Understanding the Use of Curriculum Materials: A Cross-Site Research Study Report

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Section One:
Background and Purpose of the Cross-Site Study

The Center for the Study of Mathematics Curriculum (CSMC) is a partnership of the University of Missouri, Michigan State University, Western Michigan University, the University of Chicago, Horizon Research, Inc., and three school districts. The Center was established in January 2004 with funding from the National Science Foundation (NSF Award No. ESI-0333879) under the "Centers for Learning and Teaching (CLT)" initiative.

CSMC serves the K–12 educational community by focusing scholarly inquiry and professional development around issues of mathematics curriculum. Major areas of work include: understanding the influence and potential of mathematics curriculum materials; enabling teacher learning through curriculum material investigation and implementation; and building capacity for developing, implementing, and studying the impact of mathematics curriculum materials.

A cross-site study conducted under the auspices of CSMC was designed to explore curriculum enactment of a particular mathematical topic in the three districts. District representatives selected "composing and decomposing" as the focus of the study, noting that it was an area of mathematics that teachers find challenging to teach and that students find challenging to learn. The hope was that the study would both inform the participating districts, and provide a model for others in the field to use in studying the implementation of particular mathematical ideas of interest.

The perspective underlying the study was that there are a number of reasons why teaching and learning of a particular mathematical idea might not be optimal. For example, teachers may lack knowledge of the content, or they may not agree with the philosophy of the instructional materials they have been assigned, or they may not have the resources or pedagogical skills to implement the associated instructional activities well. Knowing the status of the enacted curriculum is necessary but not sufficient for deciding what needs to be done to improve the curriculum and instruction. Accordingly, the study collected data to help explain both the "what" and the "why" of the enacted curriculum.

The research plan was to develop a teacher questionnaire that would act as an initial diagnostic tool, providing a district with a broad sense of the district's status in each of the following areas:

- Teacher attitudes and beliefs about mathematics and mathematics teaching;
- Teacher perceptions of their preparedness in mathematics content, and in using particular pedagogical strategies; and
- Classroom practices, including those related to the designated area of composing and decomposing.

Two versions of the teacher questionnaire were developed—for teachers in grades K–5 and 6–12. (See Appendices A and B). The first two sections of the teacher questionnaires collected general information about teachers' backgrounds and their practices in a "target" mathematics class. Section A examined teachers' attitudes and beliefs about mathematics and mathematics

teaching, as well as perceptions of their preparedness in mathematics content. Section B asked teachers to describe their use of particular pedagogical strategies for a specific mathematics class (their first class of the day), and to provide their opinions about the instructional materials used for that class. Many of these items were drawn from earlier surveys including the 2000 National Survey of Science and Mathematics Education Mathematics Teacher Questionnaire (Weiss, Banilower, McMahon, & Smith, 2001), and an instrument developed by Ross and colleagues (2003). The survey was administered to the population of teachers of mathematics in each of the three districts during the months of February and March 2005. Teachers responded anonymously and the response rates in the three districts ranged from 74 to 79 percent. The results reported here are based on responses from 528 teachers in grades K–5, and 130 teachers in grades 6–12.

The individual school districts involved in this study, referred to in this report as Districts A, B, and C, have been using the results to consider how to improve mathematics teaching and learning. The district leaders typically focused on the extent of alignment of the results with their district's vision of effective instruction. In addition, comparing their results with those from the other districts prompted district leaders to consider the reasons for some of the major differences. In both cases, the data raised additional questions about the status of, and reasons for, the enacted curriculum, leading them to pursue further investigations.

The purpose of this report is to highlight some key findings and illustrate how districts might use these kinds of results to better understand their own curriculum landscape. Future reports will describe how each of the CSMC districts used the results to make decisions about their mathematics programs, and the impact of those decisions.

Section Two:
Mathematics Teachers and their Classes

This section of the report describes the teachers in each district and provides data about their mathematics classes, highlighting comparisons among the districts. Complete data tables can be found in Appendices C–H.

Characteristics of the Teaching Population

In Section A of the questionnaire, teachers were asked to provide information on their teaching background and experience. Table 1 provides information on mathematics teachers' certification and years of teaching experience. Note that in each of the three districts, a considerable proportion of teachers has fewer than ten years of experience teaching at the K–12 level. Results such as these might suggest that a district pay particular attention to the support (induction/mentoring/professional development programs) needed by its novice teaching force, including assistance with the implementation of instructional materials.

Districts B and C may also need to consider the implications of the fact that a sizeable proportion of their teachers of mathematics do not have regular certification. Similarly, the high percentage of teachers who have been teaching for more than 26 years suggests that administrators in Districts B and C may need to be prepared to replace many of their mathematics teachers in the near future.

Table 1
Teachers' Background and Experience, by Grade Range and District

	Percent of Teachers					
	Grades K–5			Grades 6–12		
	District A	District B	District C	District A	District B	District C
Teacher certification						
Regular	91	74	79	89	74	82
Probationary	8	15	10	4	19	14
Provisional	1	12	10	5	7	2
Temporary	0	0	1	2	0	2
No certificate	0	0	0	0	0	0
Years taught at K–12 level						
1–5 years	26	22	18	32	35	14
6–10 years	22	30	22	18	23	27
11–15 years	18	9	18	16	8	11
16–20 years	15	6	11	9	4	11
21–25 years	10	4	9	11	4	14
26 or more years	9	28	23	16	27	23
Years taught mathematics						
1–5 years	31	29	20	35	36	20
6–10 years	21	23	24	14	24	30
11–15 years	18	11	17	18	12	13
16–20 years	14	5	12	7	8	13
21–25 years	10	9	8	12	0	8
26 or more years	6	24	21	14	20	18

Characteristics of the Mathematics Classes

Although the typical elementary teacher in these districts, and nationally, teaches mathematics to a single group of students, many secondary mathematics teachers teach multiple classes. To keep the data collection burden reasonable, each teacher was asked to respond to a series of items about a single "target class," their first class of the day. Table 2 highlights characteristics of these classes, including the number of students in their target class, and the percentage of students requiring special education services. These data are useful in helping a district determine the fit between its curriculum program and the needs of its student population. For instance, if a teacher with a high percentage of students requiring special education services determines that the instructional materials do not fit the needs of his/her students, then there is a great chance that this teacher will supplement with other materials. Such actions may affect the enactment of the adopted curriculum program.

Table 2
Demographics for the "Target" Class, by Grade Range and District

	Percent of Target Classes					
	Grades K–5			Grades 6–12		
	District A	District B	District C	District A	District B	District C
Accelerated class	—	—	—	25	12	16
Number of students in class						
10 or fewer students	0	10	5	0	22	0
11–15 students	4	4	12	5	4	7
16–20 students	42	10	35	26	4	26
21–25 students	50	40	36	40	41	21
26–30 students	4	30	10	23	22	33
30 or more students	0	4	2	5	7	14
Students requiring special education services						
Less than 25 percent	89	76	93	89	63	91
25–49 percent	11	9	2	9	15	9
50–74 percent	0	0	0	2	0	0
75 percent or more	0	15	5	0	22	0

Table 3 provides information on the length and structure of a "typical" mathematics lesson in these districts. In each of the three districts, teachers reported a wide variation in the length of their mathematics lessons. Some of this variation can be explained by the districts' use of block scheduling, with longer lessons taught on fewer days.[1] There is also the possibility that teachers may have misinterpreted the question, perhaps thinking that "length of a typical mathematics lesson" referred to the time the teacher spent instructing, not including time the students spent working individually or in groups.

[1] For example, at the time of the survey administration, one high school in District A had longer mathematics periods, but met every other day, while a second high school scheduled 50-minute periods each day. District C had two middle schools with 55-minute mathematics periods, while another middle school scheduled mathematics for 90 minutes, every other day. Both of the high schools in District C taught mathematics for 90 minutes every day for one semester (using a 4 x 4 block schedule). District B did not use block scheduling.

Table 3
Time Spent in "Target" Mathematics Class, by Grade Range and District

	Percent of Target Classes					
	Grades K–5			Grades 6–12		
	District A	District B	District C	District A	District B	District C
Length of a typical lesson						
30 or fewer minutes	6	29	12	18	33	28
31–50 minutes	21	38	19	56	37	19
51–60 minutes	40	31	30	16	30	7
61 or more minutes	32	1	39	11	0	47
Percent on daily routines, interruptions, and other non-instructional activities						
10 percent or less	78	66	50	79	59	44
11–20 percent	15	18	29	19	37	40
21–30 percent	4	13	12	2	4	9
31 percent or more	3	3	8	0	0	7
Percent on whole class lecture/discussion						
10 percent or less	9	15	12	12	7	0
11–20 percent	39	29	25	19	4	28
21–30 percent	31	16	23	33	22	37
31 percent or more	21	40	40	35	67	35
Percent on individual student work (e.g., reading textbooks, completing worksheets)						
10 percent or less	42	31	29	56	4	12
11–20 percent	26	26	26	24	37	36
21–30 percent	19	24	28	7	26	33
31 percent or more	13	19	18	13	33	19
Percent on small group work						
10 percent or less	3	21	9	9	30	14
11–20 percent	12	21	20	11	33	23
21–30 percent	19	19	23	11	22	26
31 percent or more	66	40	47	70	15	37

The data on allotment of instructional time allow a district supervisor to understand the structure of mathematics lessons by examining the distribution of time among whole class, individual, and small group activities. At the elementary level, the three districts are fairly similar in the way they distribute time among whole class, individual, and small group activities, although District A's elementary students spend more time in small group activities and less time in whole class lecture/discussion than do students in the other districts. The fact that large percentages of teachers in these three districts report spending more than 10 percent of class time on non-instructional activities may merit further investigation.

At the secondary level, the three districts distribute their time quite differently. District A classrooms tend to emphasize small group work, and District B classrooms emphasize whole class lecture/discussion. The emphasis on whole class work in District B is consistent with the shorter length of lessons in that district; it typically takes less time for teachers "to cover the content" when they themselves explain and show examples for the whole class rather than having students "work out" the ideas, explanations, problems, and examples in small groups. For any district, it is important to ensure that the distribution of time spent among these activities is aligned with what is intended.

Section Three:
Instructional Materials in Use in the Three Districts

The instructional materials assigned to a particular class are the starting place for instruction, so in considering the results of the cross-site study it is important to know what materials are in place in each district. Elementary teachers in District A use *Investigations in Number, Data, and Space* (published by Pearson Scott Foresman), and teachers in grades 6–8 use *Connected Mathematics* (Pearson Prentice Hall). Students in grades 9–12 have options to pursue a traditional sequence of courses or an integrated sequence of courses. Teachers of the integrated sequence use *Contemporary Mathematics in Context: A Unified Approach* (also known as Core Plus) published by Glencoe/McGraw-Hill. Teachers in the traditional sequence use the *University of Chicago School Mathematics Project* (UCSMP) for *Algebra, Geometry,* and *Advanced Algebra*. This sequence continues with *Precalculus: Enhanced with Graphing Utilities* (Prentice Hall) and *Calculus: Graphical, Numerical, Algebraic* (Prentice Hall).

Teachers in District B use *Bridges in Mathematics* published by the Math Learning Center in grades K–2 and *Math Trailblazers* (Kendall/Hunt) in grades 3–5. Teachers in grades 6–8 use *MathThematics* (McDougal Littell); however, some students in eighth grade take an Algebra I course using *Algebra 1* (McDougal Littell). Students in grades 9–12 use a curriculum sequence developed by the *University of Chicago School Mathematics Project* (UCSMP) including *Transitions Math*; *Algebra; Geometry; Advanced Algebra;* and *Functions, Statistics & Trigonometry*.

In District C there is an array of standards-based and traditional K–12 textbooks used across sixteen elementary, three middle, and three high schools. *Everyday Mathematics* is used in a large majority (14) of the elementary schools, one school uses *Investigations in Number, Data, and Space,* and one school uses some materials from each curriculum. The three middle schools use a combination of *Passport to Mathematics Book 2* and *Passport to Algebra and Geometry* (McDougal Littell) with one school piloting the unit *Filling and Wrapping* from the *Connected Mathematics Project* (CMP). The three high schools use a variety of texts with at least two schools using each of the following: *Geometry* and *Advanced Algebra* (Holt, Reinhart, Winston), *Mathematical Models with Applications* (W.H. Freeman), *PreCalculus 5th Edition* (Prentice Hall), *Elementary Statistics Eighth Edition* (Addison Wesley Longman), and *Calculus of Single Variable 7th Edition* (Houghton-Mifflin).

Section Four:
Mathematics Instruction

Instructional materials and instructional practices both play a key role in mathematics classes. This section of the report focuses on teachers' use of their designated instructional materials, and the instructional practices used to engage students with mathematics content.

Use of Instructional Materials

Teachers were asked to respond to several items regarding their use of the mathematics textbook/program designated for the target class. Across districts and grade ranges, a large majority of the teachers reported that decisions about selecting textbooks are made at the district level (see Table 4). The secondary level in District B is an exception, with 38 percent of teachers reporting textbook selection at the school level, and 15 percent reporting textbook selection at the individual teacher level. When someone else makes the decision about instructional materials, teachers may not agree with the philosophy of the program or may find it lacking in other important ways, which has the potential to create challenges for instruction.

Table 4
Teachers' Reports of Who Selects Textbook, by Grade Range and District

	Percent of Teachers					
	Grades K–5			Grades 6–12		
	District A	District B	District C	District A	District B	District C
District	99	92	86	91	46	95
School	1	0	13	9	38	5
Individual Teacher	0	8	1	0	15	0

Table 5 provides information on teachers' ratings of the quality of the mathematics textbooks/programs used for the target mathematics class. In each grade range, the distribution of ratings in District A is significantly different from that in Districts B and C, with District A's ratings tending to cluster more at the higher quality end of the scale.

Table 5
Teachers' Ratings of the Quality of the Designated Mathematics Textbook/Program, by Grade Range and District

	Percent of Teachers					
	Grades K–5			Grades 6–12		
	District A*	District B	District C	District A*	District B	District C
Very Poor	1	10	9	0	0	2
Poor	4	10	9	2	8	14
Fair	7	25	23	4	20	21
Good	34	19	33	21	44	33
Very Good	39	29	18	40	20	28
Excellent	15	6	9	33	8	2

* Distribution of teacher ratings in District A is significantly different from each of the other two districts (Kruskal-Wallis, with z-test follow-up, $p < 0.05$).

Table 6 highlights items related to the nature and extent of textbook use that were combined into an *extent of textbook use* composite.[2] Examples of items in this composite are the percentage of instructional time based on the textbook, the percentage of the textbook covered during a school year, and how often the teacher uses the teacher guide to plan lessons.

Table 6
Composite: Extent of Textbook Use in the Target Mathematics Classes

	Grades K–5		Grades 6–12	
	Mean	S.D.	Mean	S.D.
District A	77.40*	12.53	79.95*	10.14
District B	55.74*	19.47	59.62	15.48
District C	62.58*	18.35	58.09	16.96

* Composite score is significantly different from each of the other two districts in the indicated grade range (ANOVA, with Tukey HSD follow-up, $p < 0.05$).

As can be seen in Figure 1, at each grade range teachers in District A had higher composite scores (i.e., tended to use their textbooks more extensively) than did teachers in the other two districts. This finding is not surprising given District A teachers' higher ratings of the quality of their textbooks.

[2] To facilitate the reporting of the large amounts of survey data collected, and because individual questionnaire items are potentially unreliable, analysts combined groups of conceptually related survey questions into "composites." Each composite represents an important construct related to mathematics teaching. Appendix I includes a description of how composites were defined and computed in this report.

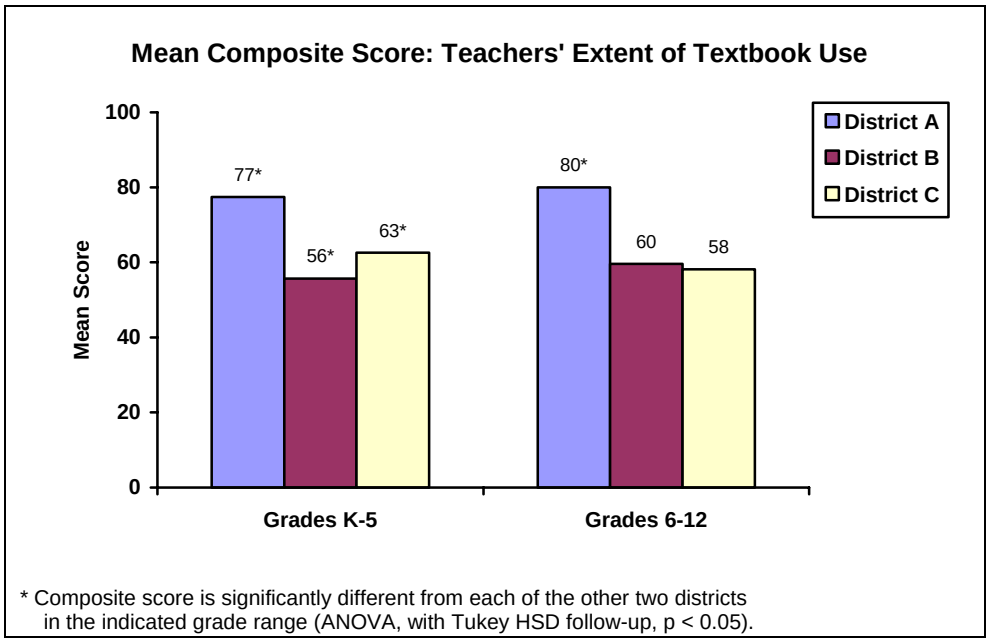


Figure 1

Based on these data, administrators in Districts B and C might want to further investigate the reasons for their teachers' low ratings of the textbook quality and their lower use of the textbooks in their classrooms. Depending on the results of this investigation, district administrators might consider providing additional professional development for teachers to increase their confidence in using the designated materials or perhaps selecting different sets of instructional materials that are more aligned with teachers' views.

Instructional Practices

Two composite variables were created to describe teachers' classroom practices (see Table 7). The *use of traditional teaching practices* composite is comprised of four items—the frequency with which teachers introduce content through formal presentations, pose close-ended questions, have students listen and take notes during a teacher-led presentation, and have students practice routine computations/algorithms. The *use of reform-oriented teaching practices* composite is comprised of eleven items such as the frequency with which teachers encourage students to explore alternative methods for solutions, encourage students to use multiple mathematical representations, and have students work in small groups.

Table 7
Composites: Teachers' Use of Reform and Traditional Teaching Practices

	Grades K–5		Grades 6–12	
	Mean	**S.D.**	**Mean**	**S.D.**
Use of Traditional Practices				
District A	47.58*	17.39	55.51*	18.91
District B	53.02*	20.99	70.60	15.87
District C	58.54*	17.93	73.69	14.41
Use of Reform-Oriented Practices				
District A	67.17*	10.82	70.02*	11.61
District B	54.15*	12.11	54.38*	9.57
District C	61.10*	13.83	64.55*	13.69

* Composite score is significantly different from each of the other two districts in the indicated grade range (ANOVA, with Tukey HSD follow-up, $p < 0.05$).

Elementary teachers in District A reported using reform-oriented instructional practices more and traditional practices less than did teachers in Districts B and C. (See Figures 2 and 3.) Results are similar at the secondary level. These data on instructional practices are consistent with the data on the structure of mathematics lessons, where teachers in District A devoted more time to small group activities than to individual student work, and teachers in District B devoted more time to whole class lectures/discussions than to small group activities. These data allow district leaders to compare actual teaching practices with those that are intended, and address any important inconsistencies.

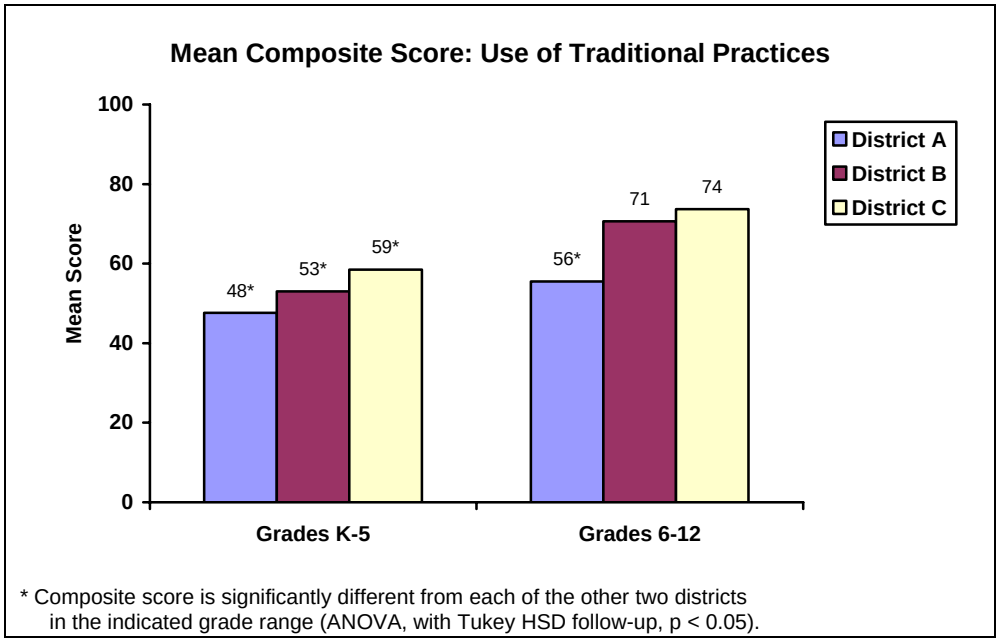


Figure 2

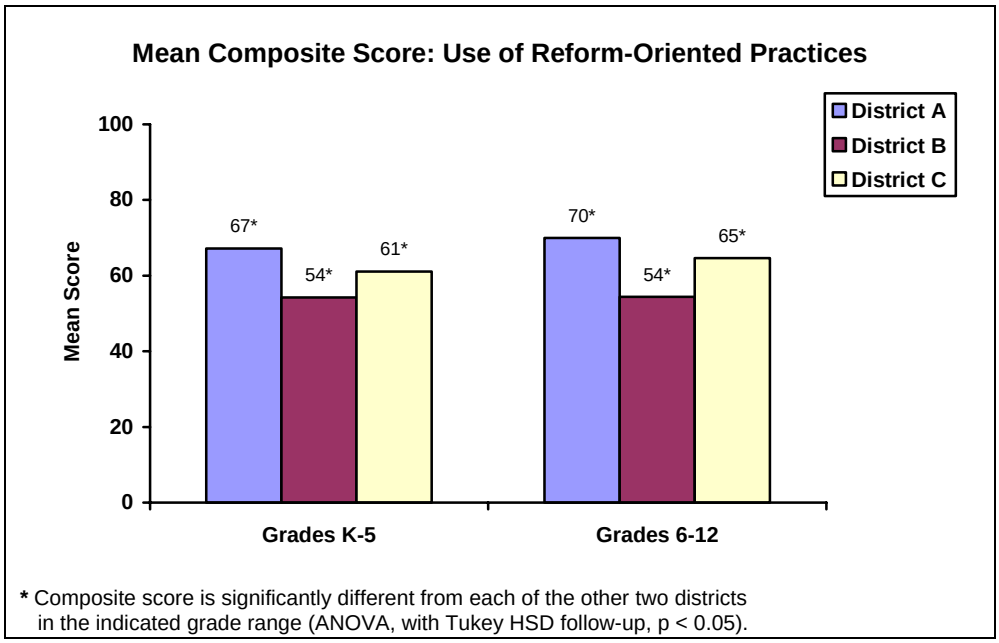

Mean Composite Score: Use of Reform-Oriented Practices
District A
District B
District C
Mean Score
100
80
60
40
20
0
67*
54*
61*
70*
54*
65*
Grades K-5
Grades 6-12
* Composite score is significantly different from each of the other two districts in the indicated grade range (ANOVA, with Tukey HSD follow-up, p < 0.05).

Figure 3

Section Five:
Teacher Perceptions

Teacher beliefs about mathematics instruction and confidence in their knowledge and skills for mathematics teaching are likely to affect their instruction. This section focuses on teacher beliefs, teacher interests, and other factors that may relate to curriculum use.

Beliefs

A composite variable was created to measure the extent to which teachers report *reform-oriented beliefs about student learning*. This composite consists of eight items measuring teachers' agreement with statements such as: "Students learn mathematics best through investigative approaches." and "It is just as important for students to learn data analysis and probability as it is for them to develop efficient skills for working mathematics exercises." Higher scores on this composite indicate more reform-oriented beliefs.

As shown in Table 8, teachers in both grade ranges in each district generally reported reform-oriented views about student learning, with composite scores ranging from 61 to 74 percent of total points possible. There were no significant differences among the districts at either grade range, a somewhat surprising finding in light of the greater use of reform-oriented instructional practices in District A.

Table 8
Composite: Reform-Oriented Beliefs about Student Learning

	Grades K–5		Grades 6–12	
	Mean	**S.D.**	**Mean**	**S.D.**
District A	73.42	11.44	73.52	12.26
District B*	70.02	11.10	61.34	10.08
District C*	69.66	12.17	66.86	11.39

* Scores for this district are significantly different between the K–5 and 6–12 grade ranges (independent samples t-test, $p < 0.05$).

Preparedness

Teachers were asked about their preparedness to teach various mathematics topics specific to each of the two grade bands. For the K–5 questionnaire, the 11 items included topics such as numeration, estimation, and measurement. For the 6–12 questionnaire, the 13 items included topics such as algebra, data collection and analysis, and calculus. The items from each grade band were combined into a composite measuring teachers' perceived *preparedness to teach mathematics topics*. The questionnaire also asked about teachers' *preparedness to guide and develop student learning* in areas such as problem solving, communication, and reasoning and proof, which was combined into a five-item composite. Teachers' scores on these composites are similar across the districts (see Table 9) and indicate that teachers in these districts generally

perceive themselves as fairly well prepared in these areas. At the same time, there were differences among topics within each district. Data on individual items provided to each district could be used to guide decision-making on potential topics for professional development.

Table 9
Composites: Elementary Teachers' Perceived Preparedness

	Mean	S.D.
To teach various K–5 mathematics topics		
District A	75.75	16.43
District B	71.87	20.53
District C	80.10	16.80
To guide and develop student learning		
District A	69.64	19.88
District B	60.88	21.93
District C	70.91	19.99

Table 10 provides similar data on secondary teachers, though it is important to note that the items were different from those on the elementary teacher questionnaire, including more advanced topics such as discrete mathematics and calculus. As is the case with elementary teachers, secondary teachers in all three districts perceive themselves as being fairly well prepared in the mathematics areas included in the questionnaire. And again, teacher perceptions of their preparedness to teach particular topics may have implications for professional development.

Table 10
Composites: Secondary Teachers' Perceived Preparedness

	Mean	S.D.
To teach various 6–12 mathematics topics		
District A	76.09	15.35
District B	66.79	23.45
District C	71.32	19.40
To guide and develop student learning		
District A	81.55	14.93
District B	67.44	22.65
District C	76.06	20.78

Professional Development Interests

Professional development is one of the primary mechanisms available to district leaders for improving teaching and learning in areas of need. To enhance the likelihood of participation, districts need to provide professional development that teachers see as relevant and important. Table 11 shows the percentage of teachers who indicated that they are very interested in each of a number of types of professional development opportunities. Overall, teachers expressed the most interest in professional development focused on teaching strategies to enhance student engagement and learning in mathematics. Although data on teachers' perceived preparedness indicated room for growth in content preparedness, the data shown in Table 11 indicate that relatively few teachers in the three districts reported being very interested in professional development aimed at deepening their content knowledge. One strategy the districts may want to consider that would both meet teachers' needs for additional content training and motivate them to attend is to offer professional development on teaching strategies, infusing appropriate mathematical content into that work.

Table 11
Teachers Very Interested in Professional Development on Various Topics

	Percent of Teachers					
	Grades K–5			Grades 6–12		
	District A*	District B*	District C*	District A*	District B§	District C*
Teaching strategies to enhance student engagement and learning in mathematics	76	72	65	93	85	77
Understanding student thinking in mathematics	58	56	46	70	69	59
Deepening own mathematics content knowledge	34	28	25	70	35	33

* Distribution of responses on teaching strategies significantly different than distribution of responses on understanding student thinking and deepening their own mathematics content knowledge (Wilcoxin Signed Ranks Test, $p < 0.05$).

§ Distribution of responses on teaching strategies significantly different than distribution of responses on deepening their own mathematics content knowledge (Wilcoxin Signed Ranks Test, $p < 0.05$).

The following sections report data from the survey that targeted a specific "slice" of mathematical content. The report concludes with a general summary and a discussion of implications.

Section Six:
Instructional Practices around Composing and Decomposing

The final section of each of the questionnaires asked about instructional practices through a content lens. In exploring content related to "composing and decomposing," survey designers selected topics such as addition, subtraction, and number sense for the elementary survey; at the secondary level, the topics included mathematics sense making, factors and multiples, and rate of change. Unlike the "general" sections of the questionnaire, which incorporated the use of items that had been used for previous research, the items in this section of the questionnaire were developed specifically for this study.

Instrument Development

Several design issues surfaced during survey construction; resolution of these issues served as guiding principles for the development of major item stems and associated sub-items. Although "composing and decomposing" was agreed upon by the survey design teams to be an important one to explore, there was concern that this descriptor might be unfamiliar to many teachers or interpreted in different ways. Leaders in one district noted that such language was prominent in their state curriculum documents; they readily identified such activities as constructing factor trees or finding equivalent fractions within the "composing and decomposing" learning objectives. Leaders from the other two districts expressed concern that the terms composing and decomposing would be confusing to teachers. The survey designers decided to describe a range of approaches/activities related to how particular topics are taught, without using the words "compose" or "decompose."

A second issue involved survey length. The survey design team recognized that it would not be feasible to address composing and decomposing in every relevant topic in the K–12 mathematics curriculum. Pilot versions of both surveys explored numerous mathematical topics and potential survey items unique to elementary and middle grades as well as those more commonly taught at the high school level. Consideration was also given to the overlap of major content areas and topic treatment between the elementary grades and those at the middle school.

Even after the items for the elementary survey were decided, the number of potential items at the secondary level grew, and concerns about survey length and the possibility of needing a separate middle school survey were discussed. The decision was made to adhere to a single survey for grades 6–12 and to focus attention on seven groups of items that broadly cover important mathematics within this grade range. The use of skip patterns allowed teachers to respond to only those item groups that matched content they taught.

The structure of each item set in both surveys followed a common format. For each of the content topics, a series of sub-items posed a variety of ways in which that particular content might be taught. The sub-items were not intended to reflect a particular curriculum, but rather to give teachers a wide range of choices of activities that are reflected in numerous curricula. The sub-item choices represented the best effort of the survey designers to not only attend to the

range of common activities/approaches associated with each mathematical topic, but to recognize that teachers may use other ways to engage their students. Specific attention was given to including activities that would distinguish tendencies between traditional approaches and more exploratory/alternative approaches used in the teaching of specific topics.

Each sub-item asked teachers to consider whole group instruction for the particular topic and estimate the *percentage of time* spent on each of the sample activities. Response choices were "None," "1–10%," "11–25%," and "more than 25%" of the time. The summary tables in this section collapse the first two categories for each district. Although the tables include results for all activity choices, the accompanying narrative highlights results where large (and interesting) differences were found among districts.

Instructional Practices at the K–5 Level

For the elementary teacher questionnaire, five mathematical topics relating to "composing and decomposing" were identified. The content item groupings were: single-digit addition, two-digit addition, three-digit addition, subtraction, and number sense.

Single-Digit Addition

Teachers reported the percentage of time spent on each of five activities related to whole-group instruction on single-digit addition. Table 12 shows results for these activities, representing typical ways in which teachers help students develop proficiency with single-digit addition.

As can be seen in Table 12, a relatively large percentage of elementary teachers in each district reported that they spend considerable time modeling problems using manipulatives, with nearly one-half of the teachers in each district indicating that they spent more than 25 percent of the whole class instructional time on this activity. The clearest differences amongst the districts in their approaches to teaching single-digit addition are found in sub-items a and b, involving the more traditional practices (i.e., using tables/flashcards and practicing sums using worksheets). For example, only 6 percent of District A's teachers reported using tables/flashcards more than 10 percent of whole class instructional time, compared to 15 percent in District B and 30 percent in District C. (See Figure 4.) Similarly, 20 percent of the teachers in District A reported substantial use of practice worksheets (more than 10 percent of whole class time) compared to 41 percent and 46 percent in Districts B and C, respectively.

Table 12
Activities Used to Teach Single-Digit Addition

	Percent of Elementary Teachers		
	District A	**District B**	**District C**
Item 20 **In this class, approximately what percentage of whole group instruction on *single-digit addition* is spent on each of the following activities?**			
a. Using tables or flashcards			
10% or less	94	85	70
11–25%	5	12	19
More than 25%	1	3	11
b. Practicing sums using worksheets			
10% or less	81	59	54
11–25%	15	22	26
More than 25%	5	19	20
c. Modeling problems using manipulatives			
10% or less	30	38	26
11–25%	23	17	27
More than 25%	47	45	48
d. Relating a sum to equivalent representations such as 7+7+1, 8+8–1, or 5+2+8			
10% or less	40	54	44
11–25%	31	28	33
More than 25%	29	18	23
e. Working related problems, to show how addition and subtraction are inverse operations			
10% or less	44	46	33
11–25%	32	34	31
More than 25%	25	19	36

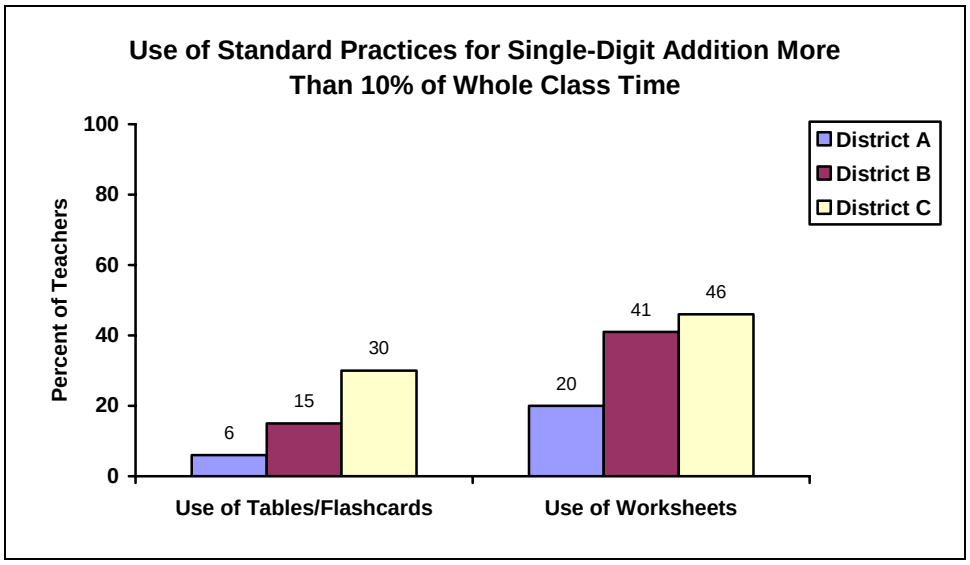


Figure 4

Addition of Two-Digit and Three-Digit Numbers

Other items focused on two-digit and three-digit addition, topics taught in some but not all of the grades within the K–5 range. To deal with this issue, each of these items began with a *filter item* which asked teachers to identify whether or not the topic is a part of any unit they taught this year.

Table 13 shows results for each of five ways in which teachers might approach two-digit addition in whole-group instruction, including the use of standard and alternative algorithms. Only teachers indicating they taught the topic were included in the analysis.

Table 13
Activities Used to Teach Two-Digit Addition†

	Percent of Elementary Teachers		
	District A	**District B**	**District C**
Item 21b **In this class, approximately what percentage of whole group instruction on *addition with two-digit numbers* is spent on each of the following activities?**			
i. Showing the right to left column addition algorithm that uses "carrying" or "regrouping" where necessary			
10% or less	80	35	31
11–25%	13	21	25
More than 25%	7	44	44
ii. Decomposing the addends into "1"s, and "10"s, and summing like groups to produce an equivalent total			
10% or less	22	42	47
11–25%	29	28	30
More than 25%	49	30	23
iii. Adding the first two numbers, then adding that partial sum to the next, and repeating that process with all numbers in the column to produce an equivalent total sum			
10% or less	52	58	57
11–25%	30	26	28
More than 25%	18	16	16
iv. Finding combinations that add to 10 as a possible strategy			
10% or less	16	48	46
11–25%	28	26	35
More than 25%	56	26	18
v. Finding *any* easy sum combinations that will result in an equivalent total sum			
10% or less	21	49	51
11–25%	33	26	30
More than 25%	46	26	19

† This analysis includes only teachers who indicated that they taught this topic to the target class.

District A teachers typically reported spending more time on alternative approaches (Items 21b-ii, b-iv, and b-v) such as finding combinations that add to 10, while District B and C teachers reported spending more time showing the more standard algorithm (Item 21b-i). As shown in Figure 5, roughly two-thirds of the teachers in Districts B and C reported that they spend more than 10 percent of the time showing the standard right to left column addition algorithm, compared to only 20 percent of District A's teachers.

Figure 5 also highlights the extent to which teachers from District A reported spending time on alternative computation strategies for addition with two-digit numbers. Eighty-four percent of District A's teachers indicated they spent more than 10 percent of the time on finding combinations that add to 10, as compared to 52 percent in District B and 53 percent in District C. Although all three districts are working to enact mathematical teaching practices that emphasize alternative strategies and reduce the emphasis placed on traditional practices, District A appears to be making more progress than the other two districts in this regard.

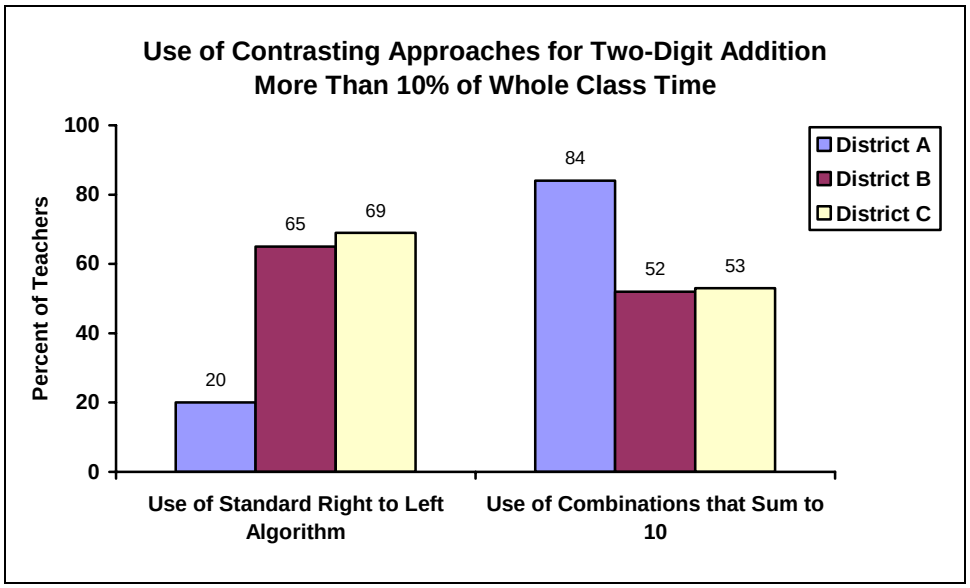


Figure 5

Item 22 focused on four teaching activities related to three-digit addition. (See Table 14.) Again, a larger percentage of teachers from District A reported spending considerable time on some of the alternative strategies (Items 22b-ii and b-iv). Only 8 percent of District A elementary teachers reported spending more than 25 percent of whole class instruction on the standard right to left column addition algorithm compared to 28 percent in District B and 39 percent in District C.

Table 14
Activities Used to Teach Three-Digit Addition

	Percent of Elementary Teachers†		
	District A	**District B**	**District C**
Item 22b **In this class, approximately what percentage of whole group instruction on *addition with three-digit numbers* is spent on each of the following activities?**			
i. Showing the right to left column addition algorithm that uses "carrying" or "regrouping" where necessary			
10% or less	77	47	39
11–25%	15	25	22
More than 25%	8	28	39
ii. Decomposing the addends into "1"s, "10"s, and "100"s, and summing like groups to produce an equivalent total			
10% or less	25	58	60
11–25%	37	22	25
More than 25%	38	19	15
iii. Adding the first two numbers then adding that partial sum to the next and repeating that process with all numbers in the column to produce an equivalent total sum			
10% or less	47	67	64
11–25%	34	22	23
More than 25%	19	11	13
iv. Rearranging the numbers in the column and looking for easier addition combinations			
10% or less	36	69	59
11–25%	28	17	26
More than 25%	36	14	15

† This analysis includes only teachers who indicated that they taught this topic to the target class.

Subtraction

Table 15 shows results for the sub-items for five activities related to teaching subtraction. These include traditional activities (using subtraction tables and flashcards and practicing difference worksheets), as well as alternative strategies such as using equivalent representations and working related problems to show that subtraction and addition are inverse operations.

Table 15
Activities Used to Teach Subtraction

	Percent of Elementary Teachers		
	District A	**District B**	**District C**
Item 23 **In this class, approximately what percentage of whole group instruction on *subtraction* is spent on each of the following activities?**			
a. Using tables or flashcards			
10% or less	96	90	75
11–25%	3	9	19
More than 25%	0	1	6
b. Practicing differences using worksheets			
10% or less	84	64	51
11–25%	13	22	33
More than 25%	3	13	17
c. Modeling problems using manipulatives			
10% or less	36	38	28
11–25%	31	22	37
More than 25%	33	40	35
d. Relating a difference to equivalent representations such as 12–6–2 , 12–4–4, or 12–2–6			
10% or less	51	67	53
11–25%	26	24	29
More than 25%	23	9	18
e. Working related problems, to show how subtraction and addition are inverse operations			
10% or less	42	55	38
11–25%	30	30	35
More than 25%	27	15	27

Modeling problems using manipulatives appears to be an especially common strategy for teaching subtraction, with more than 60 percent of the teachers in each of the three districts reporting spending more than 10 percent of whole class instructional time on this strategy. (See Figure 6.) Relatively few teachers in each district (3 percent, 10 percent, and 25 percent, in Districts A, B, and C respectively) indicated that they spent more than 10 percent of whole class instructional time using subtraction tables/flashcards. In contrast, 57 percent, 45 percent, and 62 percent of the teachers in Districts A, B, and C respectively reported that they worked related problems to show how subtraction and addition are inverse operations.

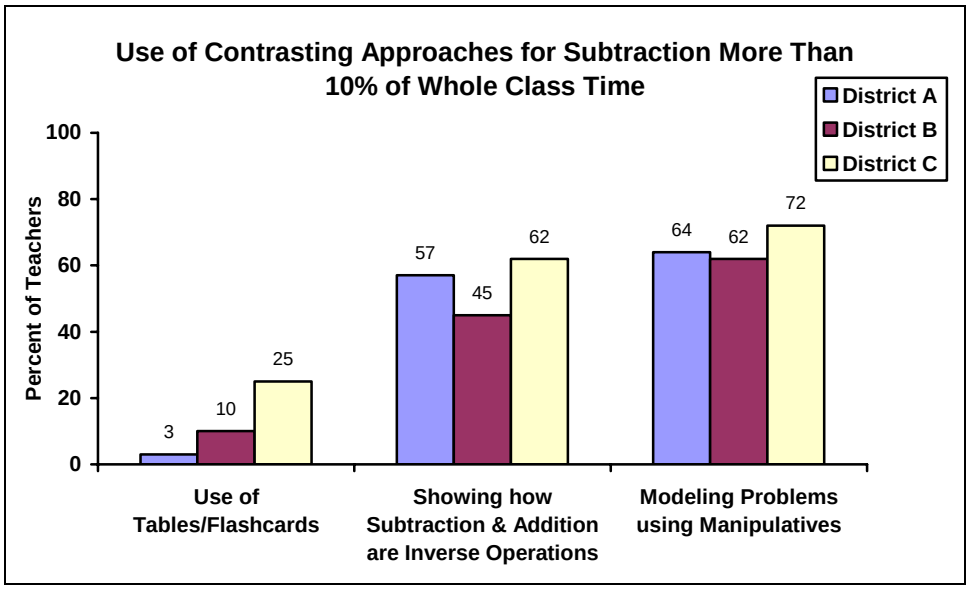


Figure 6

Developing Students' Number Sense

The final item in this section of the K–5 survey focused on activities related to developing students' number sense. Table 16 shows results for seven activities that represent typical ways in which teachers might help students develop number sense, including practicing counting skills; locating and comparing numbers on a number line; emphasizing addition and subtraction as regrouping objects; and incorporating doubling and tripling strategies.

Table 16
Activities Used to Develop Students' Number Sense

	Percent of Elementary Teachers		
	District A	**District B**	**District C**
Item 24 **In this class, approximately what percentage of whole group instruction on developing students' *number sense* is spent on each of the following activities?**			
a. Practicing counting skills			
10% or less	41	54	44
11–25%	25	19	28
More than 25%	34	26	29
b. Locating and comparing numbers on a number line			
10% or less	47	65	46
11–25%	36	24	28
More than 25%	17	12	26
c. Practicing estimation skills			
10% or less	46	42	44
11–25%	36	42	42
More than 25%	18	16	14
d. Practicing mental computations			
10% or less	22	30	39
11–25%	39	52	37
More than 25%	39	18	24
e. Relating the comparative "size" of numbers in a real-world context			
10% or less	35	46	44
11–25%	45	34	34
More than 25%	19	21	22
f. Emphasizing that both addition and subtraction can be understood as regrouping of objects			
10% or less	32	32	35
11–25%	33	41	35
More than 25%	34	26	30
g. Incorporating doubling and tripling strategies as a way to think about a number's composition			
10% or less	40	62	53
11–25%	33	26	33
More than 25%	26	12	13

Two observations are of particular interest in this item group. First, unlike in many earlier items, the teachers from District A did not respond dramatically differently from those in the other two districts in most of the sub-items related to number sense. For example, Figure 7 displays similar responses across the districts related to practicing estimation skills.

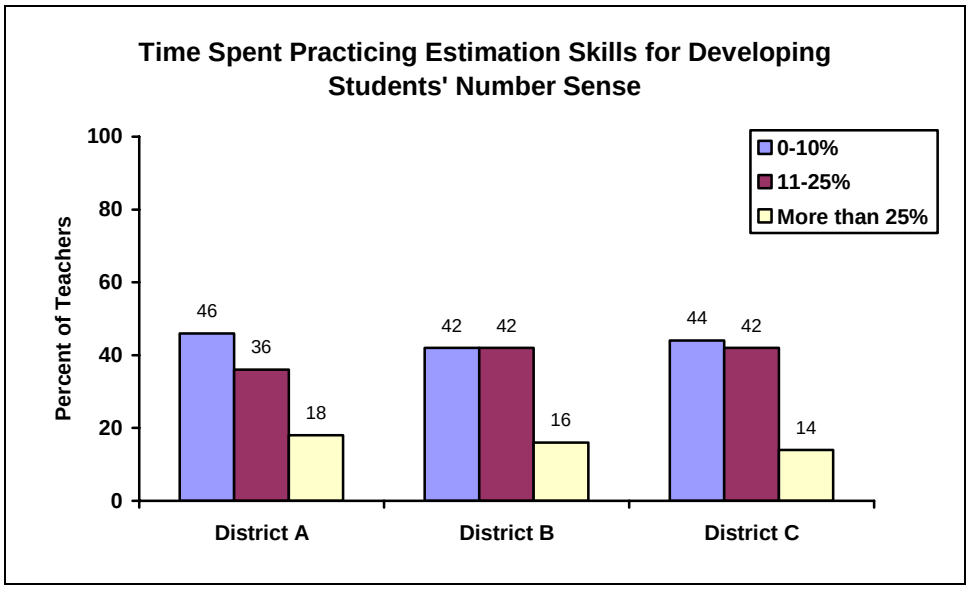


Figure 7

Second, for several items the responses for each of the three districts are roughly evenly distributed across response categories; Figure 8 shows an example of items where teachers within each district spend various amounts of time emphasizing these activities.

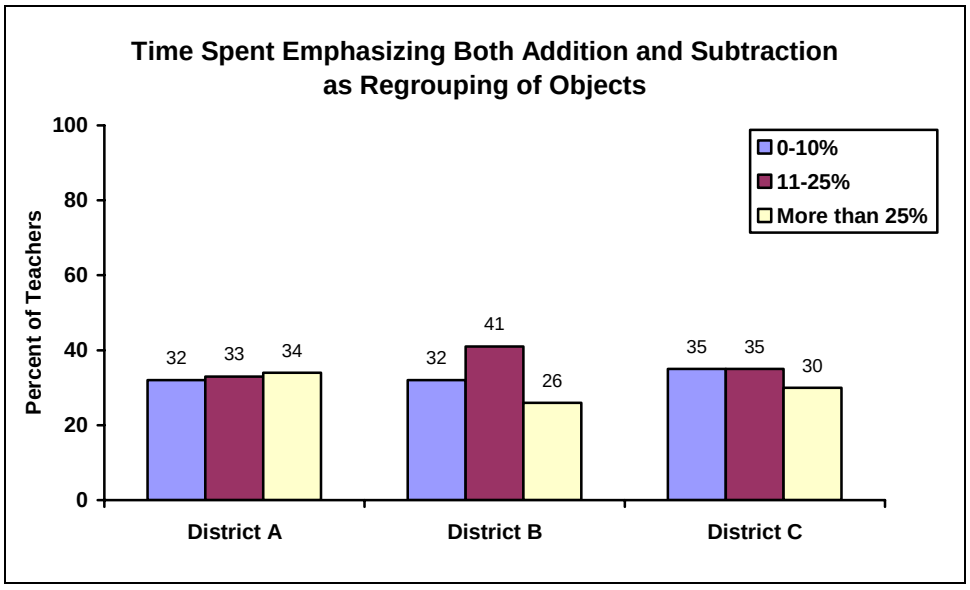


Figure 8

Instructional Practices at the 6–12 Level

For the content-specific section of the secondary teacher questionnaire, eight mathematical topics were identified that related to "composing and decomposing." The content item groupings consisted of: number sense, mathematics sense-making, equivalent fractions, factors and multiples, the distributive property, linear functions, areas of polygons, and rate of change.

Number Sense

The first two sets of items focused attention on curriculum content that could arguably be related to cultivating students' "habits of mind" and "learning to think." There are many mathematical activities that are linked to these (c.f. Cuoco, Goldenberg, & Mark, 1996; National Council of Teachers of Mathematics, 1989; Resnick, 1987), however, this survey limited the focus to activities that relate to developing number sense and mathematical sense making. Table 17 shows results for seven activities that represent typical ways in which teachers might help students develop number sense, ranging from the use of visual models and finding relationships among number representations to activities that focus more on memorizing and estimation.

Table 17
Activities Used to Develop Students' Number Sense

	Percent of Secondary Teachers		
	District A	**District B**	**District C**
Item 23 **Approximately what percentage of the target class's whole group instruction on developing students' *number sense* is spent on each of the following activities?**			
a. Relating numbers to visual models such as a number line, thermometer, etc.			
10% or less	62	60	44
11–25%	20	24	37
More than 25%	18	16	19
b. Using benchmarks and estimation to compare fractions			
10% or less	77	76	62
11–25%	11	20	24
More than 25%	12	4	14
c. Using calculators as a tool for making comparisons			
10% or less	33	67	26
11–25%	37	29	23
More than 25%	30	4	51
d. Practicing paper and pencil computations involving basic operations			
10% or less	72	32	42
11–25%	19	36	26
More than 25%	9	32	33
e. Practicing or memorizing translating between fractions, decimals, and/or percent equivalents			
10% or less	88	52	55
11–25%	11	44	29
More than 25%	2	4	17
f. Practicing mental computation strategies involving benchmarks and estimation			
10% or less	72	60	51
11–25%	21	40	32
More than 25%	7	0	17
g. Relating interpretation of fractions to the unit or whole			
10% or less	63	56	51
11–25%	28	32	27
More than 25%	9	12	22

Perhaps the clearest difference in the districts' approaches to teaching number sense is in the emphasis given to practicing paper and pencil computations. Only 9 percent of teachers in District A report using this activity more than 25 percent of whole class instructional time compared to about one-third of secondary teachers in Districts B and C. (See Figure 9.)

With respect to using calculators in developing students' number sense, District B teachers in grades 6–12 responded quite differently from those in the other two districts. Almost one-third of the District A teachers and roughly one-half of District C teachers reported using calculators more than 25 percent of the time in whole class instruction to teach number sense, compared to only 4 percent of those in District B.

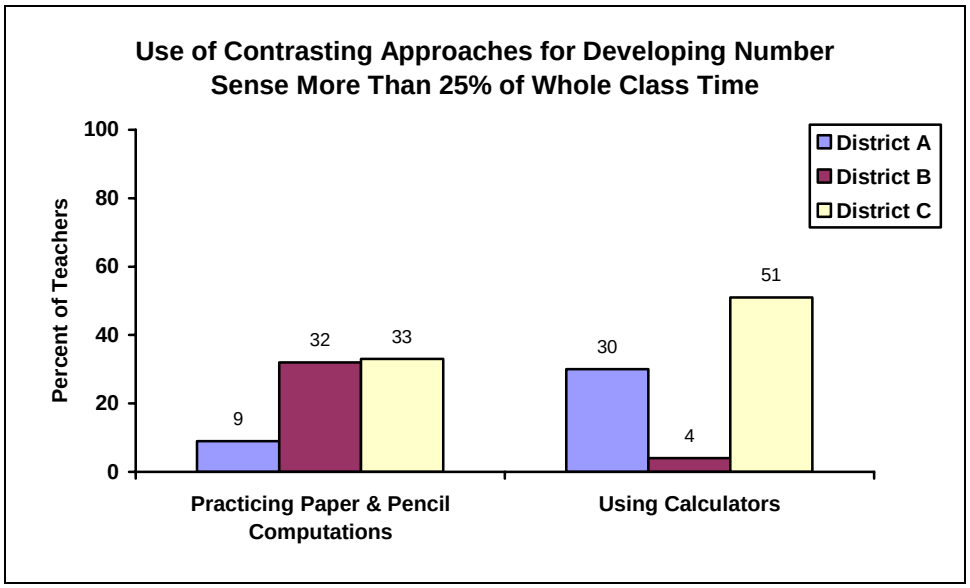


Figure 9

Making Sense of Mathematics

The second set of items asked teachers to focus attention on how they helped students make sense of the mathematical activities in which they were engaged. Table 18 shows results for nine such activities.

Three observations are of particular interest in this item group. First, for several of the sub-items (24a, 24c, and 24e) teacher responses in each district are fairly evenly distributed across response categories. Second, relatively few teachers in any of these districts emphasized either (1) providing situations where students determine which expression form is most useful for extracting information to solve a problem, or (2) the value of representing some situations/problems using one representation versus another. This finding suggests that teachers may not be comfortable working between equation representations and the situations that those equations may represent.

Table 18
Activities Used to Help Students Make Sense of Mathematics

	Percent of Secondary Teachers		
	District A	**District B**	**District C**
Item 24 **Approximately what percentage of the target class's whole group instruction on *making sense of mathematics* is spent on each of the following activities?**			
a. Emphasizing algebraic manipulations as an important skill for solving complex problems			
10% or less	44	44	28
11–25%	35	26	28
More than 25%	21	30	44
b. Providing situations where students must determine which expression/equation form is most useful for extracting information needed to solve a problem			
10% or less	67	70	53
11–25%	21	22	33
More than 25%	12	7	14
c. Writing rules/equations that represent a variety of real-world situations			
10% or less	29	41	37
11–25%	39	30	44
More than 25%	32	30	20
d. Writing about or creating real-world contexts represented by rules/equations, tables, or graphs			
10% or less	44	44	43
11–25%	26	41	43
More than 25%	30	15	14
e. Moving among verbal, symbolic, graphic, and tabular representations of equations/problems			
10% or less	39	48	45
11–25%	30	37	26
More than 25%	30	15	29
f. Emphasizing the value of representing some situations/problems using one representation versus another			
10% or less	33	67	45
11–25%	47	22	38
More than 25%	19	11	17
g. Moving between specific instances and mathematical generalizations			
10% or less	31	52	45
11–25%	40	37	33
More than 25%	29	11	21
h. Using deductive reasoning from basic properties to demonstrate why mathematics works			
10% or less	45	67	43
11–25%	33	22	31
More than 25%	22	11	26
i. Connecting the mathematics studied to other areas of mathematics			
10% or less	35	59	50
11–25%	44	26	24
More than 25%	21	15	26
j. Using computer-based, numerical, or graphical tools to solve or explore complex problems			
10% or less	40	74	55
11–25%	33	19	31
More than 25%	27	7	14

Use of technology is reflected in this content group as well (Item 24j), but more broadly worded to include computer-based, numerical, or graphical tools compared to only the calculator in the previous item. District B's teachers are again least likely to use technology, with only 7 percent of teachers reporting use of computer-based, numerical, or graphical tools more than 25 percent of their whole class time in teaching mathematics sense making, compared to 14 percent of those in District C and 27 percent in District A. (See Figure 10.)

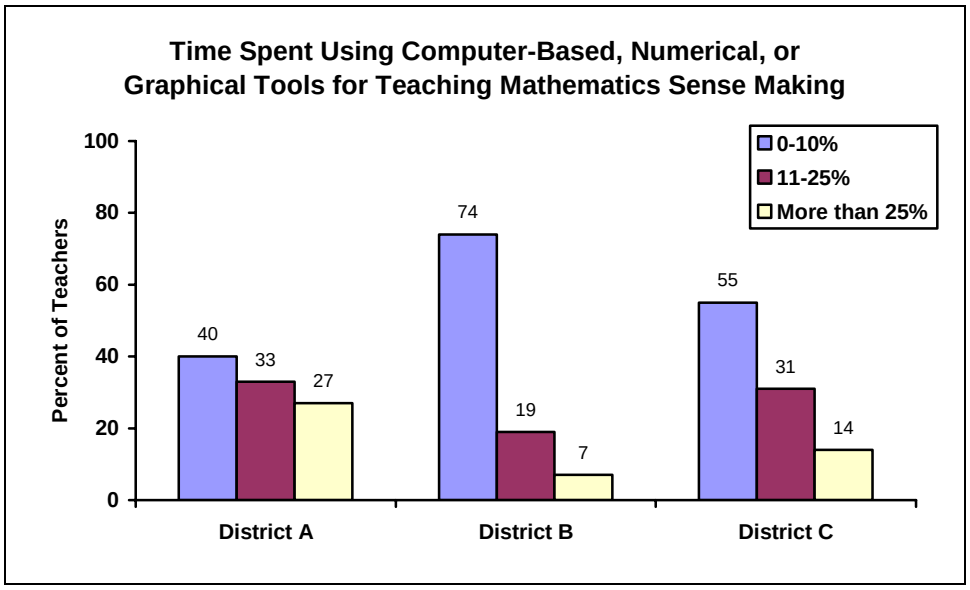


Figure 10

Extent to Which Selected Topics Are Taught Across the Districts

The remaining sets of items focused attention on specific topics that may not be included in some secondary mathematics courses. For instance, equivalent fractions is a topic likely encountered by most students in the elementary grades that continues to be revisited in many middle school mathematics classes, but may not be addressed in many high school mathematics courses. In contrast, finding the area of polygons is most closely identified with tenth-grade geometry classes, but may be encountered at a number of grade levels, particularly for students working in an integrated curriculum. To deal with this issue, several sets of content items on the 6–12 questionnaire began with a *filter item* which asked teachers to identify whether or not the topic was a part of any unit they taught that year.[3] These responses are of interest themselves, highlighting large differences in the emphasis placed on some mathematics topics among districts. For example, 81 percent of District B's teachers indicated that they teach equivalent fractions to the target class, compared to 37 percent and 60 percent in Districts A and C, respectively. (See Table 19.)

[3] To maximize the data available for the analysis of instructional emphases, teachers who reported that they did not teach the topic to the target class were asked if they taught the topic to another class. If so, they provided data for the first class of the day in which they taught that topic.

Table 19
Emphasis Placed on Selected Topics at the Secondary Level
Across the Three Districts

	Percent of Secondary Teachers		
	District A	**District B**	**District C**
25.a. Are *equivalent fractions* a part of any unit that you teach this year?			
No, not for this class	42	7	28
Yes, for this class	37	81	60
Yes, but not for this class	21	11	12
26.a. Are *factors and multiples* a part of any unit that you teach this year?			
No, not for this class	32	7	19
Yes, for this class	54	78	67
Yes, but not for this class	14	15	14
27.a. Is the *distributive property* a part of any unit that you teach this year?			
No, not for this class	28	31	0
Yes, for this class	53	65	95
Yes, but not for this class	19	4	5
28.a. Are *linear functions* a part of any unit that you teach this year?			
No, not for this class	21	42	24
Yes, for this class	67	46	69
Yes, but not for this class	12	12	7
29.a. Is the teaching of *area of polygons* a part of any unit that you teach this year?			
No, not for this class	32	42	19
Yes, for this class	54	46	71
Yes, but not for this class	14	12	10
30.a. Is the topic of *rate of change* a part of any unit that you teach this year?			
No, not for this class	16	42	15
Yes, for this class	74	38	78
Yes, but not for this class	11	19	7

Similarly, 95 percent of the teachers in District C reported they taught the distributive property to the target class compared to 53 percent of the teachers in District A, and 65 percent of the teachers in District B. As a final example, Figure 11 shows that even on more advanced topics such as area of polygons and rate of change there was considerable variability in coverage across the three districts.

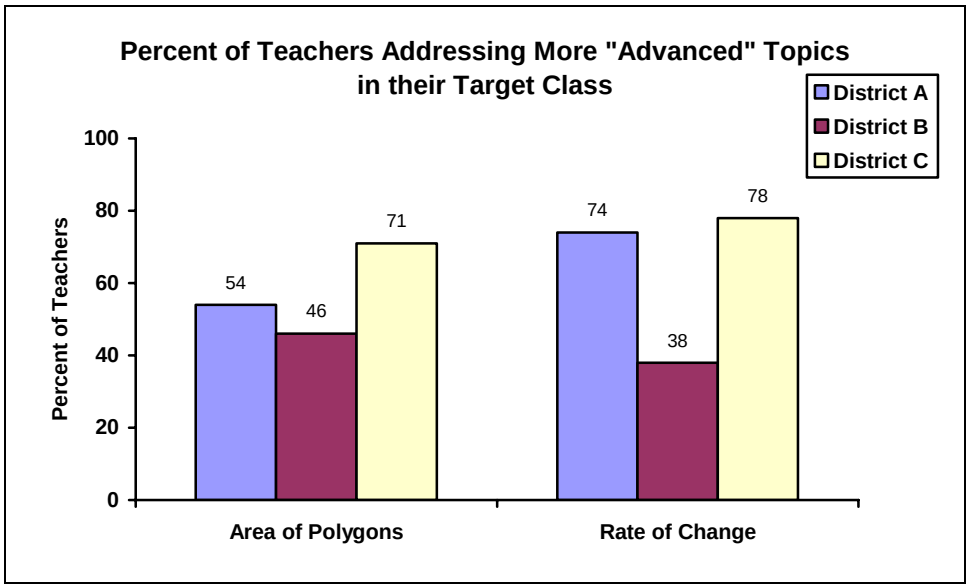


Figure 11

One of the most common topics in secondary mathematics instructional materials is linear functions. For example, it is included in instructional materials for pre-algebra, Algebra I and Algebra II courses, and all levels of current integrated curricula. Thus, the results of the filter item shown in Table 19 are curious, especially for District B where only about one-half of secondary teachers reported linear functions as part of any unit taught to the target class. One possible explanation is that the word "function" may not be the language used in some instructional materials.

Because of the many ways in which teachers, and instructional materials, introduce linear functions, this section included an item that probed how secondary teachers begin teaching this topic. As can be seen in Table 20, discussing slope as a rate of change is a common way for teachers in each of these districts to begin teaching linear functions, with percentages ranging from 34 to 49 percent. Quite a few teachers choose to begin with a geometric picture of slope, or with a scatter plot of data; only a handful begin with the formula for the slope of a line.

Table 20
Strategies Used to Begin Teaching Linear Functions†

	Percent of Secondary Teachers		
	District A	**District B**	**District C**
Item 28b **When teaching students in the target class about *linear functions* during whole class instruction, I begin:**			
With the formula for the slope of a line.	5	0	7
With a geometric picture of slope and interpret the picture as "rise over run."	17	36	38
By discussing slope as rate of change between real-world quantities as two different times.	49	43	34
With a scatterplot of data that has a linear pattern and look for ways to describe the pattern.	29	21	21

† This analysis includes only teachers who indicated that they taught this topic, either to the target class or to another mathematics class.

Equivalent Fractions

Table 21 shows the results for seven activities which might be used to teach equivalent fractions, including use of number lines and other visual models, manipulating fraction components, and memorizing algorithms. The lack of emphasis on strategies that use number lines (Items 25b-i and 25b-iv) in the three districts may be illustrative of the point made previously regarding the overlap of this topic with elementary school coverage. Teachers may assume that students have learned these skills by the time students reach the middle grades.

Table 21
Activities Used to Teach Equivalent Fractions†

	Percent of Secondary Teachers		
	District A	**District B**	**District C**
Item 25b **Approximately what percentage of the target class's whole group instruction on *equivalent fractions* is spent on each of the following activities?**			
i. Using a number line to develop different fraction names for the same location			
10% or less	76	88	71
11–25%	12	12	26
More than 25%	12	0	3
ii. Finding common denominators and making direct numerator comparisons			
10% or less	61	40	48
11–25%	33	40	29
More than 25%	6	20	23
iii. Finding equivalent fractions with common denominators for making comparisons			
10% or less	61	44	48
11–25%	30	36	31
More than 25%	9	20	21
iv. Partitioning number line models into equal sized pieces to make comparisons			
10% or less	67	76	61
11–25%	21	24	32
More than 25%	12	0	6
v. Emphasizing algorithms such as cross multiplication and comparing resulting products			
10% or less	84	52	28
11–25%	13	48	48
More than 25%	3	0	24
vi. Using visual examples such as paper folding as in 4/4 = 8/8 by an additional paper fold			
10% or less	73	79	55
11–25%	18	17	35
More than 25%	9	4	10
vii. Generating equivalent fractions by multiplying or dividing both numerator and denominator by useful forms of 1			
10% or less	64	58	33
11–25%	24	33	43
More than 25%	12	8	23

† This analysis includes only teachers who indicated that they taught this topic, either to the target class or to another mathematics class.

Of particular interest is the approach involving algorithms such as cross multiplication (Item 25b-v). Only 16 percent of District A's secondary teachers reported spending more than 10 percent of whole class time on such algorithms, compared to nearly half of District B's teachers and three-fourths of District C's teachers. Figure 12 shows this variability, as well as variability in emphasis on visual examples in teaching equivalent fractions.

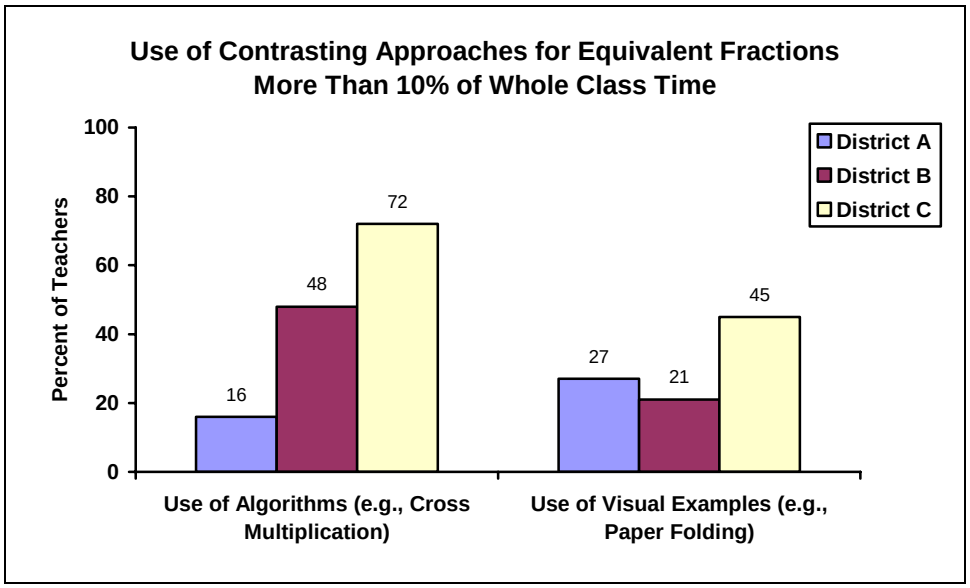


Figure 12

Factors and Multiples

Table 22 shows results for multiples and factors, another topic that spans elementary and middle school grades. Activities teachers might use in this area include constructing prime factor trees and presenting multiplication and division as inverse operations. Relatively few District A teachers, but quite a few teachers in Districts B and C reported spending more than 10 percent of whole class instructional time constructing prime factor trees, generating multiples of numbers, and using prime factorization when teaching about multiples and factors. Responses to item 26b-iv were most uniform, with one-third or fewer of the secondary teachers in each district reporting spending more than 10 percent of whole class time on activities emphasizing multiplication and division as inverse operations. (See Figure 13.) In general, responses in this section suggest that the time spent on factors and multiples involves other activities beyond the ones included in the survey.

Table 22
Activities Used to Teach Factors and Multiples†

	Percent of Secondary Teachers		
	District A	District B	District C
Item 26b **Approximately what percentage of the target class's whole group instruction on *factors and multiples* is spent on each of the following activities?**			
i. Constructing prime factor trees			
10% or less	84	61	50
11–25%	8	22	32
More than 25%	8	17	18
ii. Generating multiples of numbers to find common multiples and least common multiples			
10% or less	71	38	48
11–25%	21	46	39
More than 25%	8	17	12
iii. Using prime factorization to find the greatest common factor of two or more numbers			
10% or less	84	58	50
11–25%	13	33	35
More than 25%	3	8	15
iv. Listing factor pairs to emphasize the inverse relation between multiplication and division so that a*b = c implies a = c/b			
10% or less	66	83	68
11–25%	24	17	21
More than 25%	11	0	12

† This analysis includes only teachers who indicated that they taught this topic, either to the target class or to another mathematics class.

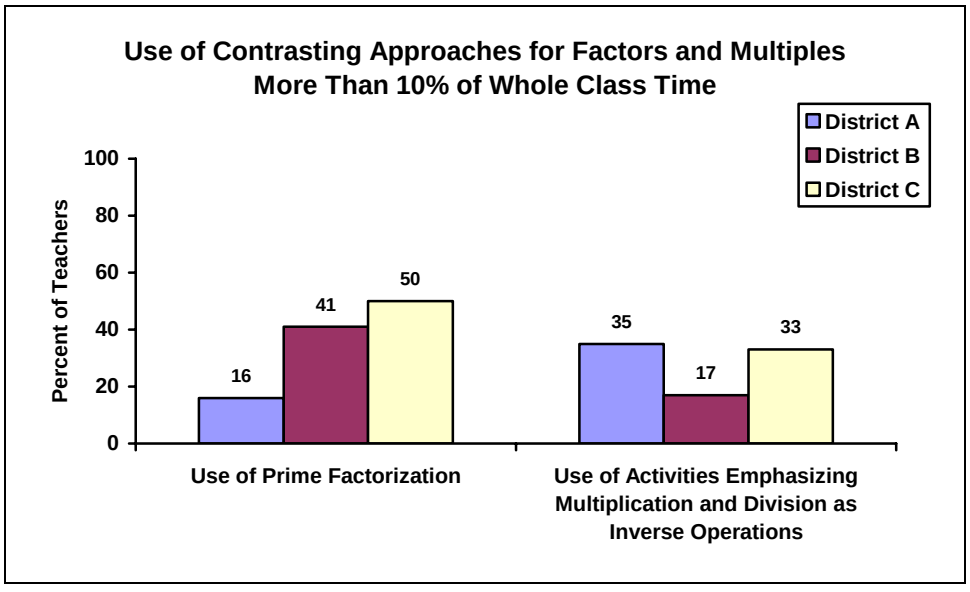


Figure 13

The Distributive Property

The next group of items focused on activities related to teaching the distributive property, a topic commonly taught within a variety of secondary courses, particularly those involving algebra. Sub-items focused on six activities, including verifying, applying, generalizing, and visually representing the property in various ways. (See Table 23.)

Table 23
Activities Used to Teach the Distributive Property†

	Percent of Secondary Teachers		
	District A	**District B**	**District C**
Item 27b **Approximately what percentage of the target class's whole group instruction on the *distributive property* is spent on each of the following activities?**			
i. Verifying a(b + c) = ab + ac using numerical skill-building exercises			
10% or less	71	53	43
11–25%	17	41	43
More than 25%	12	6	14
ii. Linking multiplication and factoring as inverse operations			
10% or less	70	47	56
11–25%	23	41	34
More than 25%	8	12	10
iii. Providing visual representations			
10% or less	55	82	43
11–25%	25	18	31
More than 25%	20	0	26
iv. Using equivalent forms of expressions to solve problems such as finding roots of polynomials			
10% or less	63	76	76
11–25%	22	24	19
More than 25%	15	0	5
v. Describing variants of the distributive property as special cases rather than as separate properties			
10% or less	80	71	67
11–25%	15	24	26
More than 25%	5	6	7
vi. Applying the distributive property to the multiplication of polynomials			
10% or less	63	61	60
11–25%	27	28	26
More than 25%	10	11	14

† This analysis includes only teachers who indicated that they taught this topic, either to the target class or to another mathematics class.

Differences among districts were most evident for the first three sub-items: verifying properties, identifying inverse operations, and use of visual representations. Roughly half of the teachers in Districts B and C reported spending more than 10 percent of whole class instructional time on activities related to verifying properties (27b-i), and linking factoring and multiplication as inverse operations (27b-ii), compared to approximately 29 percent of the teachers in District A in each case.

Teachers may choose to use visual models, for example, multiplying (x + 3) and (x + 7) using area models, to help students understand the distributive property as a supplement to expanding and factoring activities. Sub-item 27b-iii was included with such activities in mind. Note that a larger percentage of secondary teachers in District C reported emphasizing this approach than did teachers in the other two districts. Figure 14 shows results for using visual representations, and applying the distributive property to the multiplication of polynomials (27b-vi). It is interesting to note that the emphasis placed on applying the distributive property to the multiplication of polynomials is quite similar across the three districts.

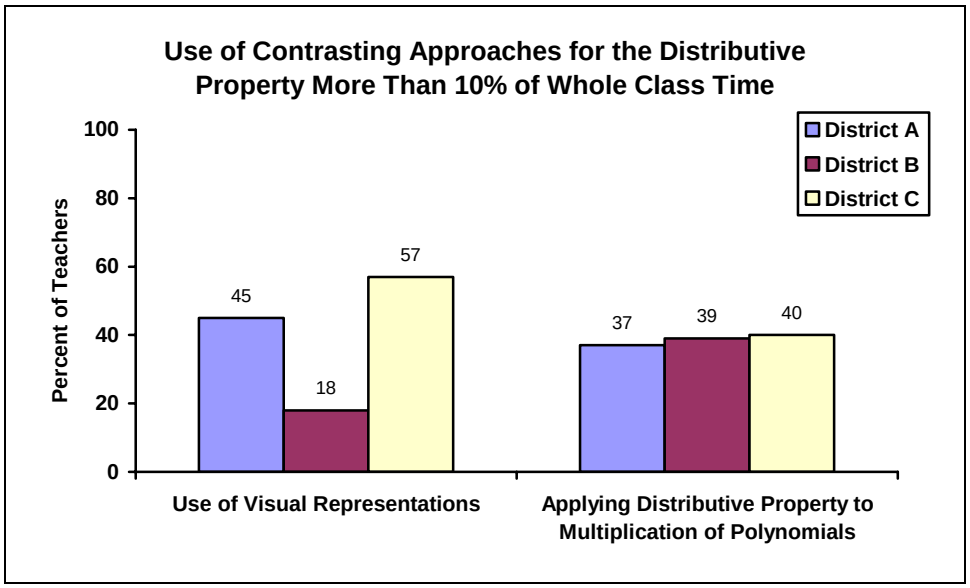


Figure 14

Linear Functions

The activity choices for this topic included teaching approaches such as examining tables and graphs, comparing linear and non-linear functions, using formulas, modeling real-world situations, and writing recursion equations. (See Table 24.) Again, District B's secondary teachers responded quite differently from their counterparts in Districts A and C. Fourteen percent of secondary teachers in District B reported spending more than 25 percent of whole class time on writing equations that model real-world situations (28c-vi); no District B teachers reported an emphasis on comparing graphs of linear and non-linear functions (28c-i), looking at the relative merit of various forms of linear functions for prediction (28c-iv), or writing recursion equations (28c-vii). By contrast, nearly one-fifth of District A's secondary teachers indicated spending more than 25 percent of whole class time on comparing linear and non-linear functions (28c-i). In general, District A teachers reported spending much more time on activities involving comparing graphs (28c-i); examining *xy* tables (28c-ii); and modeling real-world situations (28c-vi). They also placed less emphasis on obtaining proficiency with slope formulas (28c-iii) than did teachers in the other two districts.

Table 24
Activities Used to Teach Linear Functions†

	Percent of Teachers		
	District A	**District B**	**District C**
Item 28c **Approximately what percentage of the target class's whole group instruction on *linear functions* is spent on each of the following activities?**			
i. Making comparisons between graphs of linear and nonlinear functions			
10% or less	56	86	71
11–25%	27	14	26
More than 25%	18	0	3
ii. Using tables to interpret slope			
10% or less	40	86	60
11–25%	33	7	33
More than 25%	27	7	7
iii. Using slope formulas until proficiency is obtained			
10% or less	87	29	42
11–25%	9	64	48
More than 25%	4	7	10
iv. Understanding some forms of linear equations are easier to predict a pattern of change than others			
10% or less	80	86	57
11–25%	11	14	33
More than 25%	9	0	10
v. Examining the family of linear graphs and noticing how the graphs change as *m* (slope) changes			
10% or less	53	62	42
11–25%	31	31	45
More than 25%	16	8	13
vi. Writing algebraic equations that model real-world linear situations			
10% or less	24	43	42
11–25%	47	43	32
More than 25%	29	14	26
vii. Writing and interpreting recursive equations for slope such as NOW/NEXT equations of the form NEXT = NOW + C, where C is a constant			
10% or less	69	79	77
11–25%	16	21	13
More than 25%	16	0	10

† This analysis includes only teachers who indicated that they taught this topic, either to the target class or to another mathematics class.

Figure 15 highlights the variability among the three districts in emphasis placed on two approaches that are commonly used to teach linear functions. It would be interesting to see how closely related the emphasis on these approaches is to the districts' instructional programs.

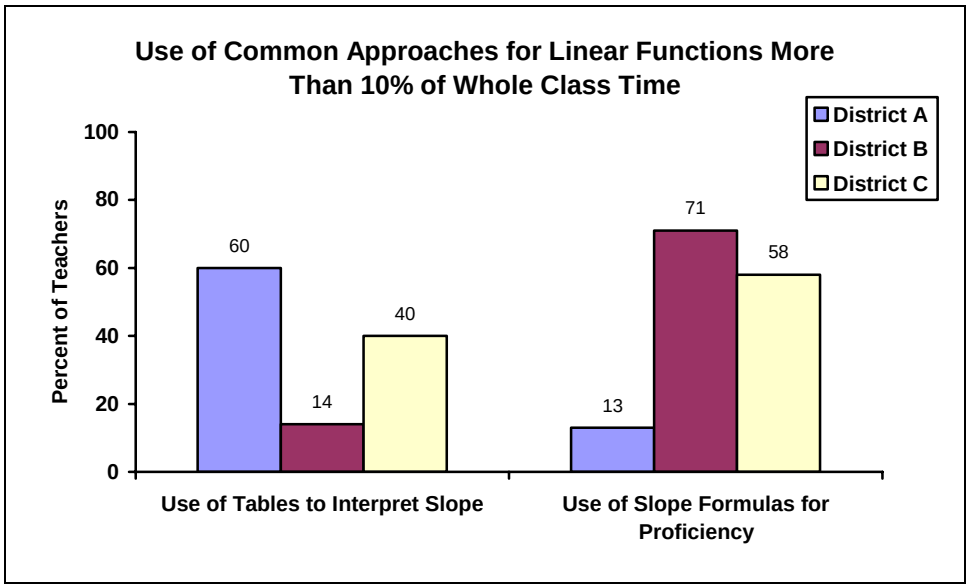


Figure 15

Finding Area of Polygons

Secondary mathematics courses often provide opportunities for students to learn area formulas for polygons, and this work may be linked to the ideas of "composition and decomposition." There are numerous approaches to teaching area of polygons, ranging from memorizing formulas to using graph paper and rulers to manipulating figures to make calculations easy. Results for items relating to area of polygons are shown in Table 25.

Table 25
Activities Used to Teach Area of Polygons†

	Percent of Secondary Teachers		
	District A	**District B**	**District C**
Item 29b **Approximately what percentage of the target class's whole group instruction on *area of polygons* is spent on each of the following activities?**			
i. Memorizing formulas for regular and common polygons			
10% or less	92	79	47
11–25%	3	14	41
More than 25%	5	7	12
ii. Measuring directly by hand and doing direct calculations			
10% or less	69	93	47
11–25%	28	7	44
More than 25%	3	0	9
iii. Measuring and calculating using a computer program such as *Sketchpad* or *Cabri*			
10% or less	97	93	94
11–25%	3	7	3
More than 25%	0	0	3
iv. Making estimates using graph paper			
10% or less	72	86	70
11–25%	23	14	24
More than 25%	5	0	6
v. Dissecting the polygon and rearranging the pieces into an "easier" shape(s) that can be calculated, then summing the areas			
10% or less	59	64	64
11–25%	28	29	30
More than 25%	13	7	6
vi. Using a scale factor and calculating the area from a smaller, similar polygon			
10% or less	79	93	65
11–25%	16	7	29
More than 25%	5	0	6
vii. Using area subtraction strategies to obtain the desired final area from a larger, encompassing figure/polygon such as subtracting triangular areas within a square			
10% or less	68	64	73
11–25%	26	29	27
More than 25%	5	7	0

† This analysis includes only teachers who indicated that they taught this topic, either to the target class or to another mathematics class.

Dynamic geometry tools are a relatively new option for studying area, and are now included in many curriculum materials. However, based on their responses to item 29b-iii, few teachers in any of the three districts placed much emphasis on engaging students with this technology.

Other items revealed differences among the three districts. For instance, relatively few teachers in Districts A and B, but roughly one-half of those in District C, reported spending more than 10 percent of whole class instructional time engaging students in memorizing formulas for polygons (29b-i). Similarly, about one-half of District C secondary mathematics teachers reported emphasizing measuring polygons by hand (29b-ii), compared to 31 percent of District A's teachers and 7 percent of District B's teachers.

Rate of Change

The final section of the 6–12 survey focused on activities involving rate of change. In some ways this topic is a more general treatment of Item 28 (linear functions), and a number of sub-items exhibit similar wording. The rationale for including this topic in the survey is its emphasis in curriculum materials as a conceptual treatment of slope beginning with simple linear phenomena and extending to the fundamental concepts of calculus. The topic also lends itself to various interpretations across multiple mathematical representations and is particularly important for interpreting and modeling real-world situations in a variety of contexts.

There are numerous approaches to teaching rate of change and most sub-items (30b-i to 30b-vi) involve typical activities that teachers use in courses prior to calculus. (See Table 26.) The last three sub-items (30b-vii to 30b-ix) are most likely to be encountered in a pre-calculus course or possibly later; they involve graphic and algebraic interpretations and understanding the definition of the derivative.

Use of the zoom feature on a graphing calculator, or similar technology, now allows students to "linearize" curves to examine rate of change in graphing windows. Yet Figure 16 shows that relatively few teachers in the three districts reported spending more than 10 percent of whole class time using such technology. In contrast, a sizeable proportion of teachers in each district reported spending considerable time on activities that have students comparing changes in *x,y* table values.

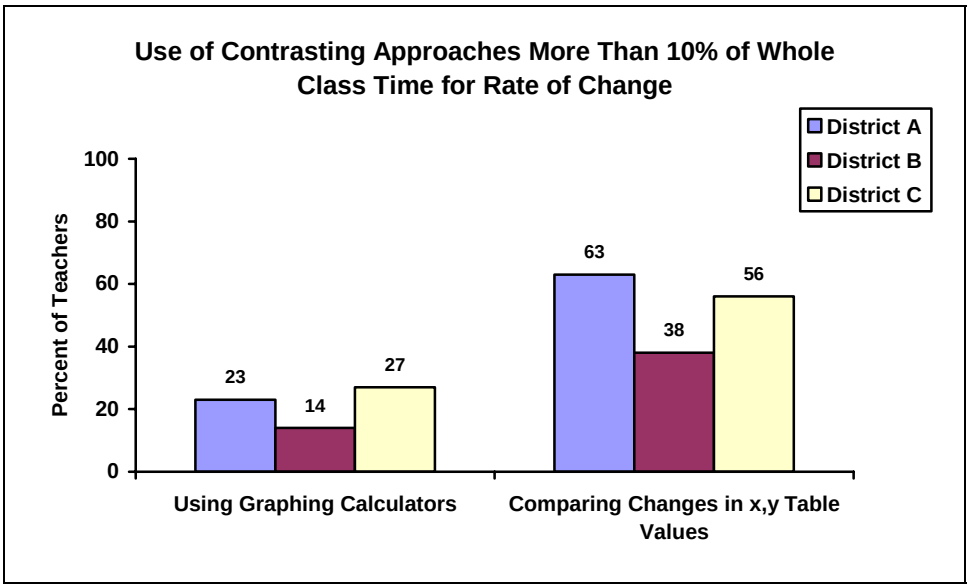


Figure 16

Important differences were also reported in two other activities: telling students the *m* in $y = mx + b$ is the rate of change and then having them practice similar identifications (30b-iii), and finding and interpreting regression lines (30b-v). District A differs from the other two districts in that little emphasis was placed on the former activity (12 percent of teachers compared to 46 percent in District B and 54 percent in District C spending more than 10 percent

of whole class time), and much more emphasis on the latter (40 percent of teachers compared to 16 percent and 24 percent in Districts B and C, respectively).

Table 26
Activities Used to Teach Rate of Change †

	Percent of Secondary Teachers		
	District A	**District B**	**District C**
Item 30b **Approximately what percentage of the target class's whole group instruction on *rate of change* is spent on each of the following activities?**			
i. Comparing changes in x,y table values			
10% or less	38	62	44
11–25%	38	38	41
More than 25%	25	0	15
ii. Examining f(x) in small graph windows on a graphing calculator or computer program			
10% or less	77	86	74
11–25%	21	14	18
More than 25%	2	0	9
iii. Telling students that *m* in y = *m*x + b is the rate of change and having them practice identifying it in similar problems			
10% or less	88	54	45
11–25%	2	31	36
More than 25%	10	15	18
iv. Creating real world problems of the form y = *a*x + b and making sensible interpretations for *a*			
10% or less	50	62	55
11–25%	31	31	21
More than 25%	19	8	24
v. Finding and interpreting regression equations			
10% or less	60	85	76
11–25%	23	8	15
More than 25%	17	8	9
vi. Working with problems involving average rate of change			
10% or less	60	54	59
11–25%	28	23	24
More than 25%	13	23	18
vii. Creating and interpreting graphs involving slope of a tangent line to a curve obtained from the limit of slopes of secant lines			
10% or less	96	93	94
11–25%	2	7	3
More than 25%	2	0	3
viii. Calculating derivatives using rules and/or formulas such as product, quotient, chain rules			
10% or less	100	100	94
11–25%	0	0	6
More than 25%	0	0	0
ix. Understanding the definition of a definition as a "derived" function and interpreting it in terms of a rate of change			
10% or less	98	100	100
11–25%	2	0	0
More than 25%	0	0	0

† This analysis includes only teachers who indicated that they taught this topic, either to the target class or to another mathematics class.

Similar to results from the elementary questionnaire, there are differences in secondary teachers' instructional practices around teaching composing and decomposing across the three districts. While the districts may want to investigate the reasons for those differences, it is also important that they examine their teachers' practices in relation to the curriculum program being implemented in their district.

Section Seven:
Summary and Implications

General Summary

The cross-site survey results indicate that elementary and secondary teachers across the three districts are teaching mathematics quite differently, which might be expected given that they are using different instructional materials. The results also show that classrooms in which the same curriculum materials are used, may also be quite different from one another, as has been demonstrated in previous studies as well (Kilpatrick, 2003; Lambdin & Preston, 1995; Spillane & Zeuli, 1999). Selecting instructional materials that are well-aligned with state/district standards is necessary but not sufficient; district leaders need to also monitor the enacted curriculum, to ensure that students are getting an appropriate opportunity to learn the specified content.

The first two sections of the survey targeted general aspects related to teacher attitudes and beliefs about mathematics, mathematics teaching, and mathematics curricula; teacher perceptions of their preparedness in mathematics content, in using particular pedagogical strategies, and professional development needs; and characteristics of their teaching practices. Teachers and administrators in all three participating districts have been working to improve the teaching and learning of mathematics, and teacher responses on a number of items reflect this work. For example, nearly all teachers in the three districts agreed that, "Every student in my room should feel that mathematics is something s/he can do." In addition, the vast majority of the teachers in each district indicated being at least fairly well prepared to teach problem solving.

At the same time, the survey results revealed significant differences in teachers' classroom practices among districts. District A teachers, as compared to Districts B and C, reported that they spend a higher percentage of time using their mathematics textbooks and "covering" a higher percentage of their textbooks; they were also more likely to give high marks to the quality of their textbooks. District A teachers also reported using reform-oriented instructional practices more, and traditional practices less, than did teachers in the other two districts.

The last section of the teacher surveys focused on a range of activities that could be used in the teaching of some important mathematical topics. With no particular curriculum in mind, ideas for sub-items were gleaned from classroom experience and research, which in turn were used to generate many of the activities included in the questionnaires. Some of these activities were intended to be consistent with the ways in which teachers have traditionally taught the included topics, and others with how those same topics tend to be presented in newer curriculum materials.

Responses to some items seemed independent of curriculum materials being used. For example, nearly half of the elementary teachers in each district reported a heavy emphasis on using manipulatives to model addition. Relatively few elementary teachers in each district reported heavy use of tables and flashcards for addition and subtraction.

Responses to other items revealed notable differences among the districts that may be reflections of the curriculum being used. At the elementary level, for example, there are some distinct differences with regard to the amount of time spent on showing algorithms and the amount of time spent using practice worksheets. K–5 teachers from Districts B and C reported spending more time using traditional practices than did teachers in District A; teachers from District A reported that they spent more time on alternative strategies to teaching addition and subtraction.

Similarly, 6–12 teachers in District B consistently responded more favorably to sub-item activities/approaches that emphasized practicing and memorizing algorithms and formulas, attention to achieving manipulation proficiency, and "telling" students what to do than did their counterparts in Districts A and C. Secondary teachers in District A were more likely to report engaging their students in activities that involved examining and making comparisons in tables and graphs, modeling and interpreting real-world contexts, and exploring such topics as regression lines. There was also a notable difference in teachers' responses to activities that involved technology, with District A teachers most likely and District B teachers least likely, to emphasize the use of technology.

Together, these patterns suggest that factors are at play within the participating districts that encourage certain teaching approaches. While such differences could simply be due to individual teacher preferences, more likely factors may lie in the approaches in use in the districts' instructional materials, and teachers' participation in professional development. In the following section, we describe some possible implications of the survey data for each of the three districts. A closer look at the enacted curriculum through classroom observation, and perhaps interviews with teachers as well would more clearly identify the forces at work and would help district leaders as they make decisions related to curriculum, instruction, and professional development.

Implications for Individual Districts

District A

District A has adopted reform-oriented instructional materials at each of the three grade ranges: K–5, 6–8, and 9–12. Most of the teachers reported liking these materials and using them extensively in their classrooms. District A teachers also indicated a fairly high agreement with reform-oriented views about student learning. These factors seem to explain why District A teachers apparently make frequent use of reform-oriented practices in their classrooms, both generally and in developing their students' ability to compose and decompose. Teacher beliefs are also consistent with how student activities are structured, with students reportedly spending more time in small group work than in individual student work.

With respect to the activities/strategies used to develop students' ability to compose and decompose, the influence of the reform-oriented instructional materials in use in District A is quite evident. At both the elementary and secondary levels, teachers in this district reported using more alternative activities in whole class instruction than teachers in the other two districts—again, indicating that this district is much closer to implementing standards-based mathematics teaching.

At this point, District A leaders may want to focus their attention on ensuring that teachers have the content understanding needed to use their instructional materials well. For example, at the elementary level, 43 percent of the teachers reported that they were no more than "somewhat prepared" to teach probability. At the secondary level, 63 percent of teachers reported being no more than "somewhat prepared" to teach calculus, which may or may not be of concern depending on their teaching assignments. The fact that a substantial proportion of District A's secondary teachers (28 percent) reported lack of preparedness in statistics may be of more concern given the increasing visibility of statistics in the K–12 curriculum.

Despite indicating a lack of preparedness in some content areas, teachers expressed most interest in professional development on teaching strategies to enhance student engagement and learning in mathematics, and least interest in deepening their own mathematics content knowledge. These interests should be considered when professional development for teachers is designed and advertised, perhaps leading with teachers' expressed interest and interweaving the mathematics content as appropriate.

District B

District B may need to reconsider its choice of instructional materials. First, only 35 percent of district elementary mathematics teachers and 28 percent of those at the secondary level rated their textbooks very good or excellent; 28 percent considered their textbooks poor or very poor. Second, 48 percent of the elementary teachers and 31 percent of the secondary teachers reported that they "cover" less than 75 percent of their mathematics textbooks in the target class; similarly, 43 percent at the elementary level and 30 percent at the secondary level based less than three-fourths of their instruction on these instructional materials. Seven out of ten elementary teachers, and eight out of ten at the secondary level, reported that they incorporate activities from sources other than the designated textbooks at least once a week. It is unlikely that District B will be able to establish a coherent mathematics program district-wide when some classes use traditional textbooks, others use reform-oriented textbooks, and still others use materials pieced together by teachers. This diversity of materials can interfere with student learning, as students need to adjust to different types of approaches from year to year; it also makes it more difficult to design and implement effective professional development. District B leaders may want to do further analysis of their data to see if textbook usage is higher for some sets of instructional materials than others, as a preliminary indication of teacher preferences.

It would also be important for District B leaders to learn more about what teachers do and do not like about the adopted materials, what they are using to supplement their textbooks, and why. It should be possible to identify sets of materials which are aligned with both state/district standards and teacher preferences.

Finally, District B leaders should attend to teachers' perceptions of their preparedness for teaching various areas of mathematics. At the elementary level, a sizeable proportion of the teachers indicated feeling less than well prepared to teach topics such as: probability, geometry and spatial sense, data collection and analysis, and algebra. At the secondary level, many teachers indicated they were no more than "somewhat prepared" to teach calculus (85 percent) and topics in discrete mathematics (70 percent), which may or may not be a concern depending on their teaching assignments. Two other content areas where sizeable percentages of

secondary teachers in this district indicated feeling less than well prepared to teach were statistics (48 percent), and functions (37 percent), suggesting areas of focus for professional development.

District C

Time devoted to mathematics instruction in District C seems problematic, with roughly one in two classes devoting more than 10 percent of lesson time to non-instructional activities. It is likely that even if nothing else changed, simply increasing time on task would be beneficial.

Teachers in District C vary considerably in their opinions of the quality of the textbooks designated for use in their mathematics classes; 27 percent of elementary teachers and 30 percent at the secondary level rated their textbooks very good or excellent, but 18 percent of elementary teachers and 16 percent at the secondary level rated their textbooks poor or very poor. Roughly one-third of the elementary teachers and one-half of the secondary teachers reported that they based less than 75 percent of their instruction on the designated textbooks. Leaders in District C may want to investigate further what teachers like and do not like about their textbooks, whether they are supplementing the textbooks because of inadequacies they perceive, or lack of alignment between the textbooks and state/district standards, or some other reasons. Depending on the explanation, District C may decide to provide additional professional development to help teachers learn how to make better use of their textbooks, or to adopt different instructional materials in the future.

As was the case with Districts A and B, District C teachers were much more likely to indicate that they were "very interested" in professional development to learn instructional strategies to enhance student engagement than in deepening their own content knowledge. In part, that interest may be a reflection of the fact that these teachers consider themselves to be already well prepared in content. Still, 42 percent of District C's elementary teachers considered themselves no more than "somewhat prepared" to teach probability, an area that is increasingly being recommended for inclusion in the elementary curriculum. Similarly, many secondary teachers in District C considered themselves no more than "somewhat prepared" to teach statistics (45 percent) and functions (49 percent). At least for these areas, and possibly for others as well, district leaders may want to offer professional development that highlights strategies for engaging students but at the same time helps teachers deepen their own content knowledge.

A Cautionary Note

The results of the cross-site survey reported here suggest that teacher surveys can be a useful tool for providing a snapshot of curriculum enactment at the district level. In particular, surveys can help identify (1) teacher beliefs about the quality of district-adopted textbooks, their preparedness, and their professional development expectations and needs; as well as (2) the frequency of specific instructional practices. This information can, in turn, assist district leaders in assessing weaknesses in curriculum enactment and in helping with decisions regarding professional development and textbook selection. At the same time, self-reported data have their limitations. District leaders need to be well-versed in the design principles and intended uses of their district's curricula and observe classrooms to get a more complete picture of the enacted curriculum, then talk with teachers about classroom practices and needs for assistance.

References

Cuoco, A., Goldenberg, E. P., & Mark, J. (1996). *Habits of mind: An organizing principle for a mathematics curriculum*. Newton, MA: Educational Development Center.

Kilpatrick, J. (2003). What works? In S. L. Senk & D. R. Thompson (Eds.), *Standards-based school mathematics curricula: What are they? What do students learn?* (pp. 471–488). Mahwah, NJ: Lawrence Erlbaum.

Lambdin, D. V. & Preston, R. V. (1995). Caricatures in innovation: Teacher adaptation to an investigation-oriented middle school mathematics curriculum. *Journal of Teacher Education, 46*(2), 130–140.

National Council of Teachers of Mathematics. (1989). *Curriculum and evaluation standards for school mathematics*. Reston, VA: Author.

Resnick, L. B. (1987). *Education and learning to think*. Committee on Mathematics, Science and Technology Education, Commission on Behavioral and Social Sciences and Education. National Research Council. Washington, DC: National Academy Press.

Ross, J. A., McDougall, D., Hogaboam-Gray, A., & LeSage, A. (2003). A survey measuring elementary teachers' implementation of standards-based mathematics teaching. *Journal for Research in Mathematics Education, 34,* 344–363.

Spillane, J. P. & Zeuli, J. S. (1999). Reform and Teaching: Exploring Patterns of Practice in the Context of National and State Mathematics Reforms. *Educational Evaluation and Policy Analysis, 21*(1), pp. 1–27.

Weiss, I. R., Banilower, E. R., McMahon, K. C., & Smith, P. S. (2001). *Report of the 2000 national survey of science and mathematics education.* Chapel Hill, NC: Horizon Research, Inc.

Appendix A

Grades K–5 Teacher Questionnaire

Center for the Study of Mathematics Curriculum (CSMC)

Teacher Questionnaire (Grades K-5)
Spring 2005

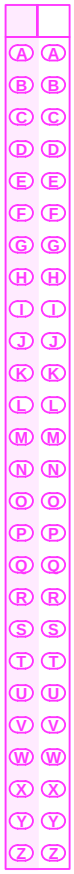
Instructions: Please use a #2 pencil to complete this questionnaire. Darken ovals completely, but do not stray into adjacent ovals. Be sure to erase completely any stray marks.

Please indicate your district. (Darken one oval.)

- ⬭ Columbia Public Schools
- ⬭ Grand Ledge Public Schools
- ⬭ Kalamazoo Public Schools

In an effort to track responses over time while protecting your identity, we ask that you create a unique ID number using the initials of **your mother's maiden name** (first and last name), **your mother's birthday** (2-digit month-day), and **your 2-digit birth order**. (For instance, if your mother's name is Mary Anderson; her birthday is April 10th; and you are the 2nd child in your family, you would bubble in MA 04 10 02.) Please use the boxes below to fill in the requested information, then darken the corresponding ovals.

First and last initials for mother's maiden name



Your mother's birthday

Month

Day

Your birth order

PLEASE DO NOT WRITE IN THIS AREA

A. Teacher Background

1. Including this year, how many years have you:
(Darken one oval on each line.)

	Number of Years									
	1	2	3	4	5	6-10	11-15	16-20	21-25	26 or more
a. taught at the K-12 level?	○	○	○	○	○	○	○	○	○	○
b. taught in this school district?	○	○	○	○	○	○	○	○	○	○
c. taught mathematics in this district or elsewhere?	○	○	○	○	○	○	○	○	○	○

2. Please indicate the type of teaching certification you hold. (Darken one oval.)

○ Regular or standard state certificate or advanced professional certificate
○ Probationary certificate (the initial certificate issued after satisfying all requirements except the completion of a probationary period)
○ Provisional or other type of certificate given to persons who are still participating in what the state call an "alternative certification program"

○ Temporary certificate (requires some additional; college coursework and/or student teaching before regular certification can be obtained)
○ Emergency certificate or waiver (issued to persons with insufficient teacher preparation who must complete a regular certification program in order to continue teaching)
○ No certificate

3. Within mathematics, many teachers feel better prepared to teach some topics than others. How well prepared do you feel to teach each of the following topics **at the grade level(s) you teach**, whether or not they are currently included in your curriculum? (Darken one oval on each line.)

	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
a. Numeration and number theory	①	②	③	④
b. Computation	①	②	③	④
c. Estimation	①	②	③	④
d. Measurement	①	②	③	④
e. Pre-algebra	①	②	③	④
f. Algebra	①	②	③	④
g. Patterns and relationships	①	②	③	④
h. Geometry and spatial sense	①	②	③	④
i. Data collection and analysis	①	②	③	④
j. Probability	①	②	③	④
k. Technology (calculators, computers) in support of mathematics	①	②	③	④

4. When teaching mathematics, many teachers feel better prepared to guide and help develop student learning in some domains than others. How well prepared do you feel to teach each of the following **at the grade level(s) you teach**, whether or not they are currently included in your curriculum? (Darken one oval on each line.)

	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
a. Problem solving	①	②	③	④
b. Reasoning and proof	①	②	③	④
c. Communication (written and oral)	①	②	③	④
d. Connections within mathematics and from mathematics to other disciplines	①	②	③	④
e. Multiple representations (e.g., concrete models, and numeric, graphical, symbolic, and geometric representations)	①	②	③	④

5. How interested are you in each of the following types of professional development opportunities? (Darken one oval on each line.)

	Not Interested	Somewhat Interested	Very Interested
a. Deepen my own mathematics content knowledge.	①	②	③
b. Focus on understanding student thinking in mathematics.	①	②	③
c. Focus on teaching strategies to enhance student engagement and learning in mathematics.	①	②	③
d. Focus on the use of mathematics curriculum materials.	①	②	③
e. Focus on the use of technology to support mathematics teaching and learning.	①	②	③
f. Observe other teachers teaching mathematics and discuss with them their decisions and teaching strategies.	①	②	③
g. Meet regularly with a local group of teachers to study/discuss mathematics teaching issues.	①	②	③

6. Please provide your opinion about each of the following statements. (Darken one oval on each line.)

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
a. Students generally learn mathematics best in classes with students of similar abilities.	①	②	③	④	⑤
b. It is just as important for students to learn data analysis and probability, as it is to learn multiplication facts.	①	②	③	④	⑤
c. Generally, students learn mathematics best through investigative approaches (e.g., hands-on experiences, inquiry).	①	②	③	④	⑤
d. Every student in my room should feel that mathematics is something s/he can do.	①	②	③	④	⑤
e. Using computers or calculators to solve mathematics problems distracts students from learning basic mathematics skills.	①	②	③	④	⑤
f. Students generally learn mathematics best through traditional approaches (e.g., lecture, drill and practice/ memorization).	①	②	③	④	⑤
g. At the grades I teach, a lot of things in mathematics must be simply accepted as true and remembered.	①	②	③	④	⑤
h. It is just as important for students to understand mathematics concepts as it is for them to develop efficient skills for working mathematics exercises.	①	②	③	④	⑤

B. Description of the Target Class

*Please answer the following questions for your mathematics instruction. If you teach mathematics to multiple classes, please answer these questions for your **first mathematics class** of the day.*

7. Approximately how many students are in this class? (Darken one oval.)

10 or fewer	11-15	16-20	21-25	26-30	more than 30
○	○	○	○	○	○

8. Please indicate the grade level of the students in this class. (Darken more than one oval **only if** there is not a majority in any single grade level.)

K	1	2	3	4	5
Ⓚ	①	②	③	④	⑤

PLEASE DO NOT WRITE IN THIS AREA

9. Approximately what percentage of students in this class is officially classified as requiring special education services? (Darken one oval.)

less than 25%	25-49%	50-74%	75% or more
⬭	⬭	⬭	⬭

10. Approximately how many minutes is a typical mathematics lesson in this class? (Darken one oval.)

10 or fewer	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81 or more
⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭

11. On average what percentage of instructional time allotted to mathematics is spent on each of the following? (Darken one oval on each line.)

	0-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
a. Daily routines, interruptions, and other non-instructional activities.	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭
b. Whole class lecture/discussions.	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭
c. Individual students reading textbooks, completing worksheets, etc.	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭
d. Small group work.	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭

12. About how often do **you** do each of the following when you teach mathematics to this class? (Darken one oval on each line.)

	Never	Rarely (e.g., a few times a year)	Sometimes (e.g., once or twice a month)	Often (e.g., once or twice a week)	Always (e.g., done at least once a day)
a. Introduce content through formal presentations.	①	②	③	④	⑤
b. Pose close-ended questions.	①	②	③	④	⑤
c. Engage the whole-class in discussions.	①	②	③	④	⑤
d. Require students to explain their reasoning when giving an answer.	①	②	③	④	⑤
e. Assess student progress by reviewing homework.	①	②	③	④	⑤
f. Encourage students to explore alternative methods for solutions.	①	②	③	④	⑤
g. Require students to use calculators/computers for learning or practicing skills.	①	②	③	④	⑤
h. Help students see connections between mathematics and other disciplines.	①	②	③	④	⑤
i. Encourage students to use multiple representations (e.g., numeric, graphic, geometric, etc.).	①	②	③	④	⑤

13. In general, about how often do the **students** in this mathematics class take part in the following activities? (Darken one oval on each line.)

	Never	Rarely (e.g., a few times a year)	Sometimes (e.g., once or twice a month)	Often (e.g., once or twice a week)	Always (e.g., done at least once a day)
a. Listen and take notes during a presentation by the teacher.	①	②	③	④	⑤
b. Work in groups.	①	②	③	④	⑤
c. Read from a mathematics textbook in class.	①	②	③	④	⑤
d. Read other (non-textbook) mathematics-related materials in class.	①	②	③	④	⑤
e. Engage in mathematical activities using concrete materials.	①	②	③	④	⑤
f. Practice routine computations/algorithms.	①	②	③	④	⑤
g. Review homework/worksheet assignments.	①	②	③	④	⑤
h. Use mathematical concepts to interpret and solve applied problems.	①	②	③	④	⑤
i. Answer textbook or worksheet questions.	①	②	③	④	⑤
j. Write reflections (e.g., in a journal).	①	②	③	④	⑤

(Question 13 continues on next page.)

13. Continued.

	Never	Rarely (e.g., a few times a year)	Sometimes (e.g., once or twice a month)	Often (e.g., once or twice a week)	Always (e.g., done at least once a day)
k. Make formal presentations to the rest of the class.	①	②	③	④	⑤
l. Keep notes in an organized notebook that is periodically reviewed by teacher.	①	②	③	④	⑤
m. Work on extended mathematics investigations or projects (a week or more in duration).	①	②	③	④	⑤
n. Record, represent, and/or analyze data.	①	②	③	④	⑤
o. Use calculators or computers to develop conceptual understanding.	①	②	③	④	⑤
p. Take a test or quiz.	①	②	③	④	⑤

14. Please indicate the **ISBN number** of the mathematics textbook/program (or any module in the series) used most often for this class, then darken the corresponding ovals.

Note that the ISBN number is typically found on the page with the copyright and publisher information.

ISBN number

0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9

15. Which best describes the level at which the decision to use that mathematics textbook/program was made? (Darken one oval.)

- ⬭ District level
- ⬭ School level
- ⬭ Individual teacher level

16. For each of the following, please indicate how often you use that mathematics textbook/program in the target class. (Darken one oval on each line.)

	Never	Rarely (e.g., a few times a year)	Sometimes (e.g., once or twice a month)	Often (e.g., once or twice a week)	Always (e.g., done at least once a day)
a. The textbook guides the structure (content emphasis) of this class.	①	②	③	④	⑤
b. I follow the textbook page by page.	①	②	③	④	⑤
c. I pick what I consider important from the textbook and skip the rest.	①	②	③	④	⑤
d. I follow my district's curriculum recommendations regardless of what is in the textbook.	①	②	③	④	⑤
e. I incorporate activities from other sources to supplement the textbook.	①	②	③	④	⑤
f. I use the student textbook to plan lessons for this class.	①	②	③	④	⑤
g. I read and review suggestions in the textbook's teacher guide to plan lessons for this class.	①	②	③	④	⑤
h. I assign homework from the textbook.	①	②	③	④	⑤
i. Students in this class use their textbook during the mathematics lesson.	①	②	③	④	⑤

17. Over the course of the school year, approximately what percentage of the mathematics instructional time for this class will be based on that mathematics textbook/program? (Darken one oval.)

less than 25%	25-49%	50-74%	75-90%	more than 90%
⬭	⬭	⬭	⬭	⬭

18. Estimate the percentage of that mathematics textbook/program you will cover during the school year with this class. (Darken one oval.)

less than 25%	25-49%	50-74%	75-90%	more than 90%
⬭	⬭	⬭	⬭	⬭

19. How would you rate the overall quality of that mathematics textbook/program for this class? (Darken one oval.)

Very Poor	Poor	Fair	Good	Very Good	Excellent
⬭	⬭	⬭	⬭	⬭	⬭

C. Teaching Practices Related to Specific Mathematics Content in the Target Class

For the class that you previously identified, please consider all of the **whole group** instructional time that you have spent thus far on each of the following **mathematical topics**. Do not be concerned if there are other related practices that are not included, there is no expectation that these should add to 100 percent.

20. In this class, approximately what percentage of whole group instruction on *single-digit addition* (such as 7+8) is spent on each of the following activities? (Darken one oval on each line.)

	Percentage of Whole Group Instruction			
	None	1-10%	11-25%	More than 25%
a. Using tables or flashcards.	⬭	⬭	⬭	⬭
b. Practicing sums using worksheets.	⬭	⬭	⬭	⬭
c. Modeling problems using manipulatives.	⬭	⬭	⬭	⬭
d. Relating a sum to equivalent representations such as 7+7+1, 8+8-1, or 5 + 2 + 8.	⬭	⬭	⬭	⬭
e. Working related problems, (e.g., comparing 7+8=15 to 15-8=7) to show how addition and subtraction are inverse operations.	⬭	⬭	⬭	⬭

21a. Is addition with two-digit numbers a part of any unit you teach this year? (Darken one oval.)

⬭ **No, not for this class.** Please continue to Question 22a.
⬭ **Yes, for this class.** Please answer Question 21b.

PLEASE DO NOT WRITE IN THIS AREA

21b. In this class, approximately what percentage of whole group instruction on *addition with two-digit numbers* is spent on each of the following activities? (Darken one oval on each line.)

Percentage of Whole Group Instruction

	None	1-10%	11-25%	More than 25%
i. Showing the right to left column addition algorithm that uses "carrying" or "regrouping" where necessary.	⬭	⬭	⬭	⬭
ii. Decomposing the addends into "1"s, and "10"s, and summing like groups to produce an equivalent total. (e.g. **1***2* + **2***7* + **3***6* = **60** + *15* = 75)	⬭	⬭	⬭	⬭
iii. Adding the first two numbers, then adding that partial sum to the next, and repeating that process with all numbers in the column to produce an equivalent total sum.	⬭	⬭	⬭	⬭
iv. Finding combinations that add to 10 as a possible strategy.	⬭	⬭	⬭	⬭
v. Finding *any* easy sum combinations that will result in an equivalent total sum.	⬭	⬭	⬭	⬭

22a. Is addition with two-digit numbers a part of any unit you teach this year? (Darken one oval.)

⬭ **No, not for this class.** Please continue to Question 23.
⬭ **Yes, for this class.** Please answer Question 22b.

22b. In this class, approximately what percentage of whole group instruction on *addition with three-digit numbers* is spent on each of the following activities? (Darken one oval on each line.)

Percentage of Whole Group Instruction

	None	1-10%	11-25%	More than 25%
i. Showing the right to left column addition algorithm that uses "carrying" or "regrouping" where necessary.	⬭	⬭	⬭	⬭
ii. Decomposing the addends into "1"s, "10"s, and "100"s, and summing like groups to produce an equivalent total. (e.g. **1***23* + **2***45* + **4***31* = **700** + *90* + 9 = 799)	⬭	⬭	⬭	⬭
iii. Adding the first two numbers then adding that partial sum to the next and repeating that process with all numbers in the column to produce an equivalent total sum.	⬭	⬭	⬭	⬭
iv. Rearranging the numbers in the column and looking for easier addition combinations.	⬭	⬭	⬭	⬭

23. In this class, approximately what percentage of whole group instruction on *subtraction* (such as 12 – 8) is spent on each of the following activities? (Darken one oval on each line.)

Percentage of Whole Group Instruction

	None	1-10%	11-25%	More than 25%
a. Using tables or flashcards.	⬭	⬭	⬭	⬭
b. Practicing differences using worksheets.	⬭	⬭	⬭	⬭
c. Modeling problems using manipulatives.	⬭	⬭	⬭	⬭
d. Relating a difference to equivalent representations such as 12 – 6 – 2, 12 – 4 – 4, or 12 – 2 – 6.	⬭	⬭	⬭	⬭
e. Working related problems, (e.g., comparing 12-8=4 to 8+4=12) to show how subtraction and addition are inverse operations.	⬭	⬭	⬭	⬭

24. In this class, approximately what percentage of whole group instruction on developing students' *number sense* is spent on each of the following activities? (Darken one oval on each line.)

	Percentage of Whole Group Instruction			
	None	1-10%	11-25%	More than 25%
a. Practicing counting skills.	⬭	⬭	⬭	⬭
b. Locating and comparing numbers on a number line.	⬭	⬭	⬭	⬭
c. Practicing estimation skills.	⬭	⬭	⬭	⬭
d. Practicing mental computations.	⬭	⬭	⬭	⬭
e. Relating the comparative "size" of numbers in a real-world context.	⬭	⬭	⬭	⬭
f. Emphasizing that both addition and subtraction can be understood as regrouping of objects.	⬭	⬭	⬭	⬭
g. Incorporating doubling and tripling strategies as a way to think about a number's composition.	⬭	⬭	⬭	⬭

Thank you very much for participating in this survey!

PLEASE DO NOT WRITE IN THIS AREA

Appendix B

Grades 6–12 Teacher Questionnaire

Center for the Study of Mathematics Curriculum (CSMC)

Teacher Questionnaire (Grades 6 - 12)
Spring 2005

Instructions: Please use a #2 pencil to complete this questionnaire. Darken ovals completely, but do not stray into adjacent ovals. Be sure to erase completely any stray marks.

Please indicate your district. (Darken one oval.)

- ○ Columbia Public Schools
- ○ Grand Ledge Public Schools
- ○ Kalamazoo Public Schools

In an effort to track responses over time while protecting your identity, we ask that you create a unique ID number using the initials of **your mother's maiden name** (first and last name), **your mother's birthday** (2-digit month-day), and **your 2-digit birth order**. (For instance, if your mother's name is Mary Anderson; her birthday is April 10th; and you are the 2nd child in your family, you would bubble in MA 04 10 02.) Please use the boxes below to fill in the requested information, then darken the corresponding ovals.

First and last initials for mother's maiden name

A	A
B	B
C	C
D	D
E	E
F	F
G	G
H	H
I	I
J	J
K	K
L	L
M	M
N	N
O	O
P	P
Q	Q
R	R
S	S
T	T
U	U
V	V
W	W
X	X
Y	Y
Z	Z

Your mother's birthday

Month		Day	
0	0	0	0
1	1	1	1
	2	2	2
	3	3	3
	4		4
	5		5
	6		6
	7		7
	8		8
	9		9

Your birth order

0	0
1	1
2	2
	3
	4
	5
	6
	7
	8
	9

A. Teacher Background

1. Including this year, how many years have you: (Darken one oval on each line.)

	Number of Years									
	1	2	3	4	5	6-10	11-15	16-20	21-25	26 or more
a. Taught at the K-12 level?	○	○	○	○	○	○	○	○	○	○
b. Taught in this school district?	○	○	○	○	○	○	○	○	○	○
c. Taught mathematics in this district or elsewhere?	○	○	○	○	○	○	○	○	○	○

2. Please indicate the type of teaching certification you hold. (Darken one oval.)

- ○ Regular or standard state certificate or advanced professional certificate
- ○ Probationary certificate (the initial certificate issued after satisfying all requirements except the completion of a probationary period)
- ○ Provisional or other type of certificate given to persons who are still participating in what the state call an "alternative certification program"
- ○ Temporary certificate (requires some additional; college coursework and/or student teaching before regular certification can be obtained)
- ○ Emergency certificate or waiver (issued to persons with insufficient teacher preparation who must complete a regular certification program in order to continue teaching)
- ○ No certificate

3. Within mathematics, many teachers feel better prepared to teach some topics than others. How well prepared do you feel to teach each of the following topics **at the grade level(s) you teach**, whether or not they are currently included in your curriculum? (Darken one oval on each line.)

	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
a. Estimation	①	②	③	④
b. Measurement	①	②	③	④
c. Pre-Algebra	①	②	③	④
d. Algebra	①	②	③	④
e. Patterns and relationships	①	②	③	④
f. Geometry and spatial sense	①	②	③	④
g. Functions (including trigonometric functions) and pre-calculus concepts	①	②	③	④
h. Data collection and analysis	①	②	③	④
i. Probability	①	②	③	④
j. Statistics (e.g., hypothesis tests, curve fitting and regression)	①	②	③	④
k. Topics from discrete mathematics (e.g., combinatorics, graph theory, recursion)	①	②	③	④
l. Calculus	①	②	③	④
m. Technology (calculators, computers) in support of mathematics	①	②	③	④

4. When teaching mathematics, many teachers feel better prepared to guide and help develop student learning in some domains than others. How well prepared do you feel to teach each of the following **at the grade level(s) you teach**, whether or not they are currently included in your curriculum? (Darken one oval on each line.)

	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
a. Problem solving	①	②	③	④
b. Reasoning and proof	①	②	③	④
c. Communication (written and oral)	①	②	③	④
d. Connections within mathematics and from mathematics to other disciplines	①	②	③	④
e. Multiple representations (e.g., concrete models, and numeric, graphical, symbolic, and geometric representations)	①	②	③	④

PLEASE DO NOT WRITE IN THIS AREA

5. How interested are you in each of the following types of professional development opportunities? (Darken one oval on each line.)

	Not Interested	Somewhat Interested	Very Interested
a. Deepen my own mathematics content knowledge.	①	②	③
b. Focus on understanding student thinking in mathematics.	①	②	③
c. Focus on teaching strategies to enhance student engagement and learning in mathematics.	①	②	③
d. Focus on the use of mathematics curriculum materials.	①	②	③
e. Focus on the use of technology to support mathematics teaching and learning.	①	②	③
f. Observe other teachers teaching mathematics and discuss with them their decisions and teaching strategies.	①	②	③
g. Meet regularly with a local group of teachers to study/discuss mathematics teaching issues.	①	②	③

6. Please provide your opinion about each of the following statements. (Darken one oval on each line.)

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
a. Students generally learn mathematics best in classes with students of similar abilities.	①	②	③	④	⑤
b. It is just as important for students to learn data analysis and probability, as it is to learn multiplication facts.	①	②	③	④	⑤
c. Generally, students learn mathematics best through investigative approaches (e.g., hands-on experiences, inquiry).	①	②	③	④	⑤
d. Every student in my room should feel that mathematics is something s/he can do.	①	②	③	④	⑤
e. Using computers or calculators to solve mathematics problems distracts students from learning basic mathematics skills.	①	②	③	④	⑤
f. Students generally learn mathematics best through traditional approaches (e.g., lecture, drill and practice/ memorization).	①	②	③	④	⑤
g. At the grades I teach, a lot of things in mathematics must be simply accepted as true and remembered.	①	②	③	④	⑤
h. It is just as important for students to understand mathematics concepts as it is for them to develop efficient skills for working mathematics exercises.	①	②	③	④	⑤

B. Description of the Target Class

7. How many mathematics classes are you teaching? (Darken one oval.)

1	2	3	4	5	6 or more
①	②	③	④	⑤	⑥

Please answer the following questions for your *first mathematics class* of the day.

8. What is the title of this class?

_____

9. Is this target class considered an accelerated class? (Darken one oval.)

- ⬭ Yes
- ⬭ No

10. Approximately how many students are in this target class? (Darken one oval.)

10 or fewer	11-15	16-20	21-25	26-30	more than 30
⬭	⬭	⬭	⬭	⬭	⬭

11. Please indicate the grade level of the students in this class. (Darken more than one oval **only if** there is not a majority in any single grade level.)

6th	7th	8th	9th	10th	11th	12th
⬭	⬭	⬭	⬭	⬭	⬭	⬭

12. Approximately what percentage of students in this class is officially classified as requiring special education services? (Darken one oval.)

less than 25%	25-49%	50-74%	75% or more
⬭	⬭	⬭	⬭

13. Approximately how many minutes is a typical mathematics lesson in this target class? (Darken one oval.)

10 or fewer	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81 or more
⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭

14. On average what percentage of instructional time allotted to mathematics is spent on each of the following? (Darken one oval on each line.)

	0-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
a. Daily routines, interruptions, and other non-instructional activities.	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭
b. Whole class lecture/discussions.	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭
c. Individual students reading textbooks, completing worksheets, etc.	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭
d. Small group work.	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭

15. About how often do **you** do each of the following when you teach mathematics to this target class? (Darken one oval on each line.)

	Never	Rarely (e.g., a few times a year)	Sometimes (e.g., once or twice a month)	Often (e.g., once or twice a week)	Always (e.g., done at least once a day)
a. Introduce content through formal presentations.	①	②	③	④	⑤
b. Pose close-ended questions.	①	②	③	④	⑤
c. Engage the whole-class in discussions.	①	②	③	④	⑤
d. Require students to explain their reasoning when giving an answer.	①	②	③	④	⑤
e. Assess student progress by reviewing homework.	①	②	③	④	⑤
f. Encourage students to explore alternative methods for solutions.	①	②	③	④	⑤
g. Require students to use calculators/computers for learning or practicing skills.	①	②	③	④	⑤
h. Help students see connections between mathematics and other disciplines.	①	②	③	④	⑤
i. Encourage students to use multiple representations (e.g., numeric, graphic, geometric, etc.).	①	②	③	④	⑤

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16. In general, about how often do the **students** in this mathematics class take part in the following activities? (Darken one oval on each line.)

	Never	Rarely (e.g., a few times a year)	Sometimes (e.g., once or twice a month)	Often (e.g., once or twice a week)	Always (e.g., done at least once a day)
a. Listen and take notes during a presentation by the teacher.	①	②	③	④	⑤
b. Work in groups.	①	②	③	④	⑤
c. Read from a mathematics textbook in class.	①	②	③	④	⑤
d. Read other (non-textbook) mathematics-related materials in class.	①	②	③	④	⑤
e. Engage in mathematical activities using concrete materials.	①	②	③	④	⑤
f. Practice routine computations/algorithms.	①	②	③	④	⑤
g. Review homework/worksheet assignments.	①	②	③	④	⑤
h. Use mathematical concepts to interpret and solve applied problems.	①	②	③	④	⑤
i. Answer textbook or worksheet questions.	①	②	③	④	⑤
j. Write reflections (e.g., in a journal).	①	②	③	④	⑤
k. Make formal presentations to the rest of the class.	①	②	③	④	⑤
l. Keep notes in an organized notebook that is periodically reviewed by teacher.	①	②	③	④	⑤
m. Work on extended mathematics investigations or projects (a week or more in duration).	①	②	③	④	⑤
n. Record, represent, and/or analyze data.	①	②	③	④	⑤
o. Use calculators or computers to develop conceptual understanding.	①	②	③	④	⑤
p. Take a test or quiz.	①	②	③	④	⑤

17. Please indicate the **ISBN number** of the mathematics textbook/program (or any module in the series) used most often for this target class, then darken the corresponding ovals.

Note that the ISBN number is typically found on the page with the copyright and publication information.

ISBN number

0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9

18. Which best describes the level at which the decision to use that mathematics textbook/program was made? (Darken one oval.)

- ○ District level
- ○ School level
- ○ Individual teacher level

19. For each of the following, please indicate how often you use that mathematics textbook/program in the target class. (Darken one oval on each line.)

	Never	Rarely (e.g., a few times a year)	Sometimes (e.g., once or twice a month)	Often (e.g., once or twice a week)	Always (e.g., done at least once a day)
a. The textbook guides the structure (content emphasis) of this class.	①	②	③	④	⑤
b. I follow the textbook page by page.	①	②	③	④	⑤
c. I pick what I consider important from the textbook and skip the rest.	①	②	③	④	⑤
d. I follow my district's curriculum recommendations regardless of what is in the textbook.	①	②	③	④	⑤
e. I incorporate activities from other sources to supplement the textbook.	①	②	③	④	⑤
f. I use the student textbook to plan lessons for this class.	①	②	③	④	⑤
g. I read and review suggestions in the textbook's teacher guide to plan lessons for this class.	①	②	③	④	⑤
h. I assign homework from the textbook.	①	②	③	④	⑤
i. Students in this class use their textbook during the mathematics lesson.	①	②	③	④	⑤

20. Over the course of the school year, approximately what percentage of the mathematics instructional time for this target class will be based on that mathematics textbook/program? (Darken one oval.)

less than 25%	25-49%	50-74%	75-90%	more than 90%
⬭	⬭	⬭	⬭	⬭

21. Estimate the percentage of that mathematics textbook/program you will cover during the school year with this target class. (Darken one oval.)

less than 25%	25-49%	50-74%	75-90%	more than 90%
⬭	⬭	⬭	⬭	⬭

22. How would you rate the overall quality of that mathematics textbook/program for this target class? (Darken one oval.)

Very Poor	Poor	Fair	Good	Very Good	Excellent
⬭	⬭	⬭	⬭	⬭	⬭

PLEASE DO NOT WRITE IN THIS AREA

C. Teaching Practices Related to Specific Mathematics Content in the Target Class

For the target class that you previously identified, please consider all of the **whole group** instructional time that you have spent or will spend on each of the following **mathematical topics**. Do not be concerned if there are other related practices that are not included, there is no expectation that these should add to 100 percent.

23. Approximately what percentage of the target class's whole group instruction on developing students' *number sense* is spent on each of the following activities? (Darken one oval on each line.)

	Percentage of Whole Group Instruction			
	None	1-10%	11-25%	More than 25%
a. Relating numbers to visual models such as a number line, thermometer, etc.	⬭	⬭	⬭	⬭
b. Using benchmarks and estimation to compare fractions.	⬭	⬭	⬭	⬭
c. Using calculators as a tool for making comparisons.	⬭	⬭	⬭	⬭
d. Practicing paper and pencil computations involving basic operations.	⬭	⬭	⬭	⬭
e. Practicing or memorizing translating between fraction, decimal, and/or percent equivalents.	⬭	⬭	⬭	⬭
f. Practicing mental computation strategies involving benchmarks and estimation.	⬭	⬭	⬭	⬭
g. Relating interpretation of fractions to the unit or whole.	⬭	⬭	⬭	⬭

24. Approximately what percentage of the target class's whole group instruction on *making sense of mathematics* is spent on each of the following activities? (Darken one oval on each line.)

	Percentage of Whole Group Instruction			
	None	1-10%	11-25%	More than 25%
a. Emphasizing algebraic manipulation as an important skill for solving complex problems.	⬭	⬭	⬭	⬭
b. Providing situations where students must determine which expression/equation form is most useful for extracting information needed to solve a problem. (e.g. Which equation form $y = (x + 2)(x + 3)$ or $y = x^2 + 5x + 6$ would you use to identify the x-intercepts, y-intercepts, line of symmetry, maximum or minimum point of the graph of $y = x^2 + 5x + 6$?)	⬭	⬭	⬭	⬭
c. Writing rules/equations that represent a variety of real-world situations.	⬭	⬭	⬭	⬭
d. Writing about or creating real-world contexts represented by rules/equations, tables, or graphs.	⬭	⬭	⬭	⬭
e. Moving among verbal, symbolic, graphic, and tabular representations of equations/problems.	⬭	⬭	⬭	⬭
f. Emphasizing the value of representing some situations/problems using one representation versus another.	⬭	⬭	⬭	⬭
g. Moving between specific instances and mathematical generalizations.	⬭	⬭	⬭	⬭
h. Using deductive reasoning from basic properties to demonstrate why mathematics works.	⬭	⬭	⬭	⬭
i. Connecting the mathematics studied to other areas of mathematics.	⬭	⬭	⬭	⬭
j. Using computer-based, numerical, or graphical tools to solve or explore complex problems.	⬭	⬭	⬭	⬭

25a. Are *equivalent fractions* a part of any unit that you teach this year? (Darken one oval.)

⬭ **No, not for any class I teach this year.** Please continue to Question 26a.
⬭ **Yes, for this class.** Please answer Question 25b for the target class.
⬭ **Yes, but not for this class.** Please answer Question 25b and consider as the target class the first class of the day where this is a goal of instruction.

PLEASE DO NOT WRITE IN THIS AREA

25b. Approximately what percentage of the target class's whole group instruction on *equivalent fractions* is spent on each of the following activities? (Darken one oval on each line.)

	Percentage of Whole Group Instruction			
	None	1-10%	11-25%	More than 25%
i. Using a number line to develop different fraction names for the same location.	⬭	⬭	⬭	⬭
ii. Finding common denominators and making direct numerator comparisons.	⬭	⬭	⬭	⬭
iii. Finding equivalent fractions with common denominators for making comparisons.	⬭	⬭	⬭	⬭
iv. Partitioning number line models into equal sized pieces to make comparisons.	⬭	⬭	⬭	⬭
v. Emphasizing algorithms such as cross multiplication and comparing resulting products.	⬭	⬭	⬭	⬭
vi. Using visual examples such as paper folding as in 4/4 = 8/8 by an additional paper fold.	⬭	⬭	⬭	⬭
vii. Generating equivalent fractions by multiplying or dividing both numerator and denominator by useful forms of 1.	⬭	⬭	⬭	⬭

26a. Are *factors and multiples* a part of any unit that you teach this year? (Darken one oval.)

⬭ **No, not for any class I teach this year.** Please continue to Question 27a.
⬭ **Yes, for this class.** Please answer Question 26b for the target class.
⬭ **Yes, but not for this class.** Please answer Question 26b and consider as the target class the first class of the day where this is a goal of instruction.

26b. Approximately what percentage of the target class's whole group instruction on *factors and multiples* is spent on each of the following activities? (Darken one oval on each line.)

	Percentage of Whole Group Instruction			
	None	1-10%	11-25%	More than 25%
i. Constructing prime factor trees.	⬭	⬭	⬭	⬭
ii. Generating multiples of numbers to find common multiples and least common multiples.	⬭	⬭	⬭	⬭
iii. Using prime factorization to find the greatest common factor of two or more numbers.	⬭	⬭	⬭	⬭
iv. Listing factor pairs to emphasize the inverse relation between multiplication and division so that a•b = c implies a = c/b.	⬭	⬭	⬭	⬭

27a. Is the *distributive property* a part of any unit that you teach this year? (Darken one oval.)

⬭ **No, not for any class I teach this year.** Please continue to Question 28a.
⬭ **Yes, for this class.** Please answer Question 27b for the target class.
⬭ **Yes, but not for this class.** Please answer Question 27b and consider as the target class the first class of the day where this is a goal of instruction.

27b. Approximately what percentage of the target class's whole group instruction on the *distributive property* is spent on each of the following activities? (Darken one oval on each line.)

	Percentage of Whole Group Instruction			
	None	1-10%	11-25%	More than 25%
i. Verifying $a(b+c) = ab + ac$ using numerical skill-building exercises. (e.g. Calculate for a = 2, b = 4, c = 7)	⬭	⬭	⬭	⬭
ii. Linking multiplication and factoring as inverse operations.	⬭	⬭	⬭	⬭
iii. Providing visual representations. (e.g. A rectangle with dimensions a and (b + c) whose area is equivalent to that of two rectangles with areas ab and/plus ac)	⬭	⬭	⬭	⬭
iv. Using equivalent forms of expressions to solve problems such as finding roots of polynomials.	⬭	⬭	⬭	⬭
v. Describing variants of the distributive property as special cases rather than as separate properties (e.g. $a(b - c) = ab - ac$ OR $a/c + b/c = (a + b)/c$).	⬭	⬭	⬭	⬭
vi. Applying the distributive property to the multiplication of polynomials (e.g. $(a + b)(c + d) = ac + ad + bc + bd$).	⬭	⬭	⬭	⬭

28a. Are *linear functions* a part of any unit that you teach this year? (Darken one oval.)

- ⬭ **No, not for any class I teach this year.** Please continue to Question 29a.
- ⬭ **Yes, for this class.** Please answer Question 28b and 28c for the target class.
- ⬭ **Yes, but not for this class.** Please answer Question 28b and 28c and consider as the target class the first class of the day where this is a goal of instruction.

28b. When teaching students in the target class about *linear functions* during whole class instruction, I begin: (Darken one oval.)

- ⬭ With the formula for the slope of a line.
- ⬭ With a geometric picture of slope and interpret the picture as "rise over run" (or equivalent language).
- ⬭ By discussing slope as rate of change between real-world quantities (e.g. population) at two different times.
- ⬭ With a scatterplot of data that has a linear pattern and look for ways to describe the pattern.

28c. Approximately what percentage of the target class's whole group instruction on *linear functions* is spent on each of the following activities? (Darken one oval on each line.)

	Percentage of Whole Group Instruction			
	None	1-10%	11-25%	More than 25%
i. Making comparisons between graphs of linear and nonlinear functions.	⬭	⬭	⬭	⬭
ii. Using tables to interpret slope (e.g. look for constant y-value differences for a given x-increment).	⬭	⬭	⬭	⬭
iii. Using slope formulas until proficiency is obtained.	⬭	⬭	⬭	⬭
iv. Understanding that some forms of linear equations are easier to predict a pattern of change than others. (e.g. From which equation is it easier to predict the patterns of change for the linear function: $y = 7 + 5(2x + 3)$ or $y = 10x + 22$?)	⬭	⬭	⬭	⬭
v. Examining the family of linear graphs and noticing how the graphs change as *m* (slope) changes.	⬭	⬭	⬭	⬭
vi. Writing algebraic equations that model real-world linear situations.	⬭	⬭	⬭	⬭
vii. Writing and interpreting recursive equations for slope such as Now/Next equations of the form: Next = Now + C, where c is a constant.	⬭	⬭	⬭	⬭

29a. Is the teaching of *area of polygons* a part of any unit that you teach this year? (Darken one oval.)

- ⬭ **No, not for any class I teach this year.** Please continue to Question 30a.
- ⬭ **Yes, for this class.** Please answer Question 29b for the target class.
- ⬭ **Yes, but not for this class.** Please answer Question 29b and consider as the target class the first class of the day where this is a goal of instruction.

29b. Approximately what percentage of the target class's whole group instruction on *area of polygons* is spent on each of the following activities? (Darken one oval on each line.)

	Percentage of Whole Group Instruction			
	None	1-10%	11-25%	More than 25%
i. Memorizing formulas for regular and common polygons.	⬭	⬭	⬭	⬭
ii. Measuring directly by hand (e.g. with a ruler) and doing direct calculations.	⬭	⬭	⬭	⬭
iii. Measuring and calculating using a computer program such as *Sketchpad* or *Cabri*.	⬭	⬭	⬭	⬭
iv. Making estimates using graph paper.	⬭	⬭	⬭	⬭
v. Dissecting the polygon and rearranging the pieces into an "easier" shape(s) that can be calculated, then summing the areas.	⬭	⬭	⬭	⬭
vi. Using a scale factor and calculating the area from a smaller, similar polygon.	⬭	⬭	⬭	⬭
vii. Using area subtraction strategies to obtain the desired final area from a larger, encompassing figure/polygon (with a known area) such as subtracting triangular areas within a square.	⬭	⬭	⬭	⬭

30a. Is the topic of *rate of change* a part of any unit that you teach this year? (Darken one oval.)

- ⬭ **No, not for any class I teach this year.** Please stop here.
- ⬭ **Yes, for this class.** Please answer Question 30b for the target class.
- ⬭ **Yes, but not for this class.** Please answer Question 30b and consider as the target class the first class of the day where this is a goal of instruction.

30b. Approximately what percentage of the target class's whole group instruction on *rate of change* is spent on each of the following activities? (Darken one oval on each line.)

	Percentage of Whole Group Instruction			
	None	1-10%	11-25%	More than 25%
i. Comparing changes in x,y table values.	⬭	⬭	⬭	⬭
ii. Examining f(x) in small graph windows on a graphing calculator or computer graphing program (e.g., zooming in or linearize the graph).	⬭	⬭	⬭	⬭
iii. Telling students that *m* in y = *m*x + b is the rate of change and having them practice identifying it in similar problems.	⬭	⬭	⬭	⬭
iv. Creating real world problems of the form y = *a*x + b and making sensible interpretations for *a*.	⬭	⬭	⬭	⬭
v. Finding and interpreting regression equations.	⬭	⬭	⬭	⬭
vi. Working with problems involving average rate of change.	⬭	⬭	⬭	⬭
vii. Creating and interpreting graphs involving slope of a tangent line to a curve obtained from the limit of slopes of secant lines.	⬭	⬭	⬭	⬭
viii. Calculating derivatives using rules and/or formulas such as product, quotient, chain rules.	⬭	⬭	⬭	⬭
ix. Understanding the definition of a derivative as a "derived" function and interpreting it in terms of a rate of change.	⬭	⬭	⬭	⬭

Thank you very much for participating in this survey!

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Appendix C

District A Grades K–5 Data Tables[†]

[†]Note: Data for Question 14 have been omitted because of the various interpretations of what was meant by ISBN number. Instead descriptions of the textbooks used in each district were thought to be more beneficial to readers and are provided in the body of the report.

CSMC Teacher Questionnaire (K-5) Spring 2005
District A

Q1

Including this year, how many years have you:	1 Percent	2 Percent	3 Percent	4 Percent	5 Percent	6-10 Percent	11-15 Percent	16-20 Percent	21-25 Percent	26 or more Percent
Q1A: taught at the K-12 level?	6	5	5	6	4	22	18	15	10	9
Q1B: taught in this school district?	11	8	5	9	5	23	17	11	7	5
Q1C: taught mathematics in this district or elsewhere?	9	5	5	5	6	21	18	14	10	6

Q2

	Regular or standard state certificate Percent	Probationary certificate Percent	Provisional Percent	Temporary certificate Percent	Emergency certificate or waiver Percent	No certificate Percent
Q2: Please indicate the type of teaching certification you hold	91	8	1	0	0	0

Q3

Within mathematics, many teachers feel better prepared to teach some topics than others. How well prepared do you feel to teach each of the following topics at the grade level(s) you teach, whether or not they are currently included in your curriculum?	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
	Percent	Percent	Percent	Percent
Q3A: Numeration and number theory	0	10	48	41
Q3B: Computation	0	3	41	55
Q3C: Estimation	0	13	46	41
Q3D: Measurement	1	11	47	41
Q3E: Pre-Algebra	16	35	33	16
Q3F: Algebra	27	37	25	11
Q3G: Patterns and relationships	0	7	36	57
Q3H: Geometry and spatial sense	0	12	49	39
Q3I: Data collection and analysis	0	10	47	42
Q3J: Probability	6	36	36	21
Q3K: Technology in support of mathematics	8	29	44	20

Q4

When teaching mathematics, many teachers feel better prepared to guide and help develop student learning in some domains than others. How well prepared do you feel to teach each of the following at the grade level(s) you teach, whether or not they are currently included in your curriculum?	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
	Percent	Percent	Percent	Percent
Q4A: Problem solving	0	5	54	41
Q4B: Reasoning and proof	6	24	46	23
Q4C: Communication (written and oral)	1	14	49	36
Q4D: Connections within mathematics and from mathematics to other disciplines	1	20	50	29
Q4E: Multiple representations (e.g., concrete models, and numeric, graphical, symbolic, and geometric representations)	1	26	49	24

Q5

How interested are you in each of the following types of professional development opportunities?	Not Interested	Somewhat Interested	Very Interested
	Percent	Percent	Percent
Q5A: Deepen my own mathematics content knowledge	14	52	34
Q5B: Focus on understanding student thinking in mathematics	3	39	58
Q5C: Focus on teaching strategies to enhance student engagement and learning in mathematics	3	21	76
Q5D: Focus on the use of mathematics curriculum materials	11	52	37
Q5E: Focus on the use of technology to support mathematics teaching and learning	9	48	43
Q5F: Observe other teachers teaching mathematics and discuss with them their decisions and teaching strategies	9	39	52
Q5G: Meet regularly with a local group of teachers to study/discuss mathematics teaching issues	26	47	27

Q6

Please provide your opinion about each of the following statements.	Strongly Disagree Percent	Disagree Percent	No Opinion Percent	Agree Percent	Strongly Agree Percent
Q6A: Students generally learn mathematics best in classes with students of similar abilities	5	51	8	32	4
Q6B: It is just as important for students to learn data analysis and probability, as it is to learn multiplication facts	1	9	13	61	17
Q6C: Generally, students learn mathematics best through investigative approaches (e.g., hands-on experiences, inquiry)	0	2	5	45	48
Q6D: Every student in my room should feel that mathematics is something s/he can do	1	1	0	21	77
Q6E: Using computers or calculators to solve mathematics problems distracts students from learning basic mathematics skills	14	44	22	17	3
Q6F: Students generally learn mathematics best through traditional approaches (e.g., lecture, drill and practice/ memorization)	23	48	17	12	1
Q6G: At the grades I teach, a lot of things in mathematics must be simply accepted as true and remembered	16	46	21	15	1
Q6H: It is just as important for students to understand mathematics concepts as it is for them to develop efficient skills for working mathematics exercises	0	1	3	48	49

Q7

	10 or fewer	11-15	16-20	21-25	26-30	more than 30
	Percent	Percent	Percent	Percent	Percent	Percent
Q7: Approximately how many students are in this target class?	0	4	42	50	4	0

Q8

Please indicate the grade level of the students in this class.	No	Yes
	Percent	Percent
Q8A: K	82	18
Q8B: 1	81	19
Q8C: 2	83	17
Q8D: 3	82	18
Q8E: 4	85	15
Q8F: 5	87	13

Q9

	less than 25%	25-49%	50-74%	75% or more
	Percent	Percent	Percent	Percent
Q9: Approximately what percentage of students in this class is officially classified as requiring special education services?	89	11	0	0

Q10

	10 or fewer	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81 or more
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Q10: Approximately how many minutes is a typical mathematics lesson in this class?	0	2	3	6	15	40	22	6	4

Q11

On average what percentage of instructional time allotted to mathematics is spent on each of the following?	0-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Q11A: Daily routines, interruptions, and other non-instructional activities	78	15	4	2	1	0	0	0	0	0
Q11B: Whole class lecture/discussions	9	39	31	11	7	2	0	0	0	0
Q11C: Individual students reading textbooks, completing worksheets, etc	42	26	19	8	4	1	0	0	0	0
Q11D: Small group work	3	12	19	21	16	10	6	9	4	1

Q12

About how often do you do each of the following when you teach mathematics to this class?	Never Percent	Rarely (e.g., a few times a year) Percent	Sometimes (e.g., once or twice a month) Percent	Often (e.g., once or twice a week) Percent	Always (e.g., done at least once a day) Percent
Q12A: Introduce content through formal presentations	5	15	31	38	11
Q12B: Pose close-ended questions	6	27	35	25	7
Q12C: Engage the whole-class in discussions	0	0	4	33	63
Q12D: Require students to explain their reasoning when giving an answer	0	0	3	23	74
Q12E: Assess student progress by reviewing homework	8	10	23	43	16
Q12F: Encourage students to explore alternative methods for solutions	0	3	5	40	52
Q12G: Require students to use calculators/computers for learning or practicing skills	15	34	40	10	1
Q12H: Help students see connections between mathematics and other disciplines	0	5	34	46	14
Q12I: Encourage students to use multiple representations (e.g., numeric, graphic, geometric, etc.)	0	1	15	47	36

Q13

In general, about how often do the students in this mathematics class take part in the following activities?	Never Percent	Rarely (e.g., a few times a year) Percent	Sometimes (e.g., once or twice a month) Percent	Often (e.g., once or twice a week) Percent	Always (e.g., done at least once a day) Percent
Q13A: Listen and take notes during a presentation by the teacher	45	21	18	13	3
Q13B: Work in groups	0	0	6	60	34
Q13C: Read from a mathematics textbook in class	75	15	4	5	1
Q13D: Read other (non-textbook) mathematics-related materials in class	21	33	28	14	3
Q13E: Engage in mathematical activities using concrete materials	0	0	10	52	37
Q13F: Practice routine computations/algorithms	8	18	34	31	9
Q13G: Review homework/worksheet assignments	14	16	26	33	10
Q13H: Use mathematical concepts to interpret and solve applied problems	2	5	16	48	29
Q13I: Answer textbook or worksheet questions	16	19	25	32	7
Q13J: Write reflections (e.g., in a journal)	23	21	27	26	3
Q13K: Make formal presentations to the rest of the class	16	28	38	17	1
Q13L: Keep notes in an organized notebook that is periodically reviewed by teacher	51	17	17	11	3
Q13M: Work on extended mathematics investigations or projects (a week or more in duration)	28	29	21	17	4
Q13N: Record, represent, and/or analyze data	2	6	34	49	8
Q13O: Use calculators or computers to develop conceptual understanding	14	31	46	9	0
Q13P: Take a test or quiz	10	10	71	8	1

Q15

	District level	School level	Individual teacher level
	Percent	Percent	Percent
Q15: Which best describes the level at which the decision to use that mathematics textbook/program was made?	99	1	0

Q16

For each of the following, please indicate how often you use that mathematics textbook/program in the target class.	Never Percent	Rarely (e.g., a few times a year) Percent	Sometimes (e.g., once or twice a month) Percent	Often (e.g., once or twice a week) Percent	Always (e.g., done at least once a day) Percent
Q16A: The textbook guides the structure (content emphasis) of this class	1	0	2	14	82
Q16B: I follow the textbook page by page	4	2	13	41	40
Q16C: I pick what I consider important from the textbook and skip the rest	15	40	31	11	3
Q16D: I follow my district's curriculum recommendations regardless of what is in the textbook	3	5	14	39	40
Q16E: I incorporate activities from other sources to supplement the textbook	4	21	35	32	8
Q16F: I use the student textbook to plan lessons for this class	25	4	9	23	39
Q16G: I read and review suggestions in the textbook's teacher guide to plan lessons for this class	1	1	7	34	57
Q16H: I assign homework from the textbook	6	9	19	41	25
Q16I: Students in this class use their textbook during the mathematics lesson	39	3	8	23	27

Q17

	less than 25%	25-49%	50-74%	75-90%	more than 90%
	Percent	Percent	Percent	Percent	Percent
Q17: Over the course of the school year, approximately what percentage of the mathematics instructional time for this class will be based on that mathematics textbook/program?	0	1	5	27	67

Q18

	less than 25%	25-49%	50-74%	75-90%	more than 90%
	Percent	Percent	Percent	Percent	Percent
Q18: Estimate the percentage of that mathematics textbook/program you will cover during the school year with this target class	0	0	5	45	50

Q19

	Very Poor	Poor	Fair	Good	Very Good	Excellent
	Percent	Percent	Percent	Percent	Percent	Percent
Q19: How would you rate the overall quality of that mathematics textbook/program for this target class?	1	4	7	34	39	15

Q20

In this class, approximately what percentage of whole group instruction on single-digit addtion (such as 7+8) is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q20A: Using tables or flashcards	46	48	5	1
Q20B: Practicing sums using worksheets	32	49	15	5
Q20C: Modeling problems using manipulatives	12	18	23	47
Q20D: Relating a sum to equivalent representations such as 7+7+1, 8+8-1, or 5 + 2 + 8	17	23	31	29
Q20E: Working related problems, (e.g., comparing 7+8=15 to 15-8=7) to show how addition and subtraction are inverse operations	15	29	32	25

Q21A

	No, not for this class	Yes, for this class
	Percent	Percent
Q21A: Is addition with two-digit numbers a part of any unit you teach this year?	38	62

Q21B

In this class, approximately what percentage of whole group instruction on addition with two-digit numbers is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q21Bi: Showing the right to left column addition algorithm that uses 'carrying' or 'regrouping' where necessary	27	53	13	7
Q21Bii: Decomposing the addends into '1's, and '10's, and summing like groups to produce an equivalent total(e.g. 12+27+36 =60+15=75)	4	17	29	49
Q21Biii: Adding the first two numbers, then adding that partial sum to the next and repeating that process with all #s in the column to produce an equivalent total sum	20	32	30	18
Q21Biv: Finding combinations that add to 10 as a possible strategy	2	14	28	56
Q21Bv: Finding any easy sum combinations that will result in an equivalent total sum	3	18	33	46

Q22A

	No, not for this class	Yes, for this class
	Percent	Percent
Q22A: Is addition with two-digit numbers a part of any unit you teach this year?	46	54

Q22B

In this class, approximately what percentage of whole group instruction on addition with three-digit numbers is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q22Bi: Showing the right to left column addition algorithm that uses 'carrying' or 'regrouping' where necessary	29	48	15	8
Q22Bii: Decomposing the addends into '1's, '10's, and '100's, and summing like groups to produce an equivalent total(e.g. 123+245+431=700+90+9=799)	10	15	37	38
Q22Biii: Adding the first two numbers then adding that partial sum to the next and repeating that process with all #s in the column to produce an equivalent total sum	20	28	34	19
Q22Biv: Rearranging the numbers in the column and looking for easier addition combinations	13	23	28	36

Q23

In this class, approximately what percentage of whole group instruction on subtraction (such as 12-8) is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q23A: Using tables or flashcards	56	40	3	0
Q23B: Practicing differences using worksheets	32	52	13	3
Q23C: Modeling problems using manipulatives	10	25	31	33
Q23D: Relating a difference to equivalent representations such as 12 – 6 – 2, 12 – 4 – 4, or 12 – 2 – 6	23	28	26	23
Q23E: Working related problems, (e.g., comparing 12-8=4 to 8+4=12) to show how subtraction and addition are inverse operations	16	26	30	27

Q24

In this class, approximately what percentage of whole group instruction on developing number sense is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q24A: Practicing counting skills	6	35	25	34
Q24B: Locating and comparing numbers on a number line	5	42	36	17
Q24C: Practicing estimation skills	3	42	36	18
Q24D: Practicing mental computations	2	19	39	39
Q24E: Relating the comparative 'size' of numbers in a real-world context	3	33	45	19
Q24F: Emphasizing that both addition and subtraction can be understood as regrouping of objects	8	24	33	34
Q24G: Incorporating doubling and tripling strategies as a way to think about a number's composition	14	26	33	26

Appendix D

District B Grades K–5 Data Tables[†]

[†]Note: Data for Question 14 have been omitted because of the various interpretations of what was meant by ISBN number. Instead descriptions of the textbooks used in each district were thought to be more beneficial to readers and are provided in the body of the report.

CSMC Teacher Questionnaire (K-5) Spring 2005
District B

Q1

Including this year, how many years have you:	1 Percent	2 Percent	3 Percent	4 Percent	5 Percent	6-10 Percent	11-15 Percent	16-20 Percent	21-25 Percent	26 or more Percent
Q1A: taught at the K-12 level?	1	10	3	0	7	30	9	6	4	28
Q1B: taught in this school district?	4	12	7	1	4	24	10	9	4	24
Q1C: taught mathematics in this district or elsewhere?	8	9	3	0	9	23	11	5	9	24

Q2

	Regular or standard state certificate Percent	Probationary certificate Percent	Provisional Percent	Temporary certificate Percent	Emergency certificate or waiver Percent	No certificate Percent
Q2: Please indicate the type of teaching certification you hold	74	15	12	0	0	0

Q3

Within mathematics, many teachers feel better prepared to teach some topics than others. How well prepared do you feel to teach each of the following topics at the grade level(s) you teach, whether or not they are currently included in your curriculum?	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
	Percent	Percent	Percent	Percent
Q3A: Numeration and number theory	2	9	35	55
Q3B: Computation	0	6	31	63
Q3C: Estimation	2	11	38	50
Q3D: Measurement	2	24	33	41
Q3E: Pre-Algebra	12	27	37	24
Q3F: Algebra	23	26	38	14
Q3G: Patterns and relationships	3	6	49	43
Q3H: Geometry and spatial sense	9	24	43	25
Q3I: Data collection and analysis	9	19	38	34
Q3J: Probability	11	32	41	17
Q3K: Technology in support of mathematics	19	30	39	12

Q4

When teaching mathematics, many teachers feel better prepared to guide and help develop student learning in some domains than others. How well prepared do you feel to teach each of the following at the grade level(s) you teach, whether or not they are currently included in your curriculum?	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
	Percent	Percent	Percent	Percent
Q4A: Problem solving	1	10	53	35
Q4B: Reasoning and proof	16	24	49	12
Q4C: Communication (written and oral)	4	27	46	22
Q4D: Connections within mathematics and from mathematics to other disciplines	6	33	48	13
Q4E: Multiple representations (e.g., concrete models, and numeric, graphical, symbolic, and geometric representations)	6	26	49	19

Q5

How interested are you in each of the following types of professional development opportunities?	Not Interested Percent	Somewhat Interested Percent	Very Interested Percent
Q5A: Deepen my own mathematics content knowledge	13	59	28
Q5B: Focus on understanding student thinking in mathematics	1	43	56
Q5C: Focus on teaching strategies to enhance student engagement and learning in mathematics	3	25	72
Q5D: Focus on the use of mathematics curriculum materials	7	45	48
Q5E: Focus on the use of technology to support mathematics teaching and learning	10	54	36
Q5F: Observe other teachers teaching mathematics and discuss with them their decisions and teaching strategies	10	50	40
Q5G: Meet regularly with a local group of teachers to study/discuss mathematics teaching issues	22	44	34

Q6

Please provide your opinion about each of the following statements.	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
	Percent	Percent	Percent	Percent	Percent
Q6A: Students generally learn mathematics best in classes with students of similar abilities	1	52	12	34	0
Q6B: It is just as important for students to learn data analysis and probability, as it is to learn multiplication facts	0	9	13	62	16
Q6C: Generally, students learn mathematics best through investigative approaches (e.g., hands-on experiences, inquiry)	0	9	1	47	43
Q6D: Every student in my room should feel that mathematics is something s/he can do	0	0	1	16	82
Q6E: Using computers or calculators to solve mathematics problems distracts students from learning basic mathematics skills	7	54	21	10	7
Q6F: Students generally learn mathematics best through traditional approaches (e.g., lecture, drill and practice/ memorization)	7	53	13	25	1
Q6G: At the grades I teach, a lot of things in mathematics must be simply accepted as true and remembered	10	37	24	25	4
Q6H: It is just as important for students to understand mathematics concepts as it is for them to develop efficient skills for working mathematics exercises	1	3	6	51	38

Q7

	10 or fewer	11-15	16-20	21-25	26-30	more than 30
	Percent	Percent	Percent	Percent	Percent	Percent
Q7: Approximately how many students are in this target class?	10	4	10	40	30	4

Q8

Please indicate the grade level of the students in this class.	No	Yes
	Percent	Percent
Q8A: K	79	21
Q8B: 1	90	10
Q8C: 2	78	22
Q8D: 3	85	15
Q8E: 4	78	22
Q8F: 5	85	15

Q9

	less than 25%	25-49%	50-74%	75% or more
	Percent	Percent	Percent	Percent
Q9: Approximately what percentage of students in this class is officially classified as requiring special education services?	76	9	0	15

Q10

	10 or fewer	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81 or more
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Q10: Approximately how many minutes is a typical mathematics lesson in this class?	4	12	13	10	28	31	0	1	0

Q11

On average what percentage of instructional time allotted to mathematics is spent on each of the following?	0-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Q11A: Daily routines, interruptions, and other non-instructional activities	66	18	13	0	3	0	0	0	0	0
Q11B: Whole class lecture/discussions	15	29	16	15	15	6	1	1	1	0
Q11C: Individual students reading textbooks, completing worksheets, etc	31	26	24	7	10	0	1	0	0	0
Q11D: Small group work	21	21	19	9	13	6	1	4	3	3

Q12

About how often do you do each of the following when you teach mathematics to this class?	Never Percent	Rarely (e.g., a few times a year) Percent	Sometimes (e.g., once or twice a month) Percent	Often (e.g., once or twice a week) Percent	Always (e.g., done at least once a day) Percent
Q12A: Introduce content through formal presentations	9	9	24	39	19
Q12B: Pose close-ended questions	5	14	32	37	12
Q12C: Engage the whole-class in discussions	0	4	13	46	36
Q12D: Require students to explain their reasoning when giving an answer	2	2	5	60	32
Q12E: Assess student progress by reviewing homework	20	12	11	36	21
Q12F: Encourage students to explore alternative methods for solutions	3	6	12	52	27
Q12G: Require students to use calculators/computers for learning or practicing skills	28	33	24	15	0
Q12H: Help students see connections between mathematics and other disciplines	3	12	36	42	7
Q12I: Encourage students to use multiple representations (e.g., numeric, graphic, geometric, etc.)	5	8	42	33	12

Q13

In general, about how often do the students in this mathematics class take part in the following activities?	Never Percent	Rarely (e.g., a few times a year) Percent	Sometimes (e.g., once or twice a month) Percent	Often (e.g., once or twice a week) Percent	Always (e.g., done at least once a day) Percent
Q13A: Listen and take notes during a presentation by the teacher	48	22	13	10	6
Q13B: Work in groups	0	7	19	54	19
Q13C: Read from a mathematics textbook in class	53	4	13	26	3
Q13D: Read other (non-textbook) mathematics-related materials in class	25	28	32	15	0
Q13E: Engage in mathematical activities using concrete materials	0	0	32	41	26
Q13F: Practice routine computations/algorithms	11	11	11	54	14
Q13G: Review homework/worksheet assignments	19	13	24	34	9
Q13H: Use mathematical concepts to interpret and solve applied problems	7	4	35	44	9
Q13I: Answer textbook or worksheet questions	24	7	16	43	10
Q13J: Write reflections (e.g., in a journal)	34	38	19	7	1
Q13K: Make formal presentations to the rest of the class	40	34	15	6	4
Q13L: Keep notes in an organized notebook that is periodically reviewed by teacher	64	16	12	4	3
Q13M: Work on extended mathematics investigations or projects (a week or more in duration)	44	37	16	1	1
Q13N: Record, represent, and/or analyze data	10	13	51	24	1
Q13O: Use calculators or computers to develop conceptual understanding	34	34	25	7	0
Q13P: Take a test or quiz	24	13	47	15	1

Q15

	District level	School level	Individual teacher level
	Percent	Percent	Percent
Q15: Which best describes the level at which the decision to use that mathematics textbook/program was made?	92	0	8

Q16

For each of the following, please indicate how often you use that mathematics textbook/program in the target class.	Never Percent	Rarely (e.g., a few times a year) Percent	Sometimes (e.g., once or twice a month) Percent	Often (e.g., once or twice a week) Percent	Always (e.g., done at least once a day) Percent
Q16A: The textbook guides the structure (content emphasis) of this class	10	6	10	36	37
Q16B: I follow the textbook page by page	28	7	25	25	13
Q16C: I pick what I consider important from the textbook and skip the rest	17	27	28	22	6
Q16D: I follow my district's curriculum recommendations regardless of what is in the textbook	4	4	13	37	40
Q16E: I incorporate activities from other sources to supplement the textbook	2	2	18	45	33
Q16F: I use the student textbook to plan lessons for this class	30	5	20	32	14
Q16G: I read and review suggestions in the textbook's teacher guide to plan lessons for this class	9	3	22	36	30
Q16H: I assign homework from the textbook	19	12	39	28	1
Q16I: Students in this class use their textbook during the mathematics lesson	47	6	11	33	3

Q17

	less than 25%	25-49%	50-74%	75-90%	more than 90%
	Percent	Percent	Percent	Percent	Percent
Q17: Over the course of the school year, approximately what percentage of the mathematics instructional time for this class will be based on that mathematics textbook/program?	9	12	22	33	24

Q18

	less than 25%	25-49%	50-74%	75-90%	more than 90%
	Percent	Percent	Percent	Percent	Percent
Q18: Estimate the percentage of that mathematics textbook/program you will cover during the school year with this target class	6	9	33	36	15

Q19

	Very Poor	Poor	Fair	Good	Very Good	Excellent
	Percent	Percent	Percent	Percent	Percent	Percent
Q19: How would you rate the overall quality of that mathematics textbook/program for this target class?	10	10	25	19	29	6

Q20

In this class, approximately what percentage of whole group instruction on single-digit addtion (such as 7+8) is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q20A: Using tables or flashcards	39	46	12	3
Q20B: Practicing sums using worksheets	26	32	22	19
Q20C: Modeling problems using manipulatives	18	20	17	45
Q20D: Relating a sum to equivalent representations such as 7+7+1, 8+8-1, or 5 + 2 + 8	18	36	28	18
Q20E: Working related problems, (e.g., comparing 7+8=15 to 15-8=7) to show how addition and subtraction are inverse operations	19	27	34	19

Q21A

	No, not for this class	Yes, for this class
	Percent	Percent
Q21A: Is addition with two-digit numbers a part of any unit you teach this year?	37	63

Q21B

In this class, approximately what percentage of whole group instruction on addition with two-digit numbers is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q21Bi: Showing the right to left column addition algorithm that uses 'carrying' or 'regrouping' where necessary	5	30	21	44
Q21Bii: Decomposing the addends into '1's, and '10's, and summing like groups to produce an equivalent total(e.g. 12+27+36 =60+15=75)	14	28	28	30
Q21Biii: Adding the first two numbers, then adding that partial sum to the next and repeating that process with all #s in the column to produce an equivalent total sum	23	35	26	16
Q21Biv: Finding combinations that add to 10 as a possible strategy	12	36	26	26
Q21Bv: Finding any easy sum combinations that will result in an equivalent total sum	16	33	26	26

Q22A

	No, not for this class	Yes, for this class
	Percent	Percent
Q22A: Is addition with two-digit numbers a part of any unit you teach this year?	46	54

Q22B

In this class, approximately what percentage of whole group instruction on addition with three-digit numbers is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q22Bi: Showing the right to left column addition algorithm that uses 'carrying' or 'regrouping' where necessary	14	33	25	28
Q22Bii: Decomposing the addends into '1's, '10's, and '100's, and summing like groups to produce an equivalent total(e.g. 123+245+431=700+90+9=799)	19	39	22	19
Q22Biii: Adding the first two numbers then adding that partial sum to the next and repeating that process with all #s in the column to produce an equivalent total sum	22	44	22	11
Q22Biv: Rearranging the numbers in the column and looking for easier addition combinations	19	50	17	14

Q23

In this class, approximately what percentage of whole group instruction on subtraction (such as 12-8) is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q23A: Using tables or flashcards	43	46	9	1
Q23B: Practicing differences using worksheets	21	43	22	13
Q23C: Modeling problems using manipulatives	17	22	22	40
Q23D: Relating a difference to equivalent representations such as 12 – 6 – 2, 12 – 4 – 4, or 12 – 2 – 6	27	39	24	9
Q23E: Working related problems, (e.g., comparing 12-8=4 to 8+4=12) to show how subtraction and addition are inverse operations	17	38	30	15

Q24

In this class, approximately what percentage of whole group instruction on developing number sense is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q24A: Practicing counting skills	15	40	19	26
Q24B: Locating and comparing numbers on a number line	12	53	24	12
Q24C: Practicing estimation skills	4	37	42	16
Q24D: Practicing mental computations	7	22	52	18
Q24E: Relating the comparative 'size' of numbers in a real-world context	7	38	34	21
Q24F: Emphasizing that both addition and subtraction can be understood as regrouping of objects	9	24	41	26
Q24G: Incorporating doubling and tripling strategies as a way to think about a number's composition	26	35	26	12

Appendix E

District C Grades K–5 Data Tables[†]

[†]Note: Data for Question 14 have been omitted because of the various interpretations of what was meant by ISBN number. Instead descriptions of the textbooks used in each district were thought to be more beneficial to readers and are provided in the body of the report.

CSMC Teacher Questionnaire (K-5) Spring 2005
District C

Q1

Including this year, how many years have you:	1 Percent	2 Percent	3 Percent	4 Percent	5 Percent	6-10 Percent	11-15 Percent	16-20 Percent	21-25 Percent	26 or more Percent
Q1A: taught at the K-12 level?	3	2	4	4	5	22	18	11	9	23
Q1B: taught in this school district?	3	3	4	6	5	26	13	18	5	17
Q1C: taught mathematics in this district or elsewhere?	3	2	5	5	5	24	17	12	8	21

Q2

	Regular or standard state certificate Percent	Probationary certificate Percent	Provisional Percent	Temporary certificate Percent	Emergency certificate or waiver Percent	No certificate Percent
Q2: Please indicate the type of teaching certification you hold	79	10	10	1	0	0

Q3

Within mathematics, many teachers feel better prepared to teach some topics than others. How well prepared do you feel to teach each of the following topics at the grade level(s) you teach, whether or not they are currently included in your curriculum?	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
	Percent	Percent	Percent	Percent
Q3A: Numeration and number theory	0	5	38	57
Q3B: Computation	0	2	29	69
Q3C: Estimation	0	9	36	55
Q3D: Measurement	0	7	40	53
Q3E: Pre-Algebra	6	17	40	37
Q3F: Algebra	14	22	36	27
Q3G: Patterns and relationships	0	6	32	62
Q3H: Geometry and spatial sense	1	11	41	47
Q3I: Data collection and analysis	3	10	41	46
Q3J: Probability	7	25	42	26
Q3K: Technology in support of mathematics	4	31	42	24

Q4

When teaching mathematics, many teachers feel better prepared to guide and help develop student learning in some domains than others. How well prepared do you feel to teach each of the following at the grade level(s) you teach, whether or not they are currently included in your curriculum?	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
	Percent	Percent	Percent	Percent
Q4A: Problem solving	1	10	49	40
Q4B: Reasoning and proof	3	26	48	23
Q4C: Communication (written and oral)	1	10	44	45
Q4D: Connections within mathematics and from mathematics to other disciplines	2	16	51	32
Q4E: Multiple representations (e.g., concrete models, and numeric, graphical, symbolic, and geometric representations)	3	23	44	30

Q5

How interested are you in each of the following types of professional development opportunities?	Not Interested	Somewhat Interested	Very Interested
	Percent	Percent	Percent
Q5A: Deepen my own mathematics content knowledge	20	55	25
Q5B: Focus on understanding student thinking in mathematics	12	42	46
Q5C: Focus on teaching strategies to enhance student engagement and learning in mathematics	4	31	65
Q5D: Focus on the use of mathematics curriculum materials	20	43	37
Q5E: Focus on the use of technology to support mathematics teaching and learning	8	48	44
Q5F: Observe other teachers teaching mathematics and discuss with them their decisions and teaching strategies	21	38	41
Q5G: Meet regularly with a local group of teachers to study/discuss mathematics teaching issues	33	47	21

Q6

Please provide your opinion about each of the following statements.	Strongly Disagree Percent	Disagree Percent	No Opinion Percent	Agree Percent	Strongly Agree Percent
Q6A: Students generally learn mathematics best in classes with students of similar abilities	5	46	12	32	6
Q6B: It is just as important for students to learn data analysis and probability, as it is to learn multiplication facts	1	10	17	56	16
Q6C: Generally, students learn mathematics best through investigative approaches (e.g., hands-on experiences, inquiry)	0	6	7	51	37
Q6D: Every student in my room should feel that mathematics is something s/he can do	1	1	2	25	71
Q6E: Using computers or calculators to solve mathematics problems distracts students from learning basic mathematics skills	14	40	17	25	4
Q6F: Students generally learn mathematics best through traditional approaches (e.g., lecture, drill and practice/ memorization)	11	53	16	17	3
Q6G: At the grades I teach, a lot of things in mathematics must be simply accepted as true and remembered	10	46	17	25	2
Q6H: It is just as important for students to understand mathematics concepts as it is for them to develop efficient skills for working mathematics exercises	1	2	2	56	39

Q7

	10 or fewer	11-15	16-20	21-25	26-30	more than 30
	Percent	Percent	Percent	Percent	Percent	Percent
Q7: Approximately how many students are in this target class?	5	12	35	36	10	2

Q8

Please indicate the grade level of the students in this class.	No	Yes
	Percent	Percent
Q8A: K	85	15
Q8B: 1	80	20
Q8C: 2	78	22
Q8D: 3	77	23
Q8E: 4	81	19
Q8F: 5	83	17

Q9

	less than 25%	25-49%	50-74%	75% or more
	Percent	Percent	Percent	Percent
Q9: Approximately what percentage of students in this class is officially classified as requiring special education services?	93	2	0	5

Q10

	10 or fewer	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81 or more
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Q10: Approximately how many minutes is a typical mathematics lesson in this class?	1	5	6	9	9	30	22	12	5

Q11

On average what percentage of instructional time allotted to mathematics is spent on each of the following?	0-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Q11A: Daily routines, interruptions, and other non-instructional activities	50	29	12	3	4	1	0	1	0	0
Q11B: Whole class lecture/discussions	12	25	23	15	14	4	3	3	0	1
Q11C: Individual students reading textbooks, completing worksheets, etc	29	26	28	12	5	1	0	1	0	0
Q11D: Small group work	9	20	23	17	10	5	3	6	2	4

Q12

About how often do you do each of the following when you teach mathematics to this class?	Never Percent	Rarely (e.g., a few times a year) Percent	Sometimes (e.g., once or twice a month) Percent	Often (e.g., once or twice a week) Percent	Always (e.g., done at least once a day) Percent
Q12A: Introduce content through formal presentations	3	9	17	49	23
Q12B: Pose close-ended questions	3	13	33	36	14
Q12C: Engage the whole-class in discussions	1	3	13	41	42
Q12D: Require students to explain their reasoning when giving an answer	0	2	13	42	43
Q12E: Assess student progress by reviewing homework	9	14	14	41	21
Q12F: Encourage students to explore alternative methods for solutions	1	4	23	46	26
Q12G: Require students to use calculators/computers for learning or practicing skills	9	23	41	22	6
Q12H: Help students see connections between mathematics and other disciplines	0	5	31	40	24
Q12I: Encourage students to use multiple representations (e.g., numeric, graphic, geometric, etc.)	2	13	30	40	14

Q13

In general, about how often do the students in this mathematics class take part in the following activities?	Never Percent	Rarely (e.g., a few times a year) Percent	Sometimes (e.g., once or twice a month) Percent	Often (e.g., once or twice a week) Percent	Always (e.g., done at least once a day) Percent
Q13A: Listen and take notes during a presentation by the teacher	35	23	17	17	7
Q13B: Work in groups	1	2	20	50	27
Q13C: Read from a mathematics textbook in class	37	20	17	22	4
Q13D: Read other (non-textbook) mathematics-related materials in class	13	31	39	15	3
Q13E: Engage in mathematical activities using concrete materials	1	2	20	54	24
Q13F: Practice routine computations/algorithms	3	7	21	51	18
Q13G: Review homework/worksheet assignments	11	14	25	36	14
Q13H: Use mathematical concepts to interpret and solve applied problems	2	6	26	50	17
Q13I: Answer textbook or worksheet questions	7	9	16	41	26
Q13J: Write reflections (e.g., in a journal)	23	23	36	14	4
Q13K: Make formal presentations to the rest of the class	29	28	26	13	4
Q13L: Keep notes in an organized notebook that is periodically reviewed by teacher	53	18	13	11	4
Q13M: Work on extended mathematics investigations or projects (a week or more in duration)	42	29	16	9	3
Q13N: Record, represent, and/or analyze data	1	19	42	34	4
Q13O: Use calculators or computers to develop conceptual understanding	10	25	43	18	4
Q13P: Take a test or quiz	7	15	61	17	1

Q15

	District level	School level	Individual teacher level
	Percent	Percent	Percent
Q15: Which best describes the level at which the decision to use that mathematics textbook/program was made?	86	13	1

Q16

For each of the following, please indicate how often you use that mathematics textbook/program in the target class.	Never Percent	Rarely (e.g., a few times a year) Percent	Sometimes (e.g., once or twice a month) Percent	Often (e.g., once or twice a week) Percent	Always (e.g., done at least once a day) Percent
Q16A: The textbook guides the structure (content emphasis) of this class	5	5	9	21	60
Q16B: I follow the textbook page by page	14	10	12	44	19
Q16C: I pick what I consider important from the textbook and skip the rest	11	20	25	34	11
Q16D: I follow my district's curriculum recommendations regardless of what is in the textbook	2	10	22	35	32
Q16E: I incorporate activities from other sources to supplement the textbook	1	7	18	45	29
Q16F: I use the student textbook to plan lessons for this class	16	8	12	35	29
Q16G: I read and review suggestions in the textbook's teacher guide to plan lessons for this class	2	4	14	35	46
Q16H: I assign homework from the textbook	24	16	19	29	11
Q16I: Students in this class use their textbook during the mathematics lesson	21	8	10	29	32

Q17

	less than 25%	25-49%	50-74%	75-90%	more than 90%
	Percent	Percent	Percent	Percent	Percent
Q17: Over the course of the school year, approximately what percentage of the mathematics instructional time for this class will be based on that mathematics textbook/program?	7	8	12	39	34

Q18

	less than 25%	25-49%	50-74%	75-90%	more than 90%
	Percent	Percent	Percent	Percent	Percent
Q18: Estimate the percentage of that mathematics textbook/program you will cover during the school year with this target class	5	6	21	46	23

Q19

	Very Poor	Poor	Fair	Good	Very Good	Excellent
	Percent	Percent	Percent	Percent	Percent	Percent
Q19: How would you rate the overall quality of that mathematics textbook/program for this target class?	9	9	23	33	18	9

Q20

In this class, approximately what percentage of whole group instruction on single-digit addtion (such as 7+8) is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q20A: Using tables or flashcards	22	48	19	11
Q20B: Practicing sums using worksheets	16	38	26	20
Q20C: Modeling problems using manipulatives	10	15	27	48
Q20D: Relating a sum to equivalent representations such as 7+7+1, 8+8-1, or 5 + 2 + 8	12	32	33	23
Q20E: Working related problems, (e.g., comparing 7+8=15 to 15-8=7) to show how addition and subtraction are inverse operations	10	23	31	36

Q21A

	No, not for this class	Yes, for this class
	Percent	Percent
Q21A: Is addition with two-digit numbers a part of any unit you teach this year?	26	74

Q21B

In this class, approximately what percentage of whole group instruction on addition with two-digit numbers is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q21Bi: Showing the right to left column addition algorithm that uses 'carrying' or 'regrouping' where necessary	10	21	25	44
Q21Bii: Decomposing the addends into '1's, and '10's, and summing like groups to produce an equivalent total(e.g. 12+27+36 =60+15=75)	14	33	30	23
Q21Biii: Adding the first two numbers, then adding that partial sum to the next and repeating that process with all #s in the column to produce an equivalent total sum	18	39	28	16
Q21Biv: Finding combinations that add to 10 as a possible strategy	12	35	35	18
Q21Bv: Finding any easy sum combinations that will result in an equivalent total sum	14	37	30	19

Q22A

	No, not for this class	Yes, for this class
	Percent	Percent
Q22A: Is addition with two-digit numbers a part of any unit you teach this year?	30	70

Q22B

In this class, approximately what percentage of whole group instruction on addition with three-digit numbers is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q22Bi: Showing the right to left column addition algorithm that uses 'carrying' or 'regrouping' where necessary	15	24	22	39
Q22Bii: Decomposing the addends into '1's, '10's, and '100's, and summing like groups to produce an equivalent total(e.g. 123+245+431=700+90+9=799)	20	39	25	15
Q22Biii: Adding the first two numbers then adding that partial sum to the next and repeating that process with all #s in the column to produce an equivalent total sum	26	38	23	13
Q22Biv: Rearranging the numbers in the column and looking for easier addition combinations	27	31	26	15

Q23

In this class, approximately what percentage of whole group instruction on subtraction (such as 12-8) is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q23A: Using tables or flashcards	21	53	19	6
Q23B: Practicing differences using worksheets	11	39	33	17
Q23C: Modeling problems using manipulatives	6	22	37	35
Q23D: Relating a difference to equivalent representations such as 12 – 6 – 2, 12 – 4 – 4, or 12 – 2 – 6	16	36	29	18
Q23E: Working related problems, (e.g., comparing 12-8=4 to 8+4=12) to show how subtraction and addition are inverse operations	11	27	35	27

Q24

In this class, approximately what percentage of whole group instruction on developing number sense is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q24A: Practicing counting skills	9	34	28	29
Q24B: Locating and comparing numbers on a number line	7	39	28	26
Q24C: Practicing estimation skills	5	39	42	14
Q24D: Practicing mental computations	4	35	37	24
Q24E: Relating the comparative 'size' of numbers in a real-world context	3	41	34	22
Q24F: Emphasizing that both addition and subtraction can be understood as regrouping of objects	6	30	35	30
Q24G: Incorporating doubling and tripling strategies as a way to think about a number's composition	18	36	33	13

Appendix F

District A Grades 6–12 Data Tables[†]

[†]Note: Data for Question 17 have been omitted because of the various interpretations of what was meant by ISBN number. Instead descriptions of the textbooks used in each district were thought to be more beneficial to readers and are provided in the body of the report.

CSMC Teacher Questionnaire (Grades 6-12) Spring 2005
District A

Q1

Including this year, how many years have you:	1	2	3	4	5	6-10	11-15	16-20	21-25	26 or more
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Q1A: taught at the K-12 level?	16	7	0	4	5	18	16	9	11	16
Q1B: taught in this school district?	19	9	2	5	7	23	11	12	4	9
Q1C: taught mathematics in this district or elsewhere?	16	11	2	2	5	14	18	7	12	14

Q2

	Regular or standard state certificate	Probationary certificate	Provisional	Temporary certificate	Emergency certificate or waiver	No certificate
	Percent	Percent	Percent	Percent	Percent	Percent
Q2: Please indicate the type of teaching certification you hold	89	4	5	2	0	0

Q3

Within mathematics, many teachers feel better prepared to teach some topics than others. How well prepared do you feel to teach each of the following topics at the grade level(s) you teach, whether or not they are currently included in your curriculum?	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
	Percent	Percent	Percent	Percent
Q3A: Estimation	2	11	25	63
Q3B: Measurement	0	7	21	72
Q3C: Pre-Algebra	0	2	12	86
Q3D: Algebra	0	5	9	86
Q3E: Patterns and relationships	0	4	12	84
Q3F: Geometry and spatial sense	0	12	30	58
Q3G: Functions (including trigonometric functions) and pre-calculus concepts	9	12	42	37
Q3H: Data collection and analysis	0	9	33	58
Q3I: Probability	2	13	46	39
Q3J: Statistics (e.g., hypothesis tests, curve fitting, and regression)	7	21	46	25
Q3K: Topics from discrete mathematics (e.g., combinatorics, graph theory, recursion)	12	28	51	9
Q3L: Calculus	30	33	21	16
Q3M: Technology in support of mathematics	2	21	40	37

Q4

When teaching mathematics, many teachers feel better prepared to guide and help develop student learning in some domains than others. How well prepared do you feel to teach each of the following at the grade level(s) you teach, whether or not they are currently included in your curriculum?	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
	Percent	Percent	Percent	Percent
Q4A: Problem solving	0	0	25	75
Q4B: Reasoning and proof	0	9	44	47
Q4C: Communication (written and oral)	0	9	48	43
Q4D: Connections within mathematics and from mathematics to other disciplines	2	12	49	37
Q4E: Multiple representations (e.g., concrete models, and numeric, graphical, symbolic, and geometric representations)	2	4	30	65

Q5

How interested are you in each of the following types of professional development opportunities?	Not Interested Percent	Somewhat Interested Percent	Very Interested Percent
Q5A: Deepen my own mathematics content knowledge	7	23	70
Q5B: Focus on understanding student thinking in mathematics	0	30	70
Q5C: Focus on teaching strategies to enhance student engagement and learning in mathematics	0	7	93
Q5D: Focus on the use of mathematics curriculum materials	4	47	49
Q5E: Focus on the use of technology to support mathematics teaching and learning	2	38	61
Q5F: Observe other teachers teaching mathematics and discuss with them their decisions and teaching strategies	2	35	63
Q5G: Meet regularly with a local group of teachers to study/discuss mathematics teaching issues	9	33	58

Q6

Please provide your opinion about each of the following statements.	Strongly Disagree Percent	Disagree Percent	No Opinion Percent	Agree Percent	Strongly Agree Percent
Q6A: Students generally learn mathematics best in classes with students of similar abilities	2	33	11	47	7
Q6B: It is just as important for students to learn data analysis and probability, as it is to learn multiplication facts	0	16	7	53	25
Q6C: Generally, students learn mathematics best through investigative approaches (e.g., hands-on experiences, inquiry)	2	7	4	47	40
Q6D: Every student in my room should feel that mathematics is something s/he can do	2	2	2	28	67
Q6E: Using computers or calculators to solve mathematics problems distracts students from learning basic mathematics skills	23	53	9	14	2
Q6F: Students generally learn mathematics best through traditional approaches (e.g., lecture, drill and practice/ memorization)	25	53	12	7	4
Q6G: At the grades I teach, a lot of things in mathematics must be simply accepted as true and remembered	30	54	5	7	4
Q6H: It is just as important for students to understand mathematics concepts as it is for them to develop efficient skills for working mathematics exercises	0	2	4	39	56

CSMC Teacher Questionnaire (Grades 6-12) Spring 2005
District A

Q7

	1	2	3	4	5	6 or more
	Percent	Percent	Percent	Percent	Percent	Percent
Q7: How many mathematics classes are you teaching?	7	9	9	11	58	7

Q9

	No	Yes
	Percent	Percent
Q9: Is this target class considered an accelerated class?	75	25

Q10

	10 or fewer	11-15	16-20	21-25	26-30	more than 30
	Percent	Percent	Percent	Percent	Percent	Percent
Q10: Approximately how many students are in this target class?	0	5	26	40	23	5

Q11

Please indicate the grade level of the students in this class.	No	Yes
	Percent	Percent
Q11A: 6th	88	12
Q11B: 7th	86	14
Q11C: 8th	88	12
Q11D: 9th	81	19
Q11E: 10th	77	23
Q11F: 11th	82	18
Q11G: 12th	84	16

Q12

	less than 25%	25-49%	50-74%	75% or more
	Percent	Percent	Percent	Percent
Q12: Approximately what percentage of students in this class is officially classified as requiring special education services?	89	9	2	0

Q13

	10 or fewer	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81 or more
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Q13: Approximately how many minutes is a typical mathematics lesson in this class?	2	5	11	16	40	16	0	2	9

Q14

On average what percentage of instructional time allotted to mathematics is spent on each of the following?	0-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Q14A: Daily routines, interruptions, and other non-instructional activities	79	19	2	0	0	0	0	0	0	0
Q14B: Whole class lecture/discussions	12	19	33	19	11	4	2	0	0	0
Q14C: Individual students reading textbooks, completing worksheets, etc	56	24	7	9	2	0	0	0	2	0
Q14D: Small group work	9	11	11	11	18	13	11	9	7	2

Q15

About how often do you do each of the following when you teach mathematics to this class?	Never Percent	Rarely (e.g., a few times a year) Percent	Sometimes (e.g., once or twice a month) Percent	Often (e.g., once or twice a week) Percent	Always (e.g., done at least once a day) Percent
Q15A: Introduce content through formal presentations	4	25	29	29	14
Q15B: Pose close-ended questions	2	24	31	27	16
Q15C: Engage the whole-class in discussions	0	0	9	32	60
Q15D: Require students to explain their reasoning when giving an answer	0	0	0	23	77
Q15E: Assess student progress by reviewing homework	0	4	4	55	38
Q15F: Encourage students to explore alternative methods for solutions	0	0	11	61	28
Q15G: Require students to use calculators/computers for learning or practicing skills	2	5	11	44	39
Q15H: Help students see connections between mathematics and other disciplines	0	2	25	60	14
Q15I: Encourage students to use multiple representations (e.g., numeric, graphic, geometric, etc.)	0	2	12	56	30

Q16

In general, about how often do the students in this mathematics class take part in the following activities?	Never Percent	Rarely (e.g., a few times a year) Percent	Sometimes (e.g., once or twice a month) Percent	Often (e.g., once or twice a week) Percent	Always (e.g., done at least once a day) Percent
Q16A: Listen and take notes during a presentation by the teacher	7	23	23	35	12
Q16B: Work in groups	4	2	7	23	65
Q16C: Read from a mathematics textbook in class	2	14	11	30	44
Q16D: Read other (non-textbook) mathematics-related materials in class	35	42	19	4	0
Q16E: Engage in mathematical activities using concrete materials	2	16	44	37	2
Q16F: Practice routine computations/algorithms	5	28	25	33	9
Q16G: Review homework/worksheet assignments	0	5	19	37	39
Q16H: Use mathematical concepts to interpret and solve applied problems	0	0	5	33	61
Q16I: Answer textbook or worksheet questions	0	5	4	19	72
Q16J: Write reflections (e.g., in a journal)	23	33	21	23	0
Q16K: Make formal presentations to the rest of the class	21	46	23	5	4
Q16L: Keep notes in an organized notebook that is periodically reviewed by teacher	25	19	14	18	25
Q16M: Work on extended mathematics investigations or projects (a week or more in duration)	14	42	30	7	7
Q16N: Record, represent, and/or analyze data	0	16	28	32	25
Q16O: Use calculators or computers to develop conceptual understanding	0	9	11	47	33
Q16P: Take a test or quiz	0	2	74	23	2

Q18

	District level	School level	Individual teacher level
	Percent	Percent	Percent
Q18: Which best describes the level at which the decision to use that mathematics textbook/program was made?	91	9	0

Q19

For each of the following, please indicate how often you use that mathematics textbook/program in the target class.	Never Percent	Rarely (e.g., a few times a year) Percent	Sometimes (e.g., once or twice a month) Percent	Often (e.g., once or twice a week) Percent	Always (e.g., done at least once a day) Percent
Q19A: The textbook guides the structure (content emphasis) of this class	0	0	0	4	96
Q19B: I follow the textbook page by page	0	4	2	44	51
Q19C: I pick what I consider important from the textbook and skip the rest	9	49	28	9	5
Q19D: I follow my district's curriculum recommendations regardless of what is in the textbook	2	10	17	37	35
Q19E: I incorporate activities from other sources to supplement the textbook	2	40	37	14	7
Q19F: I use the student textbook to plan lessons for this class	12	9	7	11	61
Q19G: I read and review suggestions in the textbook's teacher guide to plan lessons for this class	5	0	11	30	54
Q19H: I assign homework from the textbook	0	4	0	35	61
Q19I: Students in this class use their textbook during the mathematics lesson	0	2	5	12	81

Q20

	less than 25%	25-49%	50-74%	75-90%	more than 90%
	Percent	Percent	Percent	Percent	Percent
Q20: Over the course of the school year, approximately what percentage of the mathematics instructional time for this class will be based on that mathematics textbook/program?	0	0	0	25	75

Q21

	less than 25%	25-49%	50-74%	75-90%	more than 90%
	Percent	Percent	Percent	Percent	Percent
Q21: Estimate the percentage of that mathematics textbook/program you will cover during the school year with this target class?	0	0	4	60	37

Q22

	Very Poor	Poor	Fair	Good	Very Good	Excellent
	Percent	Percent	Percent	Percent	Percent	Percent
Q22: How would you rate the overall quality of that mathematics textbook/program for this target class?	0	2	4	21	40	33

Q23

Approximately what percentage of the target class's whole group instruction on developing students' number sense is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q23A: Relating numbers to visual models such as a number line, thermometer, etc	9	53	20	18
Q23B: Using benchmarks and estimation to compare fractions	25	53	11	12
Q23C: Using calculators as a tool for making comparisons	0	33	37	30
Q23D: Practicing paper and pencil computations involving basic operations	26	46	19	9
Q23E: Practicing or memorizing translating between fraction, decimal, and/or percent equivalents	46	42	11	2
Q23F: Practicing mental computation strategies involving benchmarks and estimation	19	53	21	7
Q23G: Relating interpretation of fractions to the unit or whole	26	37	28	9

Q24

Approximately what percentage of the target class's whole group instruction on making sense of mathematics is spent on each of the following activities?	None Percent	1-10% Percent	11-25% Percent	More than 25% Percent
Q24A: Emphasizing algebraic manipulation as an important skill for solving complex problems	5	39	35	21
Q24B: Providing situations where students determine which expression form is most useful for extracting information needed to solve a problem	21	46	21	12
Q24C: Writing rules/equations that represent a variety of real-world situations	5	23	39	32
Q24D: Writing about or creating real-world contexts represented by rules/equations, tables, or graphs	4	40	26	30
Q24E: Moving among verbal, symbolic, graphic, and tabular representations of equations/problems	2	38	30	30
Q24F: Emphasizing the value of representing some situations/problems using one representation versus another	4	30	47	19
Q24G: Moving between specific instances and mathematical generalizations	0	31	40	29
Q24H: Using deductive reasoning from basic properties to demonstrate why mathematics works	9	36	33	22
Q24I: connecting the mathematics studied to other areas of mathematics	2	33	44	21
Q24J: Using computer-based, numerical, or graphical tools to solve or explore complex problems	13	27	33	27

Q25A

	No, not for this class	Yes, for this class	Yes, but not for this class
	Percent	Percent	Percent
Q25A: Are equivalent fractions a part of any unit that you teach this year?	42	37	21

Q25B

Approximately what percentage of the target class's whole group instruction on equivalent fractions is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q25Bi: Using a number line to develop different fraction names for the same location	45	30	12	12
Q25Bii: Finding common denominators and making direct numerator comparisons	21	39	33	6
Q25Biii: Approximately what percentage of the target class’s whole group instruction on equivalent fractions is spent on: Finding equivalent fractions with common denominators for making comparisons	12	48	30	9
Q25Biv: Partitioning number line models into equal sized pieces to make comparisons	39	27	21	12
Q25Bv: Emphasizing algorithms such as cross multiplication and comparing resulting products	47	38	13	3
Q25Bvi: Using visual examples such as paper folding as in 4/4 = 8/8 by an additional paper fold	45	27	18	9
Q25Bvii: Generating equivalent fractions by multiplying or dividing both numerator and denominator by useful forms of 1	12	52	24	12

Q26A

	No, not for this class	Yes, for this class	Yes, but not for this class
	Percent	Percent	Percent
Q26A: Are factors and multiples a part of any unit that you teach this year?	32	54	14

Q26B

Approximately what percentage of the target class's whole group instruction on factors and multiples is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q26Bi: Constructing prime factor trees	37	47	8	8
Q26Bii: Generating multiples of numbers to find common multiples and least common multiples	16	55	21	8
Q26Biii: Using prime factorization to find the greatest common factor of two or more numbers	34	50	13	3
Q26Biv: Listing factor pairs to emphasize the inverse relation between multiplication and division so that a*b = c implies a = c/b	24	42	24	11

Q27A

	No, not for this class	Yes, for this class	Yes, but not for this class
	Percent	Percent	Percent
Q27A: Is the distributive property a part of any unit that you teach this year?	28	53	19

Q27B

Approximately what percentage of the target class's whole group instruction on the distributive property is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q27Bi: Verifying a(b+c) = ab + ac using numerical skill-building exercises (e.g. Calculate for a = 2, b = 4, c = 7)	27	44	17	12
Q27Bii: Linking multiplication and factoring as inverse operations	10	60	23	8
Q27Biii: Providing visual representations	30	25	25	20
Q27Biv: Using equivalent forms of expressions to solve problems such as finding roots of polynomials	32	32	22	15
Q27Bv: Describing variants of the distributive property as special cases rather than as separate properties	27	54	15	5
Q27Bvi: Applying the distributive property to the multiplication of polynomials (e.g. (a + b) (c + d) = ac + ad + bc + bd)	34	29	27	10

Q28A

	No, not for this class	Yes, for this class	Yes, but not for this class
	Percent	Percent	Percent
Q28A: Are linear functions a part of any unit that you teach this year?	21	67	12

Q28B

	With the formula for the slope of a line	With a geometric picture of slope	By discussing slope as rate of change between real-world qua	With a scatterplot of data that has a linear pattern
	Percent	Percent	Percent	Percent
Q28B: When teaching students in the target class about linear functions during whole class instruction, I begin	5	17	49	29

Q28C

Approximately what percentage of the target class's whole group instruction on linear functions is spent on each of the following activities?	None Percent	1-10% Percent	11-25% Percent	More than 25% Percent
Q28Ci: Making comparisons between graphs of linear and nonlinear functions	4	51	27	18
Q28Cii: Using tables to interpret slope (e.g. look for constant y-value differences for a given x-increment)	13	27	33	27
Q28Ciii: Using slope formulas until proficiency is obtained	27	60	9	4
Q28Civ: Understanding that some forms of linear equations are easier to predict a pattern of change than others	27	53	11	9
Q28Cv: Examining the family of linear graphs and noticing how the graphs change as m (slope) changes	4	49	31	16
Q28Cvi: Writing algebraic equations that model real-world linear situations	0	24	47	29
Q28Cvii: Writing and interpreting recursive equations for slope such as Now/Next equations of the form: Next = Now + C, where c is a constant	40	29	16	16

Q29A

	No, not for this class Percent	Yes, for this class Percent	Yes, but not for this class Percent
Q29A: Is the teaching of area of polygons a part of any unit that you teach this year?	32	54	14

Q29B

Approximately what percentage of the target class's whole group instruction on area of polygons is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q29Bi: Memorizing formulas for regular and common polygons	31	62	3	5
Q29Bii: Measuring directly by hand (e.g. with a ruler) and doing direct calculations	23	46	28	3
Q29Biii: Measuring and calculating using a computer program such as Sketchpad or Cabri	79	18	3	0
Q29Biv: Making estimates using graph paper	23	49	23	5
Q29Bv: Dissecting the polygon and rearranging the pieces into an 'easier' shape(s) that can be calculated, then summing the areas	10	49	28	13
Q29Bvi Using a scale factor and calculating the area from a smaller, similar polygon	32	47	16	5
Q29Bvii: Using area subtraction strategies to obtain the desired final area from a larger, encompassing figure such as subtracting triangular areas w/in a square	11	58	26	5

Q30A

	No, not for this class	Yes, for this class	Yes, but not for this class
	Percent	Percent	Percent
Q30A Is the topic of rate of change a part of any unit that you teach this year?	16	74	11

Q30B

Approximately what percentage of the target class's whole group instruction on rate of change is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q30Bi: Comparing changes in x,y table values	4	33	38	25
Q30Bii: Examining f(x) in small graph windows on a graphing calculator or computer graphing program (e.g., zooming in or linearize the graph)	35	42	21	2
Q30Biii: Telling students that m in y = mx + b is the rate of change and having them practice identifying it in similar problems	33	54	2	10
Q30Biv: Creating real world problems of the form y = ax + b and making sensible interpretations for a	17	33	31	19
Q30Bv: Finding and interpreting regression equations	26	34	23	17
Q30Bvi: Working with problems involving average rate of change	4	55	28	13
Q30Bvii: Creating and interpreting graphs involving slope of a tangent line to a curve obtained from the limit of slopes of secant lines	90	6	2	2
Q30Bviii: Calculating derivatives using rules and/or formulas such as product, quotient, chain rules	98	2	0	0
Q30Bix: Understanding the definition of a derivative as a 'derived' function and interpreting it in terms of a rate of change	94	4	2	0

Appendix G

District B Grades 6–12 Data Tables[†]

[†]Note: Data for Question 17 have been omitted because of the various interpretations of what was meant by ISBN number. Instead descriptions of the textbooks used in each district were thought to be more beneficial to readers and are provided in the body of the report.

CSMC Teacher Questionnaire (Grades 6-12) Spring 2005
District B

Q1

Including this year, how many years have you:	1 Percent	2 Percent	3 Percent	4 Percent	5 Percent	6-10 Percent	11-15 Percent	16-20 Percent	21-25 Percent	26 or more Percent
Q1A: taught at the K-12 level?	0	12	0	8	15	23	8	4	4	27
Q1B: taught in this school district?	0	16	4	12	8	20	12	4	4	20
Q1C: taught mathematics in this district or elsewhere?	0	12	0	8	16	24	12	8	0	20

Q2

	Regular or standard state certificate Percent	Probationary certificate Percent	Provisional Percent	Temporary certificate Percent	Emergency certificate or waiver Percent	No certificate Percent
Q2: Please indicate the type of teaching certification you hold	74	19	7	0	0	0

Q3

Within mathematics, many teachers feel better prepared to teach some topics than others. How well prepared do you feel to teach each of the following topics at the grade level(s) you teach, whether or not they are currently included in your curriculum?	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
	Percent	Percent	Percent	Percent
Q3A: Estimation	0	4	31	65
Q3B: Measurement	0	7	22	70
Q3C: Pre-Algebra	0	16	4	80
Q3D: Algebra	11	7	11	70
Q3E: Patterns and relationships	0	4	27	69
Q3F: Geometry and spatial sense	8	15	27	50
Q3G: Functions (including trigonometric functions) and pre-calculus concepts	26	11	33	30
Q3H: Data collection and analysis	8	16	40	36
Q3I: Probability	0	19	37	44
Q3J: Statistics (e.g., hypothesis tests, curve fitting, and regression)	22	26	33	19
Q3K: Topics from discrete mathematics (e.g., combinatorics, graph theory, recursion)	30	41	19	11
Q3L: Calculus	59	26	4	11
Q3M: Technology in support of mathematics	11	33	37	19

Q4

When teaching mathematics, many teachers feel better prepared to guide and help develop student learning in some domains than others. How well prepared do you feel to teach each of the following at the grade level(s) you teach, whether or not they are currently included in your curriculum?	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
	Percent	Percent	Percent	Percent
Q4A: Problem solving	0	8	46	46
Q4B: Reasoning and proof	12	19	31	38
Q4C: Communication (written and oral)	0	31	42	27
Q4D: Connections within mathematics and from mathematics to other disciplines	0	38	38	23
Q4E: Multiple representations (e.g., concrete models, and numeric, graphical, symbolic, and geometric representations)	7	15	52	26

Q5

How interested are you in each of the following types of professional development opportunities?	Not Interested Percent	Somewhat Interested Percent	Very Interested Percent
Q5A: Deepen my own mathematics content knowledge	0	65	35
Q5B: Focus on understanding student thinking in mathematics	4	27	69
Q5C: Focus on teaching strategies to enhance student engagement and learning in mathematics	4	12	85
Q5D: Focus on the use of mathematics curriculum materials	15	50	35
Q5E: Focus on the use of technology to support mathematics teaching and learning	0	56	44
Q5F: Observe other teachers teaching mathematics and discuss with them their decisions and teaching strategies	8	54	38
Q5G: Meet regularly with a local group of teachers to study/discuss mathematics teaching issues	31	50	19

Q6

Please provide your opinion about each of the following statements.	Strongly Disagree Percent	Disagree Percent	No Opinion Percent	Agree Percent	Strongly Agree Percent
Q6A: Students generally learn mathematics best in classes with students of similar abilities	0	22	11	56	11
Q6B: It is just as important for students to learn data analysis and probability, as it is to learn multiplication facts	4	37	11	37	11
Q6C: Generally, students learn mathematics best through investigative approaches (e.g., hands-on experiences, inquiry)	0	26	15	41	19
Q6D: Every student in my room should feel that mathematics is something s/he can do	0	0	0	41	59
Q6E: Using computers or calculators to solve mathematics problems distracts students from learning basic mathematics skills	15	41	7	33	4
Q6F: Students generally learn mathematics best through traditional approaches (e.g., lecture, drill and practice/ memorization)	4	33	33	30	0
Q6G: At the grades I teach, a lot of things in mathematics must be simply accepted as true and remembered	4	48	33	15	0
Q6H: It is just as important for students to understand mathematics concepts as it is for them to develop efficient skills for working mathematics exercises	0	4	4	70	22

CSMC Teacher Questionnaire (Grades 6-12) Spring 2005
District B

Q7

	1	2	3	4	5	6 or more
	Percent	Percent	Percent	Percent	Percent	Percent
Q7: How many mathematics classes are you teaching?	15	7	7	19	52	0

Q9

	No	Yes
	Percent	Percent
Q9: Is this target class considered an accelerated class?	88	12

Q10

	10 or fewer	11-15	16-20	21-25	26-30	more than 30
	Percent	Percent	Percent	Percent	Percent	Percent
Q10: Approximately how many students are in this target class?	22	4	4	41	22	7

Q11

Please indicate the grade level of the students in this class.	No	Yes
	Percent	Percent
Q11A: 6th	81	19
Q11B: 7th	74	26
Q11C: 8th	78	22
Q11D: 9th	85	15
Q11E: 10th	78	22
Q11F: 11th	81	19
Q11G: 12th	85	15

Q12

	less than 25%	25-49%	50-74%	75% or more
	Percent	Percent	Percent	Percent
Q12: Approximately what percentage of students in this class is officially classified as requiring special education services?	63	15	0	22

Q13

	10 or fewer	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81 or more
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Q13: Approximately how many minutes is a typical mathematics lesson in this class?	0	15	19	22	15	30	0	0	0

Q14

On average what percentage of instructional time allotted to mathematics is spent on each of the following?	0-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Q14A: Daily routines, interruptions, and other non-instructional activities	59	37	4	0	0	0	0	0	0	0
Q14B: Whole class lecture/discussions	7	4	22	37	11	7	11	0	0	0
Q14C: Individual students reading textbooks, completing worksheets, etc	4	37	26	26	4	0	0	0	4	0
Q14D: Small group work	30	33	22	7	7	0	0	0	0	0

Q15

About how often do you do each of the following when you teach mathematics to this class?	Never	Rarely (e.g., a few times a year)	Sometimes (e.g., once or twice a month)	Often (e.g., once or twice a week)	Always (e.g., done at least once a day)
	Percent	Percent	Percent	Percent	Percent
Q15A: Introduce content through formal presentations	0	7	11	63	19
Q15B: Pose close-ended questions	0	7	30	52	11
Q15C: Engage the whole-class in discussions	0	4	15	48	33
Q15D: Require students to explain their reasoning when giving an answer	0	4	15	58	23
Q15E: Assess student progress by reviewing homework	0	4	11	30	56
Q15F: Encourage students to explore alternative methods for solutions	0	0	37	59	4
Q15G: Require students to use calculators/computers for learning or practicing skills	0	11	44	33	11
Q15H: Help students see connections between mathematics and other disciplines	0	7	33	41	19
Q15I: Encourage students to use multiple representations (e.g., numeric, graphic, geometric, etc.)	0	19	52	26	4

Q16

In general, about how often do the students in this mathematics class take part in the following activities?	Never Percent	Rarely (e.g., a few times a year) Percent	Sometimes (e.g., once or twice a month) Percent	Often (e.g., once or twice a week) Percent	Always (e.g., done at least once a day) Percent
Q16A: Listen and take notes during a presentation by the teacher	4	4	7	59	26
Q16B: Work in groups	0	19	22	56	4
Q16C: Read from a mathematics textbook in class	11	19	30	37	4
Q16D: Read other (non-textbook) mathematics-related materials in class	11	63	22	4	0
Q16E: Engage in mathematical activities using concrete materials	0	11	63	26	0
Q16F: Practice routine computations/algorithms	4	7	19	56	15
Q16G: Review homework/worksheet assignments	0	7	0	26	67
Q16H: Use mathematical concepts to interpret and solve applied problems	4	0	19	48	30
Q16I: Answer textbook or worksheet questions	0	0	0	52	48
Q16J: Write reflections (e.g., in a journal)	37	37	7	15	4
Q16K: Make formal presentations to the rest of the class	22	59	19	0	0
Q16L: Keep notes in an organized notebook that is periodically reviewed by teacher	19	22	11	22	26
Q16M: Work on extended mathematics investigations or projects (a week or more in duration)	19	63	19	0	0
Q16N: Record, represent, and/or analyze data	0	46	42	12	0
Q16O: Use calculators or computers to develop conceptual understanding	4	19	52	19	7
Q16P: Take a test or quiz	0	7	56	37	0

Q18

	District level	School level	Individual teacher level
	Percent	Percent	Percent
Q18: Which best describes the level at which the decision to use that mathematics textbook/program was made?	46	38	15

Q19

For each of the following, please indicate how often you use that mathematics textbook/program in the target class.	Never Percent	Rarely (e.g., a few times a year) Percent	Sometimes (e.g., once or twice a month) Percent	Often (e.g., once or twice a week) Percent	Always (e.g., done at least once a day) Percent
Q19A: The textbook guides the structure (content emphasis) of this class	11	4	0	33	52
Q19B: I follow the textbook page by page	22	11	15	41	11
Q19C: I pick what I consider important from the textbook and skip the rest	4	35	35	12	15
Q19D: I follow my district's curriculum recommendations regardless of what is in the textbook	8	8	16	36	32
Q19E: I incorporate activities from other sources to supplement the textbook	0	15	35	35	15
Q19F: I use the student textbook to plan lessons for this class	4	4	19	42	31
Q19G: I read and review suggestions in the textbook's teacher guide to plan lessons for this class	8	12	38	35	8
Q19H: I assign homework from the textbook	8	4	4	50	35
Q19I: Students in this class use their textbook during the mathematics lesson	8	8	23	35	27

Q20

	less than 25%	25-49%	50-74%	75-90%	more than 90%
	Percent	Percent	Percent	Percent	Percent
Q20: Over the course of the school year, approximately what percentage of the mathematics instructional time for this class will be based on that mathematics textbook/program?	7	11	11	41	30

Q21

	less than 25%	25-49%	50-74%	75-90%	more than 90%
	Percent	Percent	Percent	Percent	Percent
Q21: Estimate the percentage of that mathematics textbook/program you will cover during the school year with this target class?	4	0	27	58	12

Q22

	Very Poor	Poor	Fair	Good	Very Good	Excellent
	Percent	Percent	Percent	Percent	Percent	Percent
Q22: How would you rate the overall quality of that mathematics textbook/program for this target class?	0	8	20	44	20	8

Q23

Approximately what percentage of the target class's whole group instruction on developing students' number sense is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q23A: Relating numbers to visual models such as a number line, thermometer, etc	8	52	24	16
Q23B: Using benchmarks and estimation to compare fractions	12	64	20	4
Q23C: Using calculators as a tool for making comparisons	13	54	29	4
Q23D: Practicing paper and pencil computations involving basic operations	4	28	36	32
Q23E: Practicing or memorizing translating between fraction, decimal, and/or percent equivalents	12	40	44	4
Q23F: Practicing mental computation strategies involving benchmarks and estimation	12	48	40	0
Q23G: Relating interpretation of fractions to the unit or whole	8	48	32	12

Q24

Approximately what percentage of the target class's whole group instruction on making sense of mathematics is spent on each of the following activities?	None Percent	1-10% Percent	11-25% Percent	More than 25% Percent
Q24A: Emphasizing algebraic manipulation as an important skill for solving complex problems	22	22	26	30
Q24B: Providing situations where students determine which expression form is most useful for extracting information needed to solve a problem	33	37	22	7
Q24C: Writing rules/equations that represent a variety of real-world situations	11	30	30	30
Q24D: Writing about or creating real-world contexts represented by rules/equations, tables, or graphs	22	22	41	15
Q24E: Moving among verbal, symbolic, graphic, and tabular representations of equations/problems	11	37	37	15
Q24F: Emphasizing the value of representing some situations/problems using one representation versus another	19	48	22	11
Q24G: Moving between specific instances and mathematical generalizations	4	48	37	11
Q24H: Using deductive reasoning from basic properties to demonstrate why mathematics works	7	59	22	11
Q24I: connecting the mathematics studied to other areas of mathematics	0	59	26	15
Q24J: Using computer-based, numerical, or graphical tools to solve or explore complex problems	26	48	19	7

Q25A

	No, not for this class	Yes, for this class	Yes, but not for this class
	Percent	Percent	Percent
Q25A: Are equivalent fractions a part of any unit that you teach this year?	7	81	11

Q25B

Approximately what percentage of the target class's whole group instruction on equivalent fractions is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q25Bi: Using a number line to develop different fraction names for the same location	36	52	12	0
Q25Bii: Finding common denominators and making direct numerator comparisons	0	40	40	20
Q25Biii: Approximately what percentage of the target class’s whole group instruction on equivalent fractions is spent on: Finding equivalent fractions with common denominators for making comparisons	12	32	36	20
Q25Biv: Partitioning number line models into equal sized pieces to make comparisons	28	48	24	0
Q25Bv: Emphasizing algorithms such as cross multiplication and comparing resulting products	8	44	48	0
Q25Bvi: Using visual examples such as paper folding as in 4/4 = 8/8 by an additional paper fold	42	38	17	4
Q25Bvii: Generating equivalent fractions by multiplying or dividing both numerator and denominator by useful forms of 1	17	42	33	8

Q26A

	No, not for this class	Yes, for this class	Yes, but not for this class
	Percent	Percent	Percent
Q26A: Are factors and multiples a part of any unit that you teach this year?	7	78	15

Q26B

Approximately what percentage of the target class's whole group instruction on factors and multiples is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q26Bi: Constructing prime factor trees	26	35	22	17
Q26Bii: Generating multiples of numbers to find common multiples and least common multiples	4	33	46	17
Q26Biii: Using prime factorization to find the greatest common factor of two or more numbers	8	50	33	8
Q26Biv: Listing factor pairs to emphasize the inverse relation between multiplication and division so that a*b = c implies a = c/b	22	61	17	0

Q27A

	No, not for this class	Yes, for this class	Yes, but not for this class
	Percent	Percent	Percent
Q27A: Is the distributive property a part of any unit that you teach this year?	31	65	4

Q27B

Approximately what percentage of the target class's whole group instruction on the distributive property is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q27Bi: Verifying a(b+c) = ab + ac using numerical skill-building exercises (e.g. Calculate for a = 2, b = 4, c = 7)	6	47	41	6
Q27Bii: Linking multiplication and factoring as inverse operations	0	47	41	12
Q27Biii: Providing visual representations	24	59	18	0
Q27Biv: Using equivalent forms of expressions to solve problems such as finding roots of polynomials	24	53	24	0
Q27Bv: Describing variants of the distributive property as special cases rather than as separate properties	18	53	24	6
Q27Bvi: Applying the distributive property to the multiplication of polynomials (e.g. (a + b) (c + d) = ac + ad + bc + bd)	17	44	28	11

Q28A

	No, not for this class	Yes, for this class	Yes, but not for this class
	Percent	Percent	Percent
Q28A: Are linear functions a part of any unit that you teach this year?	42	46	12

Q28B

	With the formula for the slope of a line	With a geometric picture of slope	By discussing slope as rate of change between real-world qua	With a scatterplot of data that has a linear pattern
	Percent	Percent	Percent	Percent
Q28B: When teaching students in the target class about linear functions during whole class instruction, I begin	0	36	43	21

Q28C

Approximately what percentage of the target class's whole group instruction on linear functions is spent on each of the following activities?	None Percent	1-10% Percent	11-25% Percent	More than 25% Percent
Q28Ci: Making comparisons between graphs of linear and nonlinear functions	14	71	14	0
Q28Cii: Using tables to interpret slope (e.g. look for constant y-value differences for a given x-increment)	14	71	7	7
Q28Ciii: Using slope formulas until proficiency is obtained	7	21	64	7
Q28Civ: Understanding that some forms of linear equations are easier to predict a pattern of change than others	7	79	14	0
Q28Cv: Examining the family of linear graphs and noticing how the graphs change as m (slope) changes	0	62	31	8
Q28Cvi: Writing algebraic equations that model real-world linear situations	0	43	43	14
Q28Cvii: Writing and interpreting recursive equations for slope such as Now/Next equations of the form: Next = Now + C, where c is a constant	29	50	21	0

Q29A

	No, not for this class Percent	Yes, for this class Percent	Yes, but not for this class Percent
Q29A: Is the teaching of area of polygons a part of any unit that you teach this year?	42	46	12

Q29B

Approximately what percentage of the target class's whole group instruction on area of polygons is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q29Bi: Memorizing formulas for regular and common polygons	0	79	14	7
Q29Bii: Measuring directly by hand (e.g. with a ruler) and doing direct calculations	43	50	7	0
Q29Biii: Measuring and calculating using a computer program such as Sketchpad or Cabri	86	7	7	0
Q29Biv: Making estimates using graph paper	36	50	14	0
Q29Bv: Dissecting the polygon and rearranging the pieces into an 'easier' shape(s) that can be calculated, then summing the areas	21	43	29	7
Q29Bvi Using a scale factor and calculating the area from a smaller, similar polygon	29	64	7	0
Q29Bvii: Using area subtraction strategies to obtain the desired final area from a larger, encompassing figure such as subtracting triangular areas w/in a square	14	50	29	7

Q30A

	No, not for this class	Yes, for this class	Yes, but not for this class
	Percent	Percent	Percent
Q30A Is the topic of rate of change a part of any unit that you teach this year?	42	38	19

Q30B

Approximately what percentage of the target class's whole group instruction on rate of change is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q30Bi: Comparing changes in x,y table values	0	62	38	0
Q30Bii: Examining f(x) in small graph windows on a graphing calculator or computer graphing program (e.g., zooming in or linearize the graph)	64	21	14	0
Q30Biii: Telling students that m in y = mx + b is the rate of change and having them practice identifying it in similar problems	8	46	31	15
Q30Biv: Creating real world problems of the form y = ax + b and making sensible interpretations for a	15	46	31	8
Q30Bv: Finding and interpreting regression equations	38	46	8	8
Q30Bvi: Working with problems involving average rate of change	0	54	23	23
Q30Bvii: Creating and interpreting graphs involving slope of a tangent line to a curve obtained from the limit of slopes of secant lines	93	0	7	0
Q30Bviii: Calculating derivatives using rules and/or formulas such as product, quotient, chain rules	79	21	0	0
Q30Bix: Understanding the definition of a derivative as a 'derived' function and interpreting it in terms of a rate of change	86	14	0	0

Appendix H

District C Grades 6–12 Data Tables[†]

[†]Note: Data for Question 17 have been omitted because of the various interpretations of what was meant by ISBN number. Instead descriptions of the textbooks used in each district were thought to be more beneficial to readers and are provided in the body of the report.

CSMC Teacher Questionnaire (Grades 6-12) Spring 2005
District C

Q1

Including this year, how many years have you:	1	2	3	4	5	6-10	11-15	16-20	21-25	26 or more
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Q1A: taught at the K-12 level?	0	2	0	5	7	27	11	11	14	23
Q1B: taught in this school district?	5	2	5	5	2	30	12	14	7	19
Q1C: taught mathematics in this district or elsewhere?	3	5	0	5	8	30	13	13	8	18

Q2

	Regular or standard state certificate	Probationary certificate	Provisional	Temporary certificate	Emergency certificate or waiver	No certificate
	Percent	Percent	Percent	Percent	Percent	Percent
Q2: Please indicate the type of teaching certification you hold	82	14	2	2	0	0

Q3

Within mathematics, many teachers feel better prepared to teach some topics than others. How well prepared do you feel to teach each of the following topics at the grade level(s) you teach, whether or not they are currently included in your curriculum?	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
	Percent	Percent	Percent	Percent
Q3A: Estimation	0	2	20	77
Q3B: Measurement	0	5	25	70
Q3C: Pre-Algebra	0	5	14	82
Q3D: Algebra	2	12	19	67
Q3E: Patterns and relationships	0	5	26	70
Q3F: Geometry and spatial sense	0	12	35	53
Q3G: Functions (including trigonometric functions) and pre-calculus concepts	19	30	26	26
Q3H: Data collection and analysis	2	14	33	51
Q3I: Probability	2	12	35	51
Q3J: Statistics (e.g., hypothesis tests, curve fitting, and regression)	19	26	33	23
Q3K: Topics from discrete mathematics (e.g., combinatorics, graph theory, recursion)	28	37	19	16
Q3L: Calculus	48	26	17	10
Q3M: Technology in support of mathematics	7	27	27	39

Q4

When teaching mathematics, many teachers feel better prepared to guide and help develop student learning in some domains than others. How well prepared do you feel to teach each of the following at the grade level(s) you teach, whether or not they are currently included in your curriculum?	Not Adequately Prepared	Somewhat Prepared	Fairly Well Prepared	Very Well Prepared
	Percent	Percent	Percent	Percent
Q4A: Problem solving	0	5	42	53
Q4B: Reasoning and proof	7	25	32	36
Q4C: Communication (written and oral)	0	12	40	49
Q4D: Connections within mathematics and from mathematics to other disciplines	0	14	43	43
Q4E: Multiple representations (e.g., concrete models, and numeric, graphical, symbolic, and geometric representations)	0	16	39	45

Q5

How interested are you in each of the following types of professional development opportunities?	Not Interested Percent	Somewhat Interested Percent	Very Interested Percent
Q5A: Deepen my own mathematics content knowledge	9	58	33
Q5B: Focus on understanding student thinking in mathematics	5	36	59
Q5C: Focus on teaching strategies to enhance student engagement and learning in mathematics	0	23	77
Q5D: Focus on the use of mathematics curriculum materials	9	68	23
Q5E: Focus on the use of technology to support mathematics teaching and learning	0	48	52
Q5F: Observe other teachers teaching mathematics and discuss with them their decisions and teaching strategies	5	30	66
Q5G: Meet regularly with a local group of teachers to study/discuss mathematics teaching issues	11	43	45

Q6

Please provide your opinion about each of the following statements.	Strongly Disagree Percent	Disagree Percent	No Opinion Percent	Agree Percent	Strongly Agree Percent
Q6A: Students generally learn mathematics best in classes with students of similar abilities	2	28	14	49	7
Q6B: It is just as important for students to learn data analysis and probability, as it is to learn multiplication facts	2	11	5	70	11
Q6C: Generally, students learn mathematics best through investigative approaches (e.g., hands-on experiences, inquiry)	5	7	14	64	11
Q6D: Every student in my room should feel that mathematics is something s/he can do	0	0	0	25	75
Q6E: Using computers or calculators to solve mathematics problems distracts students from learning basic mathematics skills	21	40	2	37	0
Q6F: Students generally learn mathematics best through traditional approaches (e.g., lecture, drill and practice/ memorization)	5	49	19	21	7
Q6G: At the grades I teach, a lot of things in mathematics must be simply accepted as true and remembered	7	60	14	19	0
Q6H: It is just as important for students to understand mathematics concepts as it is for them to develop efficient skills for working mathematics exercises	0	2	5	59	34

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District C

Q7

	1	2	3	4	5	6 or more
	Percent	Percent	Percent	Percent	Percent	Percent
Q7: How many mathematics classes are you teaching?	30	9	34	5	20	2

Q9

	No	Yes
	Percent	Percent
Q9: Is this target class considered an accelerated class?	84	16

Q10

	10 or fewer	11-15	16-20	21-25	26-30	more than 30
	Percent	Percent	Percent	Percent	Percent	Percent
Q10: Approximately how many students are in this target class?	0	7	26	21	33	14

Q11

Please indicate the grade level of the students in this class.	No	Yes
	Percent	Percent
Q11A: 6th	67	33
Q11B: 7th	84	16
Q11C: 8th	84	16
Q11D: 9th	84	16
Q11E: 10th	79	21
Q11F: 11th	88	12
Q11G: 12th	93	7

Q12

	less than 25%	25-49%	50-74%	75% or more
	Percent	Percent	Percent	Percent
Q12: Approximately what percentage of students in this class is officially classified as requiring special education services?	91	9	0	0

Q13

	10 or fewer	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81 or more
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Q13: Approximately how many minutes is a typical mathematics lesson in this class?	0	14	14	7	12	7	16	5	26

Q14

On average what percentage of instructional time allotted to mathematics is spent on each of the following?	0-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Q14A: Daily routines, interruptions, and other non-instructional activities	44	40	9	2	2	0	0	2	0	0
Q14B: Whole class lecture/discussions	0	28	37	14	16	2	0	0	2	0
Q14C: Individual students reading textbooks, completing worksheets, etc	12	36	33	14	5	0	0	0	0	0
Q14D: Small group work	14	23	26	14	12	9	0	2	0	0

Q15

About how often do you do each of the following when you teach mathematics to this class?	Never Percent	Rarely (e.g., a few times a year) Percent	Sometimes (e.g., once or twice a month) Percent	Often (e.g., once or twice a week) Percent	Always (e.g., done at least once a day) Percent
Q15A: Introduce content through formal presentations	0	2	9	56	33
Q15B: Pose close-ended questions	0	7	26	40	28
Q15C: Engage the whole-class in discussions	0	5	7	53	35
Q15D: Require students to explain their reasoning when giving an answer	0	2	7	42	49
Q15E: Assess student progress by reviewing homework	0	2	16	35	47
Q15F: Encourage students to explore alternative methods for solutions	0	7	16	49	28
Q15G: Require students to use calculators/computers for learning or practicing skills	5	5	10	44	37
Q15H: Help students see connections between mathematics and other disciplines	0	0	30	47	23
Q15I: Encourage students to use multiple representations (e.g., numeric, graphic, geometric, etc.)	2	7	26	44	21

Q16

In general, about how often do the students in this mathematics class take part in the following activities?	Never Percent	Rarely (e.g., a few times a year) Percent	Sometimes (e.g., once or twice a month) Percent	Often (e.g., once or twice a week) Percent	Always (e.g., done at least once a day) Percent
Q16A: Listen and take notes during a presentation by the teacher	0	12	16	49	23
Q16B: Work in groups	0	7	14	47	33
Q16C: Read from a mathematics textbook in class	5	12	45	24	14
Q16D: Read other (non-textbook) mathematics-related materials in class	12	38	36	10	5
Q16E: Engage in mathematical activities using concrete materials	0	14	40	43	2
Q16F: Practice routine computations/algorithms	0	7	19	50	24
Q16G: Review homework/worksheet assignments	0	0	12	40	48
Q16H: Use mathematical concepts to interpret and solve applied problems	0	2	10	50	38
Q16I: Answer textbook or worksheet questions	0	0	5	43	52
Q16J: Write reflections (e.g., in a journal)	17	29	39	5	10
Q16K: Make formal presentations to the rest of the class	10	43	33	12	2
Q16L: Keep notes in an organized notebook that is periodically reviewed by teacher	12	12	12	33	31
Q16M: Work on extended mathematics investigations or projects (a week or more in duration)	24	38	29	7	2
Q16N: Record, represent, and/or analyze data	5	25	45	23	3
Q16O: Use calculators or computers to develop conceptual understanding	3	13	13	41	31
Q16P: Take a test or quiz	0	0	50	48	3

Q18

	District level	School level	Individual teacher level
	Percent	Percent	Percent
Q18: Which best describes the level at which the decision to use that mathematics textbook/program was made?	95	5	0

Q19

For each of the following, please indicate how often you use that mathematics textbook/program in the target class.	Never Percent	Rarely (e.g., a few times a year) Percent	Sometimes (e.g., once or twice a month) Percent	Often (e.g., once or twice a week) Percent	Always (e.g., done at least once a day) Percent
Q19A: The textbook guides the structure (content emphasis) of this class	0	2	2	44	51
Q19B: I follow the textbook page by page	12	19	16	35	19
Q19C: I pick what I consider important from the textbook and skip the rest	5	21	30	33	12
Q19D: I follow my district's curriculum recommendations regardless of what is in the textbook	0	0	2	40	57
Q19E: I incorporate activities from other sources to supplement the textbook	0	7	19	48	26
Q19F: I use the student textbook to plan lessons for this class	12	10	14	43	21
Q19G: I read and review suggestions in the textbook's teacher guide to plan lessons for this class	7	10	22	41	20
Q19H: I assign homework from the textbook	0	0	10	63	27
Q19I: Students in this class use their textbook during the mathematics lesson	0	5	12	48	36

Q20

	less than 25%	25-49%	50-74%	75-90%	more than 90%
	Percent	Percent	Percent	Percent	Percent
Q20: Over the course of the school year, approximately what percentage of the mathematics instructional time for this class will be based on that mathematics textbook/program?	0	7	36	36	21

Q21

	less than 25%	25-49%	50-74%	75-90%	more than 90%
	Percent	Percent	Percent	Percent	Percent
Q21: Estimate the percentage of that mathematics textbook/program you will cover during the school year with this target class?	0	12	37	41	10

Q22

	Very Poor	Poor	Fair	Good	Very Good	Excellent
	Percent	Percent	Percent	Percent	Percent	Percent
Q22: How would you rate the overall quality of that mathematics textbook/program for this target class?	2	14	21	33	28	2

Q23

Approximately what percentage of the target class's whole group instruction on developing students' number sense is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q23A: Relating numbers to visual models such as a number line, thermometer, etc	7	37	37	19
Q23B: Using benchmarks and estimation to compare fractions	12	50	24	14
Q23C: Using calculators as a tool for making comparisons	2	23	23	51
Q23D: Practicing paper and pencil computations involving basic operations	5	37	26	33
Q23E: Practicing or memorizing translating between fraction, decimal, and/or percent equivalents	5	50	29	17
Q23F: Practicing mental computation strategies involving benchmarks and estimation	2	49	32	17
Q23G: Relating interpretation of fractions to the unit or whole	7	44	27	22

Q24

Approximately what percentage of the target class's whole group instruction on making sense of mathematics is spent on each of the following activities?	None Percent	1-10% Percent	11-25% Percent	More than 25% Percent
Q24A: Emphasizing algebraic manipulation as an important skill for solving complex problems	0	28	28	44
Q24B: Providing situations where students determine which expression form is most useful for extracting information needed to solve a problem	16	37	33	14
Q24C: Writing rules/equations that represent a variety of real-world situations	2	34	44	20
Q24D: Writing about or creating real-world contexts represented by rules/equations, tables, or graphs	2	40	43	14
Q24E: Moving among verbal, symbolic, graphic, and tabular representations of equations/problems	2	43	26	29
Q24F: Emphasizing the value of representing some situations/problems using one representation versus another	2	43	38	17
Q24G: Moving between specific instances and mathematical generalizations	0	45	33	21
Q24H: Using deductive reasoning from basic properties to demonstrate why mathematics works	0	43	31	26
Q24I: connecting the mathematics studied to other areas of mathematics	5	45	24	26
Q24J: Using computer-based, numerical, or graphical tools to solve or explore complex problems	12	43	31	14

Q25A

	No, not for this class	Yes, for this class	Yes, but not for this class
	Percent	Percent	Percent
Q25A: Are equivalent fractions a part of any unit that you teach this year?	28	60	12

Q25B

Approximately what percentage of the target class's whole group instruction on equivalent fractions is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q25Bi: Using a number line to develop different fraction names for the same location	10	61	26	3
Q25Bii: Finding common denominators and making direct numerator comparisons	3	45	29	23
Q25Biii: Approximately what percentage of the target class’s whole group instruction on equivalent fractions is spent on: Finding equivalent fractions with common denominators for making comparisons	3	45	31	21
Q25Biv: Partitioning number line models into equal sized pieces to make comparisons	10	52	32	6
Q25Bv: Emphasizing algorithms such as cross multiplication and comparing resulting products	3	24	48	24
Q25Bvi: Using visual examples such as paper folding as in 4/4 = 8/8 by an additional paper fold	29	26	35	10
Q25Bvii: Generating equivalent fractions by multiplying or dividing both numerator and denominator by useful forms of 1	3	30	43	23

Q26A

	No, not for this class	Yes, for this class	Yes, but not for this class
	Percent	Percent	Percent
Q26A: Are factors and multiples a part of any unit that you teach this year?	19	67	14

Q26B

Approximately what percentage of the target class's whole group instruction on factors and multiples is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q26Bi: Constructing prime factor trees	6	44	32	18
Q26Bii: Generating multiples of numbers to find common multiples and least common multiples	9	39	39	12
Q26Biii: Using prime factorization to find the greatest common factor of two or more numbers	9	41	35	15
Q26Biv: Listing factor pairs to emphasize the inverse relation between multiplication and division so that a*b = c implies a = c/b	21	47	21	12

Q27A

	No, not for this class	Yes, for this class	Yes, but not for this class
	Percent	Percent	Percent
Q27A: Is the distributive property a part of any unit that you teach this year?	0	95	5

Q27B

Approximately what percentage of the target class's whole group instruction on the distributive property is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q27Bi: Verifying a(b+c) = ab + ac using numerical skill-building exercises (e.g. Calculate for a = 2, b = 4, c = 7)	2	40	43	14
Q27Bii: Linking multiplication and factoring as inverse operations	7	49	34	10
Q27Biii: Providing visual representations	12	31	31	26
Q27Biv: Using equivalent forms of expressions to solve problems such as finding roots of polynomials	31	45	19	5
Q27Bv: Describing variants of the distributive property as special cases rather than as separate properties	17	50	26	7
Q27Bvi: Applying the distributive property to the multiplication of polynomials (e.g. (a + b) (c + d) = ac + ad + bc + bd)	26	33	26	14

Q28A

	No, not for this class	Yes, for this class	Yes, but not for this class
	Percent	Percent	Percent
Q28A: Are linear functions a part of any unit that you teach this year?	24	69	7

Q28B

	With the formula for the slope of a line	With a geometric picture of slope	By discussing slope as rate of change between real-world qua	With a scatterplot of data that has a linear pattern
	Percent	Percent	Percent	Percent
Q28B: When teaching students in the target class about linear functions during whole class instruction, I begin	7	38	34	21

Q28C

Approximately what percentage of the target class's whole group instruction on linear functions is spent on each of the following activities?	None Percent	1-10% Percent	11-25% Percent	More than 25% Percent
Q28Ci: Making comparisons between graphs of linear and nonlinear functions	19	52	26	3
Q28Cii: Using tables to interpret slope (e.g. look for constant y-value differences for a given x-increment)	7	53	33	7
Q28Ciii: Using slope formulas until proficiency is obtained	6	35	48	10
Q28Civ: Understanding that some forms of linear equations are easier to predict a pattern of change than others	7	50	33	10
Q28Cv: Examining the family of linear graphs and noticing how the graphs change as m (slope) changes	10	32	45	13
Q28Cvi: Writing algebraic equations that model real-world linear situations	0	42	32	26
Q28Cvii: Writing and interpreting recursive equations for slope such as Now/Next equations of the form: Next = Now + C, where c is a constant	47	30	13	10

Q29A

	No, not for this class Percent	Yes, for this class Percent	Yes, but not for this class Percent
Q29A: Is the teaching of area of polygons a part of any unit that you teach this year?	19	71	10

Q29B

Approximately what percentage of the target class's whole group instruction on area of polygons is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q29Bi: Memorizing formulas for regular and common polygons	12	35	41	12
Q29Bii: Measuring directly by hand (e.g. with a ruler) and doing direct calculations	13	34	44	9
Q29Biii: Measuring and calculating using a computer program such as Sketchpad or Cabri	82	12	3	3
Q29Biv: Making estimates using graph paper	6	64	24	6
Q29Bv: Dissecting the polygon and rearranging the pieces into an 'easier' shape(s) that can be calculated, then summing the areas	18	45	30	6
Q29Bvi Using a scale factor and calculating the area from a smaller, similar polygon	26	38	29	6
Q29Bvii: Using area subtraction strategies to obtain the desired final area from a larger, encompassing figure such as subtracting triangular areas w/in a square	21	52	27	0

Q30A

	No, not for this class	Yes, for this class	Yes, but not for this class
	Percent	Percent	Percent
Q30A Is the topic of rate of change a part of any unit that you teach this year?	15	78	7

Q30B

Approximately what percentage of the target class's whole group instruction on rate of change is spent on each of the following activities?	None	1-10%	11-25%	More than 25%
	Percent	Percent	Percent	Percent
Q30Bi: Comparing changes in x,y table values	6	38	41	15
Q30Bii: Examining f(x) in small graph windows on a graphing calculator or computer graphing program (e.g., zooming in or linearize the graph)	38	35	18	9
Q30Biii: Telling students that m in y = mx + b is the rate of change and having them practice identifying it in similar problems	12	33	36	18
Q30Biv: Creating real world problems of the form y = ax + b and making sensible interpretations for a	9	45	21	24
Q30Bv: Finding and interpreting regression equations	48	27	15	9
Q30Bvi: Working with problems involving average rate of change	9	50	24	18
Q30Bvii: Creating and interpreting graphs involving slope of a tangent line to a curve obtained from the limit of slopes of secant lines	71	24	3	3
Q30Bviii: Calculating derivatives using rules and/or formulas such as product, quotient, chain rules	82	12	6	0
Q30Bix: Understanding the definition of a derivative as a 'derived' function and interpreting it in terms of a rate of change	82	18	0	0

Appendix I

Composite Definitions

To facilitate the reporting of large amounts of survey data, and because individual questionnaire items are potentially unreliable, HRI combined groups of conceptually related survey questions into "composites." Each composite represents an important construct related to mathematics teaching.

Each composite is calculated by summing the responses to the items associated with that composite and then dividing by the total points possible. In order for the composites to be on a 100-point scale, the lowest response option on each scale was set to 0 and the others were adjusted accordingly; so for instance, an item with a scale ranging from 1 to 5 was re-coded to have a scale of 0 to 4. By doing this adjustment, someone who marks the lowest point on every item in a composite receives a composite score of 0 rather than some positive number. It also assures that 50 is the true mid-point. The denominator for each composite is determined by computing the maximum possible sum of responses for a series of items and dividing by 100; e.g., a nine-item composite where each item is on a scale of 0–4 would have a denominator of 0.36.

Composite definitions described in this report are presented below along with the item numbers from the respective questionnaires.

Table I-1
Extent of Textbook Us in the Target Mathematics Classes

	Elementary	**Secondary**
The textbook guides the structure (content emphasis) of this class.	Q16a	Q19a
I follow the textbook page by page.	Q16b	Q19b
I read and review suggestions in the textbook's teacher guide to plan lessons for this class.	Q16g	Q19g
I pick what I consider important from the textbook and skip the rest.†	Q16c	Q19c
I incorporate activities from other sources to supplement the textbook. †	Q16e	Q19e
The approximate percentages pf mathematics instructional time for the target class that is based on the mathematics textbook/program, over the course of the school year.	Q17	Q20
The estimated percentage of the mathematics textbook/program that will be covered during the school year with the target class.	Q18	Q21
Number of Items in Composite	**7**	**7**
Reliability (Cronbach's Coefficient Alpha)	**0.81**	**0.81**

† The scale of this item was reversed for the calculation of the composite.

Table I-2
Teacher's Use of Traditional Practices

	Elementary	**Secondary**
Introduce content through formal presentations.	Q12a	Q15a
Pose close-ended questions.	Q12b	Q15b
Listen and take notes during a presentation by the teacher.	Q13a	Q16a
Practice routine computations/algorithms.	Q13f	Q16f
Number of Items in Composite	**4**	**4**
Reliability (Cronbach's Coefficient Alpha)	**0.58**	**0.70**

Table I-3
Teachers' Use of Reform-Oriented Practices

	Elementary	Secondary
Require students to explain their reasoning when giving an answer.	Q12d	Q15d
Encourage students to explore alternative methods for solutions.	Q12f	Q15f
Help students see connections between mathematics and other disciplines.	Q12h	Q15h
Encourage students to use multiple representations (e.g., numeric, graphic, geometric, etc.).	Q12i	Q15i
Work in groups.	Q13b	Q16b
Engage in mathematical activities using concrete materials.	Q13e	Q16e
Use mathematical concepts to interpret and solve applied problems.	Q13h	Q16h
Write reflections (e.g., in a journal).	Q13j	Q16j
Work on extended mathematics investigations or projects (a week or more in duration).	Q13m	Q16m
Record, represent, and/or analyze data.	Q13n	Q16n
Use calculators or computers to develop conceptual understanding.	Q13o	Q16o
Number of Items in Composite	**11**	**11**
Reliability (Cronbach's Coefficient Alpha)	**0.78**	**0.82**

Table I-4
Reform-Oriented Beliefs about Student Learning

	Elementary	Secondary
It is just as important for students to learn data analysis and probability, as it is to learn multiplication facts.	Q6b	Q6b
Generally, students learn mathematics best through investigative approaches (e.g., hands-on experiences, inquiry).	Q6c	Q6c
Every student in my room should feel that mathematics is something s/he can do.	Q6d	Q6d
It is important for students to understand mathematics concepts as it is for them to develop efficient skills for working mathematics exercise.	Q6h	Q6h
Students generally learn best in classes with students of similar abilities. †	Q6a	Q6a
Using computers or calculators to solve mathematics problems districts from learning basic mathematics skills. †	Q6e	Q6e
Students generally learn mathematics best through traditional approaches (e.g., lecture, drill and practice/ memorization). †	Q6f	Q6f
At the grades I teach, a lot of things in mathematics must be simply accepted as true and remembered. †	Q6g	Q6g
Number of Items in Composite	**8**	**8**
Reliability (Cronbach's Coefficient Alpha)	**0.64**	**0.62**

† The scale of this item was reversed for the calculation of the composite.

Table I-5
Elementary Teachers' Perceived Preparedness to Teach K–5 Mathematics Topics

	Elementary
Estimation	Q3c
Measurement	Q3d
Pre-Algebra	Q3e
Algebra	Q3f
Patterns and relations	Q3g
Geometry and spatial sense	Q3h
Data collection and analysis	Q3i
Probability	Q3j
Technology (calculators, computers) in support of mathematics	Q3k
Numeration and number theory	Q3a
Computation	Q3b
Number of Items in Composite	**11**
Reliability (Cronbach's Coefficient Alpha)	**0.89**

Table I-6
Elementary Teachers' Perceived Preparedness to Guide and Develop Student Learning (K–5)

	Elementary
Problem solving	Q4a
Reasoning and proof	Q4b
Communication (written and oral)	Q4c
Connections within mathematics and from mathematics to other disciplines	Q4d
Multiple representations (e.g., concrete models, and numeric, graphical, symbolic, and geometric representations)	Q4e
Number of Items in Composite	**5**
Reliability (Cronbach's Coefficient Alpha)	**0.87**

Table I-7
Secondary Teachers' Perceived Preparedness to Teach 6–12 Mathematics Topics

	Secondary
Estimation	Q3a
Measurement	Q3b
Pre-Algebra	Q3c
Algebra	Q3d
Patterns and relations	Q3e
Geometry and spatial sense	Q3f
Data collection and analysis	Q3h
Probability	Q3i
Technology (calculators, computers) in support of mathematics	Q3m
Function (including trigonometric functions) and pre-calculus concepts	Q3g
Statistics (e.g., hypothesis tests, curve fitting and regression)	Q3j
Topics from discrete mathematics (e.g., combinatorics, graph theory, recursion)	Q3k
Calculus	Q3l
Number of Items in Composite	**13**
Reliability (Cronbach's Coefficient Alpha)	**0.91**

Table I-8
Secondary Teachers' Perceived Preparedness to Guide and Develop Student Learning (6–12)

	Secondary
Problem solving	Q4a
Reasoning and proof	Q4b
Communication (written and oral)	Q4c
Connections within mathematics and from mathematics to other disciplines	Q4d
Multiple representations (e.g., concrete models, and numeric, graphical, symbolic, and geometric representations)	Q4e
Number of Items in Composite	**5**
Reliability (Cronbach's Coefficient Alpha)	**0.86**