

Chapter 8

Structural and Student-Related Influences on Instruction

Highlights of Findings

Several teachers identified structural factors, such as those relating to time and class size, as obstacles to their instruction.

Time-related factors, including disruptions, lack of planning time, schedule configurations, the need to teach other subjects, and the breadth of the curriculum, are perceived by some teachers as obstacles to effective mathematics instruction. Class size was another structural factor that was discussed by many teachers. However, teachers' concerns about class size appear to be as much about variation in student ability as about large classes *per se*.

Students' skill levels, attitudes, home lives, and language abilities may also influence instruction.

Students' lack of preparation—particularly in basic mathematics skills—presents a major obstacle for many teachers. Poor student behavior and low student motivation are also perceived as instructional obstacles by a large number of teachers, especially at the eighth-grade level. Some teachers identified factors having to do with parents and student home life as being a challenge, and a few also mentioned students' language differences. However, the proportion of teachers who indicated that language differences presented a major obstacle to their mathematics teaching was relatively small.

Background

In addition to materials, standards, assessment, and professional development, several other important influences on teachers and on their instruction became apparent in the analysis of qualitative data (open-ended survey comments and interviews). These included some that were structural, such as time and class size. Others were related to student characteristics such as preparation and skill level, behavior and motivation, parents and home factors, and language differences.

Numerous state, district, and school policies have bearing on these types of structural and student-related influences on instruction. For example, recent state policies and legislation touching on such matters have included:

The Class Size Reduction Program. California’s Class Size Reduction (CSR) Program was established in 1996 to improve student achievement, particularly in reading and mathematics, in the primary grades. The CSR Program is a voluntary incentive program in which the state provides districts with additional per pupil funding for each child in grades K-3 who receives instruction in a class of 20 or fewer students. In 1998-1999, the third year of the program, 99% of California school districts participated.

Pupil Promotion and Retention Legislation. Three pieces of related legislation, all signed by the Governor in 1998, relate to the promotion—or lack thereof—of students from one grade level to the next. AB 1626 required each school district to “approve a policy regarding the promotion and retention of pupils” between certain grade levels based on “pupils’ level of proficiency” in reading, English language arts, and mathematics. AB 1626 also required the Superintendent of Public Instruction to recommend, and the State Board of Education to adopt, minimum levels of performance on the assessments in the STAR program for the determination of student proficiency.¹ AB 1639, meanwhile, requires districts to offer supplemental instructional services to retained students through summer school, after-school, Saturday, and/or intersession instruction. SB 1370 appropriated funding for this supplemental instruction.

Proposition 227. Proposition 227, known prior to its passage as the Unz Initiative, was enacted by California voters in June 1998. It requires that all children in California public schools be placed in “English language classrooms,” defined as classrooms “in which the language of instruction used by the teaching personnel is overwhelmingly the English language, and in which such teaching personnel possess a good knowledge of the English language.” The proposition also specified that English language learners are to be placed in “sheltered English immersion” for no more than one year. However, parents may request waivers so that their children can be placed in “classes where they are taught English and other subjects through bilingual education techniques or other generally recognized educational methodologies permitted by law.” Schools where 20 or more students at any given grade level have received waivers are required to offer such classes.

¹ As of the publication of this report, no such recommendation had yet been made, largely out of a concern that the determination of student proficiency be based on standards-aligned assessments. When the STAR augmentation (Standards-Based Test) has been deemed valid and reliable and is included as a measure on the state’s Academic Performance Index (API), then the Superintendent may proceed with the recommendation. Until then, districts are free to make their own determinations of minimum levels of student proficiency, and have been encouraged by CDE to base the determinations on multiple measures of student performance. (R. Anderson, CDE, personal communication, May 23, 2000).

Along with these and other state programs and policies, many district and school policies also are related to structural and student influences on instruction. For example, some districts may have policies affecting how much time may be spent on mathematics instruction (e.g., versus other subject areas), whether students may be grouped by ability, or what happens to students whose behavior repeatedly disrupts the learning of other students.

An in-depth analysis of all of these various policies and their effects on mathematics instruction—not to mention on student achievement—was well beyond the scope of this study. However, teachers’ comments made it clear that such policies can and do exert a strong influence, and that mathematics instruction must be considered in the context of such policies.

Time

Several teachers said that time-related factors, such as disruptions, lack of planning time, schedule configurations, the need to teach other subjects, and the breadth of the curriculum, presented obstacles to their instruction.

On the survey, approximately 16% of teachers at both fourth and eighth grade levels identified factors having to do with *time* as being among the biggest obstacles to their mathematics teaching. However, not every teacher shared exactly the same time-related concern. The most common concerns included:

Frequent disruptions to instruction. In the interview question, “Is there anything that gets in the way of your effectiveness as a math teacher?” one eighth-grade teacher replied, “Scheduling—there are so many interruptions and other things going on.” A fourth-grade teacher in the same district said, “Yes, anything that takes time away from time on task. The school schedule changes a lot because of assemblies and different events; this takes time away from instruction and what we can get done.” On the survey, an eighth-grade teacher in a different district remarked, “Anything that takes away from instruction time is a disservice to our students (assemblies, special days, excessive testing, etc.)” Indeed, as discussed in the chapter on assessment, several other teachers also commented on the problem of testing taking time away from instruction.

Lack of time to plan and prepare. This was particularly an issue at the fourth-grade level. As one teacher who was interviewed said, “As a fourth-grade teacher, we don’t have prep time.” Several other fourth-grade teachers, on both the survey and in interviews, made similar comments about lacking planning/preparation time.

Schedule configuration. Some eighth-grade teachers indicated on the survey that schedule configuration factors interfered with the effectiveness of their mathematics teaching:

Teaching in 45 minute blocks, too limiting

Periods too short to do an adequate job of presentation

Too long a day which results in tired students and teachers.

Block scheduling (one really long day, one really short day, only 4 days total for each student in math)

Unlike this writer of this last remark, however, other teachers spoke positively about block scheduling.² In the answer to the survey question about policies that have helped mathematics instruction, one teacher replied, “Longer periods twice a week. I believe there should be less electives and longer periods of math.” A teacher in a different district remarked in an interview, “Two hour blocks would be great once a week so we could do longer activities rather than having them last for four to five days.”

Amount of time for mathematics as compared with other subjects. This, meanwhile, was obviously more of an issue at the fourth grade level. The following comments, each from a teacher in a different district, were made in response to the obstacles question on the survey:

The time during the day to effectively teach math with many other curriculum areas to cover.

Time! I could use about 1 1/2 hours each day just for math.

Time. As an elementary school teacher I must also teach other subjects. If a person wants to teach a subject in depth or for understanding it takes TIME.

The matter of time for mathematics as compared for other subjects was a particular issue in a fourth district, where the district administration had recently mandated a daily three-hour “literacy block” for all elementary students as part of a strong district focus on literacy. “In this district this year,” commented the district mathematics coordinator, “there’s been no push in mathematics. Everything is literacy.” He thought that although some teachers may have used the emphasis on literacy to avoid teaching mathematics, others did continue to teach it.

The fourth-grade teachers from this district who returned the survey did indicate that, on average, they spent as much time on mathematics instruction as teachers from the other

² On the eighth-grade survey, 21 teachers indicated a clear block-scheduling arrangement in their answers to questions about minutes per day and days per week of mathematics instruction. Other respondents may also have had block scheduling but not indicated this in their responses.

surveyed districts. However, of the 20 teachers from this district who opted to answer the open-ended survey questions, 8 of them commented that the district’s literacy emphasis was having a negative effect on mathematics instruction. Some of the comments were as follows:

[cited as obstacle] Time, because our district requires too much time for other subjects... [cited as hindering policy] [District’s] implementation of the literacy program.

This year our district is requiring 3 hrs/day of literacy instruction. It is extremely hard to teach all other subjects including math.... The literacy program implemented in our district this year doesn’t allow me to teach math when I need to, or spend as much time as I want to.

[cited as hindering policy] Math is second fiddle to reading—and I think it will be that way for the next couple years!

Lack of time to adequately cover the whole mathematics curriculum. As discussed in the chapter on standards, many teachers commented that they feel the new standards are too ambitious in terms of the amount of material they covered. Concordantly, time to “fit everything in” was a problem cited both by fourth-grade teachers and eighth-grade teachers. Among the fourth-grade survey comments on this topic were the following:

[cited as obstacle] Not enough time to cover all strands well.

[cited as obstacle] Increasing the content to be taught, but not the time to be spent teaching. Do I ensure depth of understanding or go on to the next topic to fit it all in?

I am unable to teach all of the new standards to mastery while also teaching long division/fractions and decimals. Plus I need to have it done by April! This leads to poor teaching practices—drill without understanding because of time constraints.

Math—at any elementary level—seems to require too much to be covered. Little time for long projects.

Eighth-grade teachers’ survey comments were similar. They included:

[cited as obstacle] Lack of time (classtime) compared to amount of curriculum demanded.

Too much material to cover, not enough time!

[cited as obstacle] Trying to accomplish too much in the time frame allowed.

Time to meet the needs of individual students. Finally, a few teachers’ concerns about time had to do with a lack of time to meet the needs of individual students. For example, one fourth-grade teacher wrote on the survey that her biggest obstacles were “meeting everyone’s

individual needs” and “time to do this.” Another wrote, “Classes with 32 students in them don’t allow enough time to meet individuals’ remediation or acceleration needs.” As demonstrated by this last remark, these types of concerns about time are closely related to teachers’ concerns about class size and ability range, discussed in the following section.

Class Size and Ability Range

Teachers do have concerns about class size, but these concerns appear to be as much about variation in student ability as about large classes per se.

One of the questions on the survey asked, “How many students are enrolled in your class?” The mean for all 281 fourth-grade teachers was 29.56; individual district means ranged from 27.43 up to 33.17. Four districts had a mean above 30. For eighth-grade, the mean across all eleven districts (n=116) was 30.27. Individual district means ranged from 28.0 up to 35.6³; six districts had a mean above 30. The means for the different eighth-grade course types were comparable to one another.⁴

Perhaps not surprisingly (given that the statewide class size reduction initiative has been for grades K-3, stopping just short of fourth grade), many fourth-grade teachers complained about large class sizes. In fact, large class size/ability range was identified on the survey by more than 25% of responding fourth-grade teachers as being among the biggest obstacles to their mathematics teaching, forming the second largest category (behind curriculum materials) of responses to the obstacles question.

In response to the obstacles and hindrances questions on the survey, 28 fourth-grade teachers gave responses such as “large class size” or “too many students.” However, almost half of these teachers *also* included something in their response such as “and too wide a range of abilities.” Moreover, *an additional 35* teachers did not mention large class size *per se*, but did discuss wide ability range. Sample responses to the obstacles question, each from a different district, include:

Having children who are 2-3 years below grade level, grade level and above grade level. All with different needs.

Having 34 students, each at different levels. Having to create lesson plans to challenge the higher students, but that do not frustrate and confuse lower students.

³ The 35.6 was unusually high. The next highest figure was 32.33.

⁴ The mean class size for problem solving courses, at 33.13, was a bit larger than for the other course types, which ranged only from 29.0 to 30.59. However, this may be a function of a relatively small sample size for the problem solving courses (n=8) and the fact that all of these courses were clustered in a district with one of the higher district means (31.87).

[Students'] skills and concepts are all over the board creating multiple needs that are difficult to address when 33 students are in a class.

Thus, it would seem that for most teachers, the concern about class size is not really a concern about large classes *per se*, but rather is about the wide range of abilities within the class. Logically, the larger the class, the more likely there is to be a wide range of abilities within the class, and the more difficult it may be for teachers to meet all students' needs.

Indeed, another survey question asked teachers to describe their class in terms of variation in student ability; nearly 75% of teachers checked the box that said, "heterogeneous with a mixture of two or more ability levels." (The other three options were "fairly homogeneous and low in ability," "fairly homogeneous and average in ability," and "fairly homogeneous and high in ability.")

The same findings generally held at the eighth-grade level, but on a slightly lower scale. At the eighth-grade level, responses having to do with class size/grouping practices formed the third largest category of responses to the obstacles question, at 19.4%. Representative comments (again, each from a different district) include:

The range of student abilities: from 2nd-3rd grade levels to high school ability all in one class.

Wide range of ability of students

Large classes with varying abilities and student prep.

I find it hard to meet the needs of my students in a class with such a wide range of abilities and needs.

Many of these types of remarks came from teachers of Math 8 courses—perhaps not surprising, given that Math 8 courses might be more likely than other course types to include students with a wide range of ability. In response to the survey question about variation in student ability, 54.7% of the eighth-grade teachers—including 79.2% of the Math 8 teachers—indicated that the class for which they were completing the survey was "heterogeneous with a mixture of two or more ability levels." About 25% checked "fairly homogenous and high in ability. Of the 29 teachers who checked this box, 19 (65.5%) were teaching algebra, and 5 (17.2%) were teaching integrated math. None of the teachers who checked this box were teaching Math 8.

[text continues on the next page]

Student Preparation and Skill Level

Students' lack of preparation—particularly in basic mathematics skills—presents another major obstacle for many teachers.

Teachers' concerns about the wide range of ability within their class relate closely to another major concern: that too many students come to them unprepared or below grade level. On the “obstacles” survey question, approximately 12% of fourth-grade teachers, and 14% of eighth grade teachers, gave responses such as “students unprepared,” “students below grade level,” or “students behind from previous year.”

One eighth-grade teacher who was interviewed, when asked “Is there anything that gets in the way of your effectiveness of a mathematics teacher?” replied:

Kids that come in underprepared—kids that come in that are way behind. Especially in math. If you go to other subjects, it's not really that critical, like in history, it's not critical that you know ancient history in order to know U.S. history. You can pick up wherever. But in math, it's like, what are you going to do? If mean, if the kid doesn't know how to add and subtract integers, you've got a problem. That definitely gets in the way. Because, then you have a decision to make. You know, do you get them caught up, at the expense of the people who are ready to move on, or do you not teach them, and they get lost, and then you go on and teach the people who are ahead? So either way, you're kind of losing a group. It's tough to manage.

This teacher's reference to some students' apparent inability to “add and subtract integers” suggests his perception that the preparation deficit tends to be in the area of basic skills. This perception was shared by a great many teachers. Although a few survey respondents did comment that students lacked sufficient conceptual understanding and problem-solving ability, many more teachers indicated that students' lack of preparation was primarily in the area of basic computational skills and knowledge of “math facts” (e.g., multiplication tables). In fact, on the survey, about 10% of teachers at both grade levels identified “students lacking basic skills” as being among their biggest obstacles. Representative survey comments included:

[from a fourth-grade teacher] Students who come to 4th grade without computational skills in the basics!

[from a fourth-grade teacher] The children do not come to me knowing their basic facts, addition, subtraction, and multiplication. I have to reteach everything!

[from a fourth-grade teacher] Students not remembering their +, -, division, x facts

[from a fourth-grade teacher] Students come not having basic skills of + and -, except to use their fingers.

[from an eighth-grade teacher] Students don't know basic skills—things they should have learned in elementary school.

[from an eighth-grade teacher] A few students lacking basic arithmetic skills.

The new trends in state and district policy toward the implementation of grade-level standards and toward ending social promotion may, in the long run, help alleviate some of these concerns. If teachers at all grade levels have a clear understanding of what students should know by the end of the year, and students who have not sufficiently mastered the expected content do not go on to the next grade, teachers should, at least in theory, experience less of a problem with students coming to them unprepared.

One district mathematics coordinator was optimistic about this, saying that historically, schools have been free to “do their own thing,” but that the new emphasis on student outcomes, standards-based instruction, and the end of social promotion have brought about a “push” toward greater uniformity, which she felt is for the best. However, she acknowledged that until the curriculum is aligned with the standards and teachers have really adopted the new standards, the desired effect may remain elusive. And about social promotion, an accountability administrator in a different district commented, “The notion that we’re going to punish kids, and hold them over, when they haven’t had access to quality instruction, isn’t right.” The point made by both of these administrators is that for legislation to be effective, it must be accompanied by substantial capacity-building activities.

Student Behavior and Motivation

Poor student behavior and low student motivation are also perceived as major instructional obstacles by a large number of teachers, especially at the eighth-grade level.

In addition to student preparation and skill level, other student factors—such as poor behavior, low motivation, and low attendance—were also cited by many teachers as being among the biggest obstacles to their mathematics teaching. In fact, at the eighth grade level, such factors were the *most commonly cited* obstacle to mathematics teaching, with 32.3% of teachers listing them. At the fourth-grade level, such factors were cited only by 6.8% of teachers, so this appears mainly to be a middle school issue.

For some, the main problem was student behavior or disciplinary problems. “Student discipline—too much time is wasted dealing with tardies and other violations of school

rules,” wrote one eighth-grade teacher. Many of these types of responses seemed to attribute the problems to the students themselves. For example, one eighth-grade teacher who was interviewed gave the following response to the question, “Is there anything that gets in the way of your effectiveness as a math teacher?”

Some days the kids are a little whiny, and some have a little attitude, or sometimes the discipline problems that do occur. That greatly affects my teaching, because it’s very hard to run a class where the kids are looking for trouble.

Along the lines of “running a class,” however, some teachers cited their own struggle with classroom management—often related to student behavior—as an obstacle to their effectiveness. One eighth-grade teacher who was interviewed commented:

Just classroom management, apart from the math itself, is a major factor in regards to effectiveness. I mean, I think someone could be very good at math, but if the classroom management isn’t there, then it doesn’t really matter what the math curriculum is. So that’s been a major factor that we’ve been working on this year. Just kind of on my own personal level of working with the different classes to develop a classroom management that works.

A few teachers also related student disciplinary problems to school or district policies. In response to the “hindering policies” survey question, one teacher remarked, “Policies that continue to allow students with serious behavior problems back in the classroom.” A teacher from a different district wrote similarly, “The unwillingness of the district and the state to deal strictly with the small ‘hard core’ group of disruptive students (or to allow our school to deal strictly with them).”

Perhaps related closely to the issue of student behavior and classroom management is the matter of student motivation. Low student motivation was the other student-related factor that was cited as an obstacle by many eighth-grade teachers on the survey, as indicated by the following representative remarks:

Students with low interest/desire to succeed

Student who don’t try and don’t care

Lack of student desire to learn

Apathy both in students and parents—an attitude that it’s okay to fail.

Again, similar comments were made in interviews. Although these kinds of comments are by no means new, and the problems of student behavior and motivation will probably never completely vanish, they may not be unrelated to other aspects of mathematics instruction.

For example, for some teachers, altering the instructional approach may increase student motivation, which may in turn bring improved student behavior.

Indeed, in some of the mathematics lessons that were observed, observers did note problems with student behavior and discipline, and often they attributed these problems to the nature of instruction. For example, one observer wrote the following about an observed fourth-grade class:

The lack of engagement of students plus their inability to follow what the teacher was teaching led to ongoing disciplinary problems... [The teacher] was reteaching what the high students already knew so they were not paying attention, ... and the lower students were lost.

Another observer wrote about an eighth-grade class in a different district:

Behavior “problems” (e.g., students not paying attention, talking, being restless) grew towards the end of the class, most likely signifying students’ lack of interest in and engagement with the material, and their increasing boredom.

On the other hand, observers also witnessed several classes at both grade levels where student behavior was not a problem at all. These tended to be classes in which the teachers seemed to have a good rapport with the students and/or in which the mathematics instruction was kept lively and interesting.

Parent and Home Factors

Some teachers identified factors having to do with parents and student home life as being a challenge.

Another obstacle that was cited on the survey more at the eighth grade level than at the fourth grade level relates to students’ parents and home life. Parent and home factors were cited as an obstacle by about 16% of eighth-grade teachers, but only by 6% of fourth-grade teachers. In interviews, however, parent-related concerns were mentioned by more fourth-grade teachers than eighth-grade teachers.

Lack of parent support or reinforcement (for example, with homework) and lack of parent involvement were two of the specific concerns cited. As one eighth-grade teacher put it on the survey, “Lack of parent commitment to assisting their students in being successful. They are unable to even check whether or not student has done homework.”

Another parent-related concern that was mentioned by some of the fourth-grade teachers had to do with negative attitudes about mathematics. For example, one teacher wrote that one of her biggest obstacles was, “Students believing what they hear from parents, other teachers, etc. that math is ‘hard’ or ‘boring’.” Similarly, a teacher at a different school wrote, “Parents that tell their children, ‘I was always bad in math.’”

As with student behavior and motivation, some might assume that these parent-related obstacles are ever-present, insurmountable, and unrelated to mathematics instruction. However, there may be programs and policies that can help. One fourth-grade survey respondent did mention an activity involving parents as being a policy that had *helped* her mathematics teaching: “Family Math nights.” An eighth-grade teacher who was interviewed also identified Family Math as being one of the major things that would help him improve his mathematics instruction. Increased communication with parents and other types of programs aimed at fostering increased parent knowledge about and involvement in their children’s mathematics education might also be successful.

Language Differences

Remarkably few teachers indicated that language differences presented a major obstacle to their mathematics teaching.

Some teachers at both grade levels did express a concern about dealing with students’ language differences. “Most students speak limited English; they can’t read word problems,” put one eighth-grade teacher as an obstacle on the survey; a fourth-grade teacher, meanwhile, wrote, “English language use with LEP students in an all-English class.”

However, given the high proportion of English language learners in the surveyed districts and the passage of Proposition 227, the number of teachers who indicated that language-related factors were among their biggest obstacles—3.8% of fourth-grade teachers and 5.4% of eighth-grade teachers—was remarkably small. The relative scarcity of teachers’ comments about language barriers was not a result of English language learners being underrepresented in the classes of responding teachers; to the contrary, English language learners were quite well represented in the survey sample. In 9 of the 11 districts for fourth grade and 7 of the 11 districts for eighth grade, the average percentage of English language learners in the responding teachers’ classes⁵ exceeded the average for the district as a

⁵ These figures were based on teachers’ self report on the survey, dividing the number of English language learners they reported being in their class by the total number of students they reported being in their class. Only teachers who gave counts for both were included in the calculations.

whole.⁶ Moreover, the average percentage of English language learners reported by responding teachers across all 11 surveyed districts slightly exceeded that of the state as a whole.⁷

Most teachers who were interviewed indicated that they do attempt to address the needs of English language learners during mathematics instruction in some way. For example, they said that they speak slowly, repeat directions, make extensive use of visuals, attend particularly to vocabulary, or provide assistance as needed on an individual basis.⁸ Others said that they have translators or bilingual aides who help the English language learners; some of the teachers said they themselves are able to translate for the students when necessary, or that they allow the students to write or speak in their native language. In addition, a few of the observed classes were taught partially or primarily in students' native language, these students having received waivers from Proposition 227. On the other hand, some teachers who were interviewed said that their English language learning students were sufficiently English-proficient to need no special provisions during mathematics instruction.

In the Next Chapter

This chapter, along with several of the preceding chapters, identified some of the challenges that teachers face in their efforts to implement effective mathematics instruction. We have also seen that there do not appear to be any “magic bullets” for the improvement of student mathematics achievement. The next chapter builds on all of the findings presented in this report to discuss implications and recommendations for policy.

⁶ From the Education Data Partnership web site

⁷ The average for the classes of responding fourth grade teachers was 33%, and the average for the classes of responding eighth grade teachers was 28%. In the state as a whole, 27.4% of students are reported as being English language learners. All of these figures are for the 1998-1999 school year, when the survey was conducted.

⁸ Classroom observers, however, were not always able to confirm that such strategies were in place or that English language learners' needs were truly being met.

(This page intentionally left blank.)