to answer.					
2. Choral reading.					
3. Choral response.					
4. Teacher addresses students appropriately when mistaken.					
5. Teacher addresses students appropriately if they do not participate.					
6. Teacher praises students.					

Students seem used to reviewing homework:    YES    NO

If no, why do you think so: \_\_\_\_\_

Additional comments: \_\_\_\_\_

## DIRECT INSTRUCTION

Starts: \_\_\_\_\_ Ends: \_\_\_\_\_

	Almost always	Very often	Often	Sometimes	Almost never
1. Teacher starts with a review of a previous topic.					
2. Teacher starts with simple questions to build up knowledge.					
3. Teacher breaks down questions to simpler ones.					
4. Students wait for signal to answer.					
5. Choral reading.					
6. Choral response.					
7. Teacher addresses students appropriately when mistaken.					
8. Teacher addresses students appropriately if they do not participate.					
9. Teacher praises students.					
10. Teacher speaks shortly and clearly					
11. Teacher is consistent with the lesson language.					
12. Level of teacher's preparedness.	LOW	MEDIUM	HIGH		
13. Level of students' attention.	LOW	MEDIUM	HIGH		
14. Level of students' engagement	LOW	MEDIUM	HIGH		
15. Level of students' understanding.	LOW	MEDIUM	HIGH		

Additional comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**PROBLEM PRACTICE**

Starts: \_\_\_\_\_ Ends: \_\_\_\_\_

1. Short and clear instructions.			
2. Students start working immediately.			
3. There is back up work for students who finish their problems.			
	Almost always	Very often	Often
	Sometimes	Almost never	
4. Teacher checks students' work.			
5. Teacher addresses students appropriately when mistaken.			
6. Teacher guides students without giving the answers.			
7. Teacher praises students.			
8. Teacher speaks shortly and clearly			
9. Teacher is consistent with the lesson language.			
10. Level of students' concentration.	LOW	MEDIUM	HIGH
11. Level of students' frustration.	LOW	MEDIUM	HIGH
12. Level of students' perseverance.	LOW	MEDIUM	HIGH
13. Level of students' accuracy at the end.	LOW	MEDIUM	HIGH

How does the teacher know when students are done? \_\_\_\_\_

Additional comments: \_\_\_\_\_

## LESSON DEBRIEF

Not all teachers are expected to do this section

Starts: \_\_\_\_\_ Ends: \_\_\_\_\_

Questions asked :

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Level of students' participation:	LOW	MEDIUM	HIGH
Level of students' accuracy as to what the lesson content was:	LOW	MEDIUM	HIGH
Level of teacher's enthusiasm:	LOW	MEDIUM	HIGH
Students seem used to doing debriefing :	YES	NO	

If no, why do you think so: \_\_\_\_\_  
\_\_\_\_\_

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_