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ABSTRACT

The Study of Academic Instruction for Disadvantaged Students explored the nature and effects of alternatives to conventional practices in mathematics, reading, and writing instruction in schools that serve high concentrations of children from low-income backgrounds. This report presents what was learned by describing and analyzing instructional practices in approximately 140 first- through sixth-grade classrooms in 15 high-performing elementary schools across 6 districts in 3 states. Findings dispel the myth that academically challenging work should be postponed until children of poverty have mastered all relevant basic skills. The alternative practices studied helped children connect their academic learning with the world outside school. More often than not, teachers combined conventional modes of instruction with alternative practices. The challenge for teachers is not to discard what they have been doing, but to expand their repertoires to teach a more challenging curriculum. Local and state policymakers can play a key role by doing whatever is necessary to support educational goals. The Federal Government can exercise leadership, particularly in promoting professional development. The overall conclusion is that instruction that emphasizes meaning and understanding has proved its worth. Findings are summarized in 72 tables, 1 exhibit, and 4 figures. (SLD)

Study of Academic Instruction for Disadvantaged Students

ACADEMIC CHALLENGE FOR THE CHILDREN OF POVERTY

Volume 1: Findings and Conclusions

1993

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Volume 1: Findings and Conclusions

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OVERVIEW AND INTRODUCTION

In the first part of the report, we introduce the study and highlight its major findings and conclusions. To facilitate the reader's ability to focus on what we found, we present a "Summary and Conclusions" chapter first, which attempts to synthesize findings from all other chapters in the report. Findings are cross-referenced to pertinent chapters, to help the reader locate the more extended analyses and discussions of findings.

Following that, two chapters provide an introduction to study themes, questions, and design (Chapter I); and an overview of the districts, schools, and classrooms that we studied (Chapter II).

SUMMARY AND CONCLUSIONS

Educators and policymakers have long been concerned about the education of children from low-income families. That concern has come to a focus in recent years as reformers have drawn attention to issues of educational quality and the continuing inequities in schooling in America. In the view of many educators, the nation cannot afford to ignore questions regarding the quality of the academic instruction made available to economically "disadvantaged" children.

This report describes what has been learned from a major federal investigation of classrooms serving the children of poverty.* The Study of Academic Instruction for Disadvantaged Students explored the nature and effects of alternatives to conventional practices in mathematics, reading, and writing instruction in schools that serve high concentrations of children from low-income backgrounds.

The study addressed four primary questions regarding the content, conduct, and effects of instruction in schools serving high concentrations of children from low-income families:

(1) How--and how much--does mathematics, reading, and writing instruction in schools serving the children of poverty reflect new research-based ideas about imparting advanced skills and challenging content?

(2) How do teachers manage the academic learning environment and respond to differences in student background? How do special programs supplement instruction in the regular classroom to accommodate diverse student populations?

(3) Which approaches to instruction in the three subject areas show promise for boosting students' mastery of advanced as well as basic skills? Do alternatives to conventional practice contribute as effectively to student learning as more traditional approaches?

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* This Summary and Conclusions chapter appears, in a somewhat elaborated form, as a separately bound Summary Report.

(4) What factors in the school, district, and state context support or inhibit the introduction of alternative instructional approaches?

The report answers these questions by describing and analyzing instructional practices in approximately 140 first- through sixth-grade classrooms located in 15 elementary schools that serve large numbers of children from low-income families. To increase the likelihood of identifying a variety of effective practices, schools within six districts across three states were chosen that had attained better-than-average performance on conventional measures of academic achievement. Within the schools, teachers were selected at each grade level to represent variation in approach to mathematics, reading, and writing instruction. (See the Appendix for a review of study sample and methods.)

In this summary section, we provide an overview of the answers to the primary research questions. Readers wishing further detail should turn to the chapters in the report, as indicated throughout the summary.

Alternatives to Conventional Practice

Recent research and a growing body of evidence from demonstration programs suggest that academically challenging learning experiences can benefit the children of poverty, who are at greater risk of academic failure than their more affluent peers. In the typical elementary school, however, these students encounter instruction that is repetitive, uninspiring, and limited to "the basics."

Current practice reflects, in part, a widely accepted "conventional wisdom" about the best ways to teach in such settings. These approaches emphasize curricula that proceed in a linear fashion from the "basics" to "advanced" skills (but seldom reach the latter), instruction that is tightly controlled by the teacher, and ability grouping that often becomes permanent tracks at an early age. "Good" instruction is that which keeps children at work on academic tasks. Children who fail to keep up are targeted for reteaching and extra practice with discrete skills, often through a supplemental instructional program. Although these approaches may improve children's grasp of basic skills, they appear to shortchange the learning of more advanced skills in comprehension, reasoning, and composition. We observed a good deal of teaching that followed this "conventional wisdom," much of it apparently successful at the goals for which it was designed. In fact, across the sample of classrooms, the most common pattern of instruction was based on conventional premises (described in Chapters III, VI, and IX, for the three subject areas).

We describe below the alternatives to conventional practice that we encountered among the sample classrooms. Following that, we explore the relationship between these alternatives and the way teachers managed the academic learning environment and responded to differences in student backgrounds. Finally, we summarize what we have learned about the role of supplemental instruction in relation to these alternative patterns of instruction.

Teaching for Meaning and Understanding (Chapters IV, VII, X)

Rather than study any particular technique or approach to instruction, we focused on certain core features shared by a variety of approaches. As summarized in Exhibit 1, the alternative ways of teaching mathematics, reading, and writing we found had three features in common:

- *Emphasis on meaning and understanding.* Alternative approaches in each subject gave priority to understanding and meaning--for example, by helping students to comprehend what written text said "between the lines," communicate in writing thoughts that an audience would care to know, or understand what mathematical procedures meant and how they could be used to tackle unfamiliar problems.

- *Embedding skills in context.* In each subject area, alternative approaches deemphasized (but did not abandon) the teaching of discrete skills out of the context in which these skills were applied, that is, apart from their appearance in written text, in the act of composing, or in problems that could be solved with mathematical tools.

- *Connections between subject areas and between school and life outside of school.* Finally, in each subject area, alternative approaches stressed the connections between one subject area and the next and between what was learned in school and children's home lives.

The classrooms we studied varied in the degree to which they embraced these alternative principles. At one end of the continuum in each subject area, classrooms departed little or not at all from the conventional wisdom described above. In classrooms that departed the most from conventional practice, the curriculum, the nature of academic tasks, and teachers' ways of delivering instruction looked considerably different from the basic-skills-oriented curriculum and direct teaching style that typified conventional classrooms.

The principles underlying alternative approaches to instruction mean somewhat different things in the three subject areas we studied. *In mathematics, the hallmark of alternative practices was the range of mathematical topics other than arithmetic included in the curriculum and the degree of emphasis placed on conceptual understanding.* Instruction in classrooms that departed the most from conventional practice comes close to the goals of current reform movements in mathematics reflected in the National Council of Teachers of Mathematics' *Curriculum and Evaluation Standards for School Mathematics*. Such classrooms differ a great deal from instruction in which arithmetic computational skill is the overriding or sole focus.

In reading, classrooms that departed the most from conventional practice adopted strategies aimed at maximizing children's understanding of what they read--for example, by increasing the amount of time children spent actually reading text, by explicitly teaching comprehension strategies, and by providing children opportunities to discuss what they were reading. In classrooms in which these strategies were most in evidence, reading instruction was typically part of an integrated language arts curriculum. In some cases, what teachers did was based on "whole language" philosophies, but few of the classrooms we studied would be considered exemplars of "whole language" teaching. Virtually all the reading teachers devoted a substantial amount of time to teaching reading mechanics skills in one way or another. The distinguishing features among classrooms were the other learning experiences students encountered in reading instruction, as well as the way in which skill learning was (or wasn't) connected to reading itself.

Exhibit 1

CONVENTIONAL AND ALTERNATIVE APPROACHES TO MATHEMATICS, READING, AND WRITING INSTRUCTION IN THE SAMPLE CLASSROOMS

Practices That Follow "Conventional Wisdom" Most Closely	Practices That Depart the Most from Conventional Wisdom
Mathematics Instruction	
• Focus on arithmetic to the exclusion of other mathematical topics	• Focus on multiple mathematical topics
• Primary or sole goal of teaching computational skills	• Emphasis on conceptual understanding and applications in addition to skill building
Reading Instruction	
• Focus on reading mechanics taught out of context	• Reading mechanics taught in context
• Little time for reading text	• Extensive opportunities for reading text
• Separation of reading from writing	• Integration of reading and writing
• Little teaching of comprehension strategies or focus on comprehension beyond literal meaning	• Explicit teaching of comprehension and focus on deeper understanding of text
• Little or no attempt to discuss reading and extend knowledge	• Regular opportunities to discuss reading
Writing Instruction	
• Little or no writing of extended text	• Extensive writing of extended text
• Separation of reading from writing	• Integration of reading and writing
• Emphasis on language mechanics skills taught out of context	• Language mechanics taught in context
• Little attempt to teach the process of writing	• Explicit teaching of the writing process
• Little or no interaction allowed among children in connection with writing	• Interaction encouraged among children in connection with writing

In writing, the most important difference among classrooms had to do with the amount of composed "extended" text that children wrote in the classroom--that is, stories, reports, essays, or other forms of text that allowed children to express their thoughts in an elaborated form, as contrasted with "restricted" text such as fill-in-the-blank exercises, copying, or short sentence answers to questions on a worksheet. In classrooms that had a great deal of extended writing, teachers tended to use a variety of instructional strategies that maximized students' opportunities for meaningful written communication. These strategies parallel those noted above for reading instruction and generally reflect the attempt to integrate the teaching of language arts. They depart considerably from conventional practice characterized by a focus on the mechanics of writing (spelling, grammar, punctuation rules, etc.) with relatively little practice in writing text.

Curiously, what teachers in our sample did in one subject area tells relatively little about what they did in another. *Few teachers were engaged in instruction that departed substantially from conventional practices in more than one of the three subject areas.* Whereas more than half of the sample teachers engaged extensively in alternative forms of teaching in one of the three subject areas, only 15 percent did so in two, and only 3 percent did so in all three. In effect, teachers specialized. It was not unusual to visit a classroom in which writing lessons were filled with extended text writing and associated learning experiences, to be followed by the most mundane forms of skills-oriented mathematics instruction. Conversely, classrooms in which multiple mathematics topics were taught with an emphasis on conceptual understanding were sometimes the same classrooms in which reading instruction was filled with skills dittos and oral reading at the literal level only. There was simply too much to know for teachers to master difficult new ways of teaching in all areas of the curriculum. Extra effort in one subject area often left less energy--and even less classroom time--for other subject areas.

Managing the Academic Learning Environment (Chapter XII)

For the instructional strategies described above to be effective, students must be engaged in appropriate academic tasks. Teachers in schools serving the children of poverty typically find this to be a tall order, for reasons that include both the nature of the schools serving these children and the characteristics of the families and communities from which they come.

The teachers in the study sample had varying degrees of success in establishing and maintaining classroom order that sustains academic learning. Judged initially in terms of the consistency of student engagement in academic tasks, the teachers' efforts resulted in three distinct kinds of academic learning environments:

- *Dysfunctional learning environments*, characterized by a constant struggle to maintain order that overshadows attention to academic work. In such environments, relatively little sustained academic work takes place.
- *Adequate learning environments*, characterized by a basic level of control by the teacher, but with a continuing struggle over order. Some academic work takes place, but distractions are frequent.
- *Orderly learning environments*, characterized by an effective management system that results in keeping most or all students seriously engaged in academic work.

The majority of the teachers we studied fell into the third category, but a further distinction among them is important:

- *Orderly, restrictive learning environments*, found in smoothly run, highly structured classrooms, with tightly managed routines and a relatively narrow range of instructional strategies.
- *Orderly, enabling environments*, found in smoothly run classrooms with an often looser (though not loose) structure and a wider range of routines and instructional strategies in evidence.

The latter group of classrooms had a more comfortable feel to them and were characterized by a "spark" or enthusiasm for learning that the former lacked.

Across these categories of classroom, teachers displayed different basic management styles (e.g., how they dealt with disruptions, established classroom routines, or held students accountable for work) and made different choices about the subject matter they were teaching (e.g., how they motivated students in each subject area, paced instruction, or fostered student responsibility for learning).

Teachers' management styles and choices about subject matter were closely linked to their decision whether or not to emphasize meaning and understanding. Teachers who established "orderly, enabling" learning environments were the most likely to orient their instruction (in at least one subject area) toward meaning and understanding. (Such teachers did not change their basic way of managing the learning environment when they switched to other subjects, however conventional their learning goals, choice of academic tasks, or way of presenting lesson material.)

Although the nature of the academic learning environment in a classroom and the teacher's approach to a particular subject area are hard to separate, they are not one and the same. Some of the teachers in our sample who emphasized meaning and understanding in mathematics, reading, or writing did not manage to establish an orderly environment in which to learn. Conversely, some classrooms with orderly, enabling learning environments did not place high priority on meaning and understanding. In short, the teacher's approach to a particular subject does not guarantee a certain quality of learning environment, nor does the quality of the learning environment necessarily imply a particular teaching approach.

Responding to Differences in Students' Backgrounds (Chapter XIII)

Reflecting the mix of cultures and social classes in the school attendance area, classrooms presented teachers in the study sample with children who came from a variety of backgrounds. In some cases, the classroom was fairly homogeneous, as in the case of several all-white and all-African-American classrooms in which every child received a free or reduced-price lunch. More often, the classrooms were more diverse, combining children from low-income and more affl·‹nt families and from two or more distinct cultural groups. In virtually all cases, the social and cultural (although not necessarily racial) backgrounds of most children in the classroom differed from that of the teacher.

Teachers responded to these differences in various ways, ranging from approaches that actively excluded children from learning opportunities because of their backgrounds (e.g., in one classroom, not giving Hispanic children the chance to read aloud because they "might be embarrassed" in front of the Anglo children, who were generally better readers) to attempts to use students' backgrounds as a positive basis for learning in the classroom (e.g., in another classroom within the same district, choosing a novel about Hispanic migrant children as the centerpiece of a month's work in English and building a variety of learning experiences around this theme).

Our data indicate that *the nature of a teacher's responses to student differences is clearly linked to both the teacher's choice of instructional approach and the degree of student engagement in learning.* Teachers who took active, constructive steps to connect learning to students' backgrounds were much more likely to have chosen alternative approaches to teaching reading, writing, and mathematics. This finding is not surprising; by focusing on understanding and meaning, teachers were building a bridge between children's knowledge base and the academic learning experience, which was unlike the home experiences of many students.

By connecting instruction more closely to children's home experiences, language arts teachers were also able to achieve higher levels of engagement in academic learning (the finding does not hold for mathematics, however; there, levels of engagement were approximately the same--and relatively high, on average--regardless of the extent of connection to students' backgrounds).

Supplementing Instruction in the Regular Classroom (Chapter XIV)

The contributions of supplemental programs (such as Chapter 1, special education, and various locally funded efforts) to the academic instruction offered the children of poverty are mixed and highly varied. In the study sample, each classroom presented a nearly unique configuration of supplemental services. Nonetheless, several overall observations can be made.

Supplemental instruction is a ubiquitous resource to the classroom teacher in the schools we studied. Children in nearly four-fifths of the sample classrooms received some form of supplemental instruction in language arts; half of the classrooms had some form of supplemental mathematics instruction. Almost two-fifths of the students in the study sample participated in one or more of these programs. More often than not, these services were offered within the regular classroom (chiefly by in-class instructional aides, but also by specialists in a quarter of all the language arts classrooms we studied). Approximately two-fifths of the classes had some form of supplemental instruction taking place outside the classroom, almost always taught by a specialist in a pullout room.

The most common role of supplemental instruction is to reinforce basic skills instruction: this is nearly universal in the reading and mathematics pullout rooms we observed, and is also the case in three-fourths of the in-class work. Basic skills practice is not the only thing done in a given supplemental class; in half the observed mathematics pullout classes, for example, some attempt was made to get at conceptual understanding. The basic skills focus of most supplemental instruction reflects a variety of factors, among them the capabilities of supplemental staff and the belief held by some specialists in this focus of instruction. Our qualitative data suggest that a basic skills focus is especially common in Chapter 1 instruction, which in these schools typically aims to remedy children's specific skill deficits.

In some schools, however, we found supplemental instruction that was at the forefront of the school's ventures into alternative practices. Here, the specialist teachers were sometimes important resources for the professional development of classroom teachers. They offered demonstration lessons, team teaching, and new materials that could extend the repertoires of those classroom teachers who were interested (Chapter 1 funding supported this approach in one district; local supplemental funding did so in two others).

Most supplemental dollars do not go into professional development or leadership, however, but into special help for selected students. *For those targeted programs, including Chapter 1, the connections between supplemental and regular instruction vary with staffing decisions, scheduling, and intangible factors such as the interpersonal "chemistry" among staff.* We found a trade-off between the qualifications of program staff and the closeness of the relationship: instructional aides typically did what the classroom teacher asked them to do (although there were exceptions), while the specialist teachers might or might not synchronize their lessons with the classroom program or communicate with the regular teacher about students' progress. Schools sometimes facilitated communication through scheduling arrangements, but the match or mismatch in teachers' professional philosophies made a difference as well.

Whatever else it accomplishes, the presence of supplemental instruction creates or encourages different curricula for students of varying achievement levels. In most of the schools, what supplemental instruction does best is to sort students by their prior achievement and presumed potential, offering something different to those who do not quite measure up. *Overall, the contribution of supplemental programs to instruction aimed at meaning and understanding appears to be uneven.* To the extent schools favor the goals of this approach to instruction, there is a need to rethink how supplemental programs can make the greatest contribution.

Outcomes of Instruction That Emphasizes Meaning and Understanding

The variation in approach to mathematics, reading, and writing instruction among the 140 classrooms we studied enabled us to examine the relative effectiveness of the different approaches, while controlling statistically for differences among classrooms that might influence outcomes. For simplicity, we summarize here the principal findings by contrasting classrooms placing the least emphasis on meaning and understanding (approximately a third of the sample for most analyses) with those that placed the most (between a quarter and a third for most analyses).

The study results answer questions of instructional effectiveness in three ways. First, for each year of the study and across 12-month periods of time (e.g., fall to fall, spring to spring), we assessed the relative associations between each type of instruction and measures of mathematical understanding, problem-solving ability, reading comprehension, and competence at written expression. Second, measures of mathematical computation, reading mechanics skills, and the mechanical correctness of written text provided a way of assessing the relative contribution of each classroom type to students' mastery of basic skills. Third, by comparing results separately for students in the lowest third of the overall achievement distribution with those in the highest third, it was possible to determine whether the associations between outcomes and instructional approaches depended on the students' initial levels of achievement.

Capacity to Understand, Reason, and Compose (Chapters V, VIII, XI)

Short Term Outcomes (Fall to Spring)--There is evidence that *students exposed to the instruction that emphasizes meaning and understanding in each subject area are likely to demonstrate a greater grasp of advanced skills at the end of the school year.* Children receiving instruction focused on multiple mathematical topics and conceptual understanding performed significantly higher in advanced mathematical skills [e.g., in Year 1 between 6 and 7 Normal Curve Equivalents (NCEs) on a standardized test of thematical understanding] than their counterparts in classrooms in which conventional practice prevailed--that is, which focused on arithmetic skills only. Similar differences appear with regard to results on a test of mathematical problem-solving ability. The evidence was not so strong in the second year, though also in a positive direction. We found comparable results for reading comprehension and competence at written expression.

These results represent the difference in learning outcomes at the end of each school year, controlling for initial differences in students' level of poverty and achievement. Put another way, the analysis identifies the increment of students' performance that can be attributed to the instructional approach, once initial differences among students are taken into account.*

In writing, the results are replicated across years in the study, whereas in mathematics and reading the effects are not equally strong in both years. There are various possible explanations for this fact, among them the uneven implementation of alternative forms of instruction in the second year (for example, when one controls statistically for differences in teachers' background or general proficiency at managing instruction, the end-of-the-year difference in mathematics outcomes increases and reaches statistical significance).

Our findings mask some important differences between grade levels (although given the relatively small number of classrooms per grade, our ability to identify clear grade-by-grade differences is somewhat constrained). In mathematics, for example, effects of alternative forms of instruction on the mastery of advanced skills appeared to be less pronounced in the upper elementary grades.

Longer-Term Results (Fall to Fall, Spring to Spring)--*The evidence regarding the retention of learning over a 12-month period (thus including the summer months) tells a similar story, although the results are slightly more mixed.* Across the 12 months from fall to fall, students exposed to instruction aimed at meaning and understanding performed significantly better than their counterparts exposed to conventional instruction in two of the three subject areas (mathematics and writing). Parallel analyses across the 12 months from spring of the first year to the following spring reveal, in all three subject areas, positive differences that favor students exposed to instruction aimed at meaning and understanding, in one instance (writing)

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* Readers should bear in mind that this study is not reporting average NCE gains from pretest to posttest, as is typically done in Chapter 1 evaluations. Instead, our NCE figures represent the differences between the posttest scores of students receiving different forms of instruction, controlling for differences in pretests and poverty level at the beginning of the year.

statistically significant and in another (reading) narrowly missing significance. These analyses must be viewed as somewhat inconclusive, however; findings across both 12-month periods are seriously hampered by possible attrition biases resulting from the loss of more than half the Year 1 students from the Year 2 sample.

The 12-month findings leave open the possibility that the results of instruction aimed at meaning and understanding are in various degrees susceptible to "summer fall-off." That fact does not negate the positive effects of such instruction across the school year, but it raises questions about the importance of additional educational support over the summer months and also about the value of continued exposure to alternative instructional practices across years. We were unable to explore the impact of sustained exposure to instruction aimed at meaning and understanding, because so few of the students from Year 1 who had experienced this kind of instruction ended up in classes the following year with comparable instructional experiences.

Because the size of effects is modest for most outcome analyses, it is worth asking whether the instructional approaches we have studied are helping the children of poverty very much. Our conclusion is that statistically significant group differences in the range of +1.4 to +6.4 NCEs are noteworthy and educationally important. In demonstration or experimental studies, considerably larger effects have been reported, but in such settings results can be demonstrated by experimental methods that permit a large number of relevant factors to be controlled. The results from this study are correlational: they indicate that when a variety of other relevant variables are taken into account, the instructional approaches we have been studying have consistent, positive associations with outcomes. They do so even when numerous other variables known to be related to learning (e.g., teacher expectations) are inconsistently or not at all linked to outcomes (see "Other Influences on Outcomes" below). The fact that instruction aimed at meaning and understanding has consistent effects in such circumstances strikes us as educationally significant.

Mastery of Basic Skills (Chapters V, VIII, XI)

Outcome data for assessing the effects of instruction on children's grasp of basic skills are somewhat less complete than for investigating effects on understanding, reasoning, and composing skills: measures of basic skills attainment were available for only one of the two years in mathematics and reading and, in the latter case, only for children in the lower three elementary grades. Nonetheless, some patterns of association can be discerned in the available data.

Overall, there is evidence that alternative practices do not impede the mastery of basic skills and may facilitate it. In mathematics, children extensively exposed to alternative practices performed substantially better on measures of computational ability than students being taught arithmetic skills only--the very skills that were tested. In reading and writing, extensive exposure to instruction aimed at meaning and understanding generally produced positive differences in all but one instance (word attack skills in Year 1), although these differences were not statistically different from zero at the .05 level. At the least, children's learning of basic skills was no worse in classes that departed from conventional practices than in those that were oriented more toward curricula emphasizing basic skills learning.

Additional analyses indicated that a single-minded pursuit of basic skills instruction in writing through heavy doses of instruction in discrete language mechanics skills does not significantly improve students' grasp of *basic* skills. In reading, however, there is some evidence that such instruction does boost basic skills scores, at least in the early grades.

Differences Between High- and Low-Performing Children (Chapters V, VIII, XI)

Alternative approaches to mathematics, reading, and writing instruction may not make so much sense in schools serving the children of poverty if they work well for only the brightest children in these schools. To discover whether this was the case, we divided the overall student population into thirds based on levels of achievement at the beginning of the school year and then ran parallel analyses for each third.

The results present clear evidence that alternative practices work at least as well for low-performing as high-performing students. In all three subject areas, instruction aimed at meaning and understanding appeared to work as well for students at the low end as those at the high end of the achievement distribution. In both years, the incremental difference attributable to alternative practices is positive for both groups, and in half the instances it is statistically different from zero at the .05 level. The weight of evidence thus inclines toward the assertion that, on average, after initial differences among them are taken into account, *low-performing children increase their grasp of advanced skills at least as much as their high-achieving counterparts when both experience instruction aimed at meaning and understanding.* And for both groups, this approach to instruction produces results superior to those of conventional practices.

Other Influences on Outcomes (Chapters V, VIII, XI)

We considered other factors that might influence results, both because they might offer alternative explanations for the apparent effects described above and because they might provide important insights into the components of effective practice. We did so by running outcome analyses with additional variables in the equation--regarding instructional time, attention to discrete basic skills, the teacher's general proficiency at managing instruction, and other background characteristics of the teacher.

These analyses indicate that the association between approach to instruction and students' capacity to understand what they read, reason mathematically, and compose is largely unaffected by the presence of these variables in regression equations. In other words, it appears that *the results we have described cannot be accounted for solely by the amount of* *time spent in instruction, the attention paid to discrete skills teaching, or various characteristics of the teachers.* At the same time, many of these variables are themselves significantly linked to variation in outcomes and in directions one might expect. In particular, the amount of time spent in instruction is positively associated with outcomes, as is the teacher's general proficiency in managing instruction. Interestingly, the amount of instruction in basic skills (which alternative-approach teachers did in varying degrees) was also positively linked to outcome scores.

Independent of instruction in any given year, characteristics of the students themselves are also powerful predictors of achievement outcomes. In all our analyses, two factors--poverty level and initial achievement level--are consistently and powerfully linked to outcome scores (and, in statistical terms, they account for most of the variance in outcome measures). This result is hardly surprising; decades of educational research have uncovered similar associations. In other words, children's learning reflects the influence of various factors linked to poverty level (e.g., differential access to school resources, variable home support for learning, lack of familiarity with the culture of the school, inadequate nutrition) and initial achievement (e.g., the cumulative effect of inadequate teaching in earlier years, lower levels of innate ability, self-images of the learner from a low-income background, a developing pattern of resistance to the culture of the school).

The Environment for Academic Instruction in Schools, Districts, and States

In light of the promise that teaching for meaning and understanding holds for the children of poverty, it is important to examine the conditions that support teachers' adoption of such instructional techniques. With rare exceptions, we found that teachers in our sample were strongly influenced in what they taught and how they taught by forces outside the classroom door. There are real differences across schools, districts, and states because conditions and policy choices at these levels enhance--or constrain--what teachers are able to do in the classroom.

We explore below the major forces that explain instructional differences among schools and districts and discuss implications for the adoption of instruction emphasizing meaning and understanding.

Explaining Differences Among Schools and Districts (Chapters XV, XVI)

There are big differences among schools within the sample in the percentages of classrooms that were extensively engaged in alternative practices. Take, for example, Schools 1 and 12: the two present nearly opposite profiles, with the former exhibiting high percentages of teachers engaged in alternative practices in all three subject areas and the latter with practically none so engaged. In between these extremes, schools often are characterized by a specialty subject, as in the case of School 3, which has made writing a major focus of its curriculum, or School 10, which houses a mathematics and science magnet program. In each of these two schools, high percentages of teachers are engaged in alternative practices in writing or mathematics but not in the other two subject areas.

At the district level, too, differences in the aggregate profile of instructional practices show up. This is not to say that all schools within these districts are similar to one another. For example, the two schools in our sample from District 1 have nearly identical profiles with regard to reading and writing instruction but are nearly opposite in mathematics instruction.

Why do alternative practices in a particular subject area take root in some school settings but not in others? The answers include two sets of factors. The first reflects the demography of students and teachers (see Chapter XV for an extended discussion of this set of factors). On average, classrooms with higher levels of poverty and larger classes are slightly less likely to have instruction that departs from the conventional wisdom (this fact may reflect a number of things, including the assignment of teachers to classes based on policy-level assumptions about what's "good" for certain types of classrooms). In addition, over time, certain schools may attract and retain teachers with compatible instructional philosophies.

The second set of factors stems from the interaction of school, district, and state policies. *Policymakers' choices about appropriate teaching and learning and how to support them collectively affect an individual teacher's actions in the classroom.* Sometimes, all these forces push a teacher in a single direction, as in the case of a new teacher who found herself in a district that placed very little emphasis on writing instruction and mandated the teaching of reading through a structured phonics-based program. Furthermore, the principal insisted on quiet, orderly classrooms. Although the teacher had been trained in whole-language approaches and started the year emphasizing active student learning, she eventually yielded to the pressures and altered her style of teaching to bring it more in line with conventional practices. Sometimes the forces were all aligned in the opposite direction, as in another school in which the principal, resource specialists, district mandates, and the state framework and assessment practices all encouraged teachers to teach language arts with emphasis on meaning and understanding.

More typically in the classrooms we visited, policies were not so clearly aligned to support--or inhibit--particular practices, and most teachers received mixed signals about what to teach. Accordingly, they based their decisions about curriculum and instruction on various factors, among them the nature of the students they were teaching and their beliefs about them, the extent of their preparation and knowledge in the subject area they taught, and their own personal predilection to take risks (see Chapter XV).

Our analyses suggest that it is not easy for policymakers to create the conditions necessary for teachers to adopt alternative instructional approaches, especially when such approaches depart significantly from a teacher's own training and experience. Three areas of policy over which educational decisionmakers have control seem to be especially important:

- *Pressure for change in instructional practices.* Various forces in the school setting could exert pressure on teachers to adopt--or avoid--instruction aimed at meaning or understanding, among them the prevailing philosophy of school instructional leaders, district curriculum mandates, state curricular frameworks, and assessment policies at all levels. In settings where hierarchical control was emphasized, these pressures could be difficult for teachers to ignore.

- *Professional autonomy.* Teachers embarking on new approaches to instruction typically did so in settings where they felt some degree of autonomy--that is, room to experiment without feeling that they would be called to immediate account. School and district leaders could do much to grant this autonomy to teachers or, on the other hand, to deprive them of it. Of course, some teachers were more likely to strike out on their own regardless of external constraints, and such innovators were among the teachers in our sample who sought to orient their teaching toward meaning and understanding. Nonetheless, many others needed the permission that some principals and district officials granted before experimenting with alternative practices.

- *Professional support.* Schools and districts could support their teachers in various ways, and many did--chiefly through moderate levels of professional development and other forms of technical assistance, and sometimes in the form of needed instructional resources (e.g., manipulatives for mathematics instruction). Support ranged from formal activities such as workshops to informal advice and collegial assistance. Although few schools in our sample could be said to provide sustained high levels of support for all teachers, there was nonetheless a range from schools that were generally supportive of alternative practices to those that actively discouraged such practices.

Adopting instructional strategies that emphasize meaning and understanding typically means that teachers must fundamentally rework their conceptions of the subject they are teaching and their approaches to it. Mandating changes without giving teachers considerable professional support and the flexibility to adapt the mandate to their particular circumstances can often be counterproductive. In such instances, many teachers become confused and embark on new approaches without understanding them, resulting in ineffective teaching. Study findings suggest that *policymakers have to find a balance between pressuring teachers to change their practice and providing sufficient professional autonomy and support to make that change meaningful and appropriate.*

What the Study's Results Mean

It is time to take stock of what we have learned and what it means in the larger picture of education for the children of poverty. What do our results say about instruction that is effective for this segment of the nation's student population? Does adopting alternative approaches mean abandoning conventional modes of instruction, which, after all, have accomplished impressive gains in certain areas of learning? What do our findings imply for the roles of policymakers at the local, state, and federal levels who wish to establish and sustain more challenging instruction for the children of poverty? These are among the questions that call for reflection.

Identifying What Is Appropriate for the Children of Poverty

Because we have not examined comparatively the impact of instruction on students from affluent and low-income backgrounds, we have no empirical way to determine whether the practices we have been studying are uniquely suited to the children of poverty. But we can comment on the appropriateness of teaching for meaning and understanding for the segment of the population on which this study has concentrated.

Above all, our findings dispel one kind of myth that has been around for a long time regarding the children of poverty: that, because of their presumed or apparent deficiencies in relevant skills, academically challenging work should be postponed until they are "ready," that is, until they have mastered all relevant basic skills. Needless to say, that time of readiness may never arrive for many children.

In fact, it is plausible that the alternative practices we have studied are <u>especially</u> appropriate for the children of poverty because, in cultural and social terms, they tend to live apart from the mainstream of American society. In the classrooms we studied, these practices help children connect their academic learning with the world they know outside the school, a world in which the routines, activities, and discoveries of the classroom often seem out of place. Alternative approaches to writing, for example, give children from these backgrounds numerous avenues of expression they would otherwise be denied. Strategies aimed at maximizing understanding in reading encourage children to get behind the literal meaning of words to deeper understandings. These are important opportunities for disenfranchised groups--there is much in their world that is hard to make sense of. The more chances and tools they have to do so, the better.

Expanding Teachers' Instructional Repertoires

Although instruction aimed at meaning and understanding reflects a rejection of many conventional premises for instruction, teachers in the study sample did not typically view themselves as choosing between incompatible pedagogical philosophies. More often than not, teachers combined conventional modes of instruction with alternative practices. For example, many teachers who taught multiple mathematical topics with emphasis on conceptual understanding also gave students considerable practice in arithmetic computation. Reading teachers typically taught reading mechanics alongside activities that maximized understanding.

In part, this tendency to combine old with new reflects teachers' learning curve: it is easier to learn new approaches by incrementally adjusting or adding to an existing repertoire than to start afresh with a whole new set of instructional routines. But the pattern may also reflect a sensible approach to the student population under study. Even though it is clearly effective to have students do a lot of reading with a focus on comprehension, the need for practice with decoding does not disappear. Alternative approaches to reading stress the need to encounter, learn, and practice decoding in context--and we observed a great deal of this in the classrooms we studied. But given that many students in this population have clear weaknesses in basic reading skills, there still may be an important role for additional practice in decoding done the "old-fashioned" way. Our findings about discrete skills teaching in reading are especially suggestive of this need.

Instruction that emphasizes meaning and understanding does call into question many assumptions underlying the conventional practice--regarding the place of "basic skills" in the overall curricular sequence, the usefulness of focusing on complex tasks (writing, reading, unfamiliar mathematics problems) from early on, and so on. But the bottom line for the children of poverty may be that instruction which appropriately subsumes conventional practices within an instructional framework guided by alternative assumptions has the most to offer. *Thus, the prospect for teachers is not to abandon what they have been doing--and often doing exceedingly well--but to expand their repertoires to teach a more challenging curriculum.*

But expanding instructional repertoires is no guarantee of "better" teaching. It may seem from the study findings that basing instruction on alternative premises would lead teachers naturally to a mode of teaching that works better, in terms of the teachers' comfort level, students' engagement in academic learning, and the outcomes of instruction. However, our data make it clear that instruction aimed at meaning and understanding was implemented well in some instances and poorly in others. Thus, we saw numerous instances of "bad" alternative teaching across the 2 years of the study. In extreme cases, teachers lost control of their classrooms in search of a more flexible structure, greater student responsibility for learning, more opportunities for expression, or flexible grouping arrangements. For example, of the 23 classrooms studied intensively in Year 1 that engaged extensively in alternative practices for one or more subject areas, 4 had serious problems with basic levels of classroom order, and 2 were classified as "dysfunctional." (Of course, problems of classroom order were not unique to this group--two classrooms that taught all subjects in the most conventional way were also classified "dysfunctional.") More frequently, teachers attempting to put alternative principles into practice "got the words but not the tune"--that is, undertook new kinds of learning activities without understanding them or exploiting their opportunities for learning. Many, perhaps most, of the teachers categorized as "moderately" engaged in alternative practices taught their classes this way. Such teachers might ask probing comprehension questions to get at deeper meanings of a reading passage, while neglecting to listen, probe, or respond to students' answers.

Or they might use manipulatives, ostensibly to motivate students' learning arithmetic, without helping them make important conceptual connections (or even understanding the connections themselves). In writing instruction, extended composition tasks might be assigned or completed without any attempt at revision or even the realization by students that revision is part of writing.

Partial implementation of new practices is understandable as teachers struggle to master new ways of conceiving of the material they teach and new ways of orchestrating children's engagement with material. *But when many teachers think they understand alternative practices fully but grasp only part of the story, they may unintentionally defeat the very purpose they are trying to accomplish.* Gaining a fuller appreciation of these practices requires sustained professional support, as discussed below.

Creating Supportive Conditions in Schools, Districts, and States

If teachers are to expand their repertoires successfully, there is much that schools, districts, and states need to do. As noted above, the results suggest that a delicate balance must be struck among professional support, autonomy, and pressure for change in instructional practice. No one of these elements by itself is sufficient to create a fully supportive environment. It is obvious from our data, for example, that pressure for change from school instructional leaders, district policymakers, and state agency officials helped to encourage--sometimes, push--teachers to try new ways of teaching mathematics, reading, or writing. At the same time, mandates without considerable professional support were not particularly effective (as in District 4) or, worse, were counterproductive in the sense that some teachers embarked on an alternative instructional approach without understanding what they were doing and then simply assumed that they had mastered it.

Similarly, teachers need enough autonomy to experiment, but full autonomy over their instructional programs will not necessarily lead teachers to expand their repertoires successfully. Left to their own devices, a smaller percentage of the teachers in our sample would most likely have tried to incorporate alternative instructional approaches into their existing routines.

In the final analysis, the study team has no easy solutions to suggest for state and local policymakers interested in changing the process of teaching and learning in elementary classrooms. However, we conclude that *local and state policymakers can play key leadership roles in establishing clear goals, devising instructional strategies that are consistent with these goals, and providing resources and other support to put these strategies in place*. Importantly, such leadership and support must be combined with respect for the professional autonomy of teachers and school administrators, who ultimately will control what children are taught and how they are taught.

Reconsidering Governmental Roles in Academic Instruction for the Children of Poverty

Besides what has just been discussed, state--and especially the federal--governments have various ways of influencing educational practice that are profound and far-reaching, although the policy instruments available are indirect. *For example, government officials can exercise leadership in the national dialogue about education, and government programs can build capacity for understanding and addressing educational problems.*

In the area of leadership, a major trend on the national policy scene that is consistent with the message of this report is the move toward ambitious standards of achievement for all students. For example, the AMERICA 2000 plan now advocates "world-class" standards in academic subjects. Similarly, the National Council on Educational Standards and Testing urges the development of national curriculum standards and tests that would depart dramatically from the current de facto national minimum expectations for students. The Council's report argues that policymakers have done inadvertent harm to education by holding schools accountable only for students' mastery of basic skills--encouraging systems of curriculum and instruction that correspond to what we now call the conventional wisdom. The high standards now gaining endorsement by national policymakers would instead hold out much higher aspirations for schools, focusing to a greater degree on students' skills in conceptual understanding and reasoning.

To help build schools' and teachers' capacity to meet these high standards, federal and state governments have various options to consider. *One set of options aims to identify and disseminate new images of what can be done in classrooms.* Our study is one example of projects that could be designed to investigate effective instruction that departs from the conventional wisdom. Conferences and networking activities of various kinds can address a similar goal. Such projects can challenge the assumption that alternative practices are best suited to children from privileged backgrounds or children who show unusual promise. Indeed, much research and development on the education of "gifted" children might usefully be replicated with more diverse populations; we suspect that the results might show that an "enriched" curriculum works for all students.

In addition to drawing attention to promising alternatives for instructional practice, *government agencies have various ways to stimulate and promote professional development.* For example, some small federal programs, such as the Eisenhower Mathematics and Science Education Program, have teachers' professional development as their chief aim; various state programs have been developed with similar goals in mind. Even programs that do not target professional development as a primary purpose support various forms of professional development. Technical assistance networks provide another potential resource in this regard. Chapter 1, for example, supports federal contractors and state educational agencies to provide technical assistance, including assistance to teachers.

In this study, we found a few examples of supplemental programs (usually local programs rather than federal or state ones) supporting leadership in academic innovation within school buildings: some supplemental teachers were an important resource to their colleagues, making new materials available and modeling new teaching approaches in demonstration lessons. Our findings suggest that, among the options available to them, federal or state program managers can make it known that communication and collegial support among teachers is a valid use of program funds, and can encourage such use.

Finally, for decades, state and federal governments have influenced the capacities of schools and classrooms by providing supplemental resources for the education of targeted groups of students. As this study shows, this policy tradition is reflected in schools that have become adept at sorting students by their apparent deficits. The effects on instruction are mixed at best. In the schools we visited, supplemental programs--notably Chapter 1--are often bastions of the sequential, skill-based instruction associated with conventional practices. This is not the outcome sought by many policymakers, among them those at the federal level. The current Chapter 1 legislation, for example, emphasizes "more advanced skills" for students and mandates coordination between Chapter 1 instruction and the regular classroom program. *By reconsidering the ways in which resources for supplemental instruction are configured, state and federal governments may open up new avenues of instructional support that are now infrequently encountered.*

Avoiding a Formula for the Future

Our overall conclusion is this: *instruction that emphasizes meaning and understanding, as interpreted and implemented by the teachers we studied, has proved its worth.* Across a wide range of settings--and even in the absence of sustained support or focused promotion--these ways of conducting academic instruction have shown that they belong in the repertoire of teachers working with this segment of the student population. As such, they deserve the support of policymakers and curriculum designers responsible for the schools that serve the children of poverty.

The evidence favoring these approaches to instruction is not without important qualifications:

- *Our results come from a search for effective practice in better-than-average schools.* The conditions in "typical" or below-average schools serving children from low-income families may present less hospitable environments for the development of these approaches.

- *The clearest evidence about the outcomes of alternative approaches comes from fall-to-spring analyses.* There is some evidence regarding longer-term effects over a 12-month period, but it is less strong and possibly is influenced by sizable attrition biases across years in our sample.

- *Alternative approaches (sometimes in conjunction with more conventional teaching) appear to contribute to the mastery of basic skills in most cases, but not all.* The main exception in our data is reading among lower elementary-age children (our data on mastery of basic skills are less complete than we would like). To the extent that educators believe in the value of demonstrated proficiency with basic skills, then, they may wish to be cautious about abandoning instruction that contributes most directly to these skills.

- *Alternative approaches demand a lot from teachers; not all teachers will want, or feel prepared, to engage in these practices.* Policy-makers and those who support instruction should realize how much is required to make instruction of this sort work, plan support systems accordingly, and carefully consider the implications of policies that impinge on curriculum and instruction.

Given these qualifications and given all that is involved in according meaning and understanding a more central place in academic instruction for the children of poverty, *educators should resist making teaching for meaning and understanding the formula for the future.* There is nothing formulaic about the way the most successful teachers in this study approached their task. No checklist of behaviors, questioning styles, instructional strategies, or ways of connecting instruction to students' backgrounds exists--or could exist--that would bring teachers closer to the goal of offering the children of poverty an academically challenging learning experience in elementary school. This study's results are best thought of as a series of challenges to often unquestioned assumptions. As long as educators continually challenge these (and future) assumptions underlying their craft, the children of poverty will be well served.

I STUDY FOCUS AND APPROACH

Schools that serve large numbers of children from poor families face one of the most difficult tasks in education. Over the years, the teachers and administrators who staff these schools have learned to cope with high mobility among children, limited resources, inadequate facilities, and concentrations of children with diverse and hard-to-meet learning needs. Perhaps most difficult of all, these educators see children walk in the door each day who are not particularly well versed in the art of "doing school."

Most teachers try hard to make the best of the challenge before them; many wonder why it seems difficult to engage and maintain children's attention to learning tasks, communicate what often appears to be common sense, and show demonstrable achievement gains on conventional measures of learning. In doing so, these teachers often settle for a curriculum that aims at the most "basic" elements of the content to be learned, on the assumption that no more can be managed and that even mastery of the basics is an important accomplishment.

The children who attend such schools face an equally difficult task. From their point of view, it is not always obvious why they should be in school or what they have to gain from being there or from going along with what schools ask of them. For one thing, the culture and language of school are unfamiliar, even if the children have grown up speaking English, and for a growing percentage of poor children it is literally a foreign language. To complicate matters, what teachers expect of them is not always clear or compelling; indeed, it often appears to them that relatively little is expected of them.

The result is an educational experience that lacks meaning and importance to the learners who participate in schooling in these settings. Thus, children learn to work two-digit subtraction without understanding in some

some basic way what the two columns of figures represent, or even what "subtraction" is, much less how it relates to their lives. Or these children learn to recognize letter sounds and syllables on the printed page but remain puzzled about what the text actually says or why it is important to read. Or they never get the experience of writing something coherent and readable to an audience with which they wish to communicate.

The reasons for the failure to teach the children of poverty to understand what they are learning are complex and go well beyond the nature of curriculum and instruction in the schools that serve this segment of the student population. Nor are the complaints about lack of meaning in the education of these students unique to the children of poverty; reformers have directed attention to these issues for schools serving all segments of society. But the problem is demonstrably acute for the children of poverty.

In this report, we summarize what has been learned from a 2-year national investigation of these issues as they appear in schools that serve large numbers of children from low-income families. The study focused on what was taught, how it was taught, and the results of instruction in approximately 140 classrooms located within 15 such schools across 3 states. The investigation is part of the search for more effective practices in mathematics, reading, and writing in schools that serve this segment of the student population.

In this introduction, we first review the issues addressed by the study and the research questions it attempts to answer. Next, we explain the study's design and our way of framing the investigation.

Teaching for Meaning: Conventional Wisdom and Alternative Approaches

The following capsule of a fifth-grade mathematics lesson midway through the year in one of our sample classrooms introduces the central concerns of the study:

- Mr. Gates' mathematics lesson. It is time for mathematics. Mr. Gates asks the children to switch from the dictionary skills worksheet that they have been working on to the mathematics homework. The students, a mixed group of Anglo and Hispanic children from a nearby housing project, fumble for their homework sheets. Some never find them; a few--primarily a handful of boys (mostly Hispanic) located at seats around the edge of the room--pay little attention to what is going on, but the teacher appears not to notice (for the moment, the nonparticipants are quiet). The next 15 minutes are devoted to a review of the homework, which involved long division. Mr. Gates proceeds in rapid-fire fashion, asking for the correct answer and providing it if some member of the class fails to give it. The students correct their own sheets and then sing out how many they got right. The class shifts to a 15-minute presentation by Mr. Gates at the blackboard on the finer points of long division with a two-digit divisor (which was the subject of the homework). Many students fidget during the explanation; the nonparticipating children are beginning to be louder and more noticeable. "This class just doesn't seem to get it," he explains at the end of the class; his game plan appears to be to repeat the explanation "till they understand it." The class ends with a period of seatwork--more practice with long division problems. The class works at this task, but the contingent of nonparticipating boys does little. Once again, Mr. Gates pays little attention to them (he explains later that he has tried hard to involve them and they "just don't respond; they don't care about learning, so I don't spend much time with them"). A few minutes later they and their classmates are tumbling out the door to recess.

The scene is typical of many days in this classroom and of many other classrooms across the nation as well. To be sure, things are happening that distinguish it from the dysfunctional classrooms that are often found in schools serving poor children. In Mr. Gates' room, instruction is taking place; the class is under control, for the most part; children are being given homework, most are doing it, and to some extent they are being held to account for it. But some important elements are missing from their education. The students are being taught procedures without meaning and without a compelling reason to learn these procedures. What they are being taught lacks connection to their lives. Not surprisingly, their response to instruction lacks enthusiasm. As a class, they are not "getting it," even though by year's end they may manage a reasonable score on the district's standardized tests. What is more, a part of the class has, in effect, been written off.

There are already widely accepted answers about how to educate the kinds of students in Mr. Gates' classroom, and his approach to mathematics exemplifies many of them. These answers form an unstated but pervasive "conventional wisdom" about curriculum and instruction that we have described in detail elsewhere (see Knapp, Turnbull, & Shields, 1990; Knapp & Shields, 1991).

In brief, the conventional wisdom (1) focuses on what children lack (e.g., print awareness, grasp of Standard English syntax, a supportive home environment); (2) seeks to remedy these deficiencies by teaching discrete skills (e.g., decoding skills, language mechanics, arithmetic computation) in a fixed sequence as a prerequisite for the more complex activities of comprehension, composition, and reasoning; and (3) features a style of teaching in which instruction is fast paced and tightly controlled by the teacher to maximize student time on task. In addition, this approach to instruction differentiates what is taught, and how, by students' proficiency: especially in reading, high- and low-performing students tend to be segregated into different "ability-based" groups, and the latter are often assigned to one or more remedial programs, which provide supplemental instruction aimed at deficiencies in basic skills. Conditions in the school or district setting often support this view of academic instruction, among them, curricular scope-and-sequences, assessment procedures or instruments, textbook choices, and supplemental program guidelines.

Significant alternatives to this conventional wisdom have attracted the attention of the professional community in the past decade, and there is beginning to be evidence that these alternatives can work well for the children of poverty, at least in demonstration settings. For example:

- Alternative approaches to mathematics instruction. Quasi-experimental trials of "cognitively guided" mathematics instruction--in which teachers spend more time on word problems, deemphasize drill and math facts, encourage multiple solutions to problems, and draw heavily on children's prior mathematical knowledge--provide evidence that inner-city "disadvantaged" children greatly improve their capacity for solving unfamiliar problems as a result of this kind of instructional experience (Villasenor, 1990; Peterson, Fennema, & Carpenter, 1991).

Similarly, new ways of approaching reading and writing that grow out of a philosophy that views both as integral parts of "literacy" have produced promising results in demonstrations:

- Alternative approaches to reading instruction. Efforts to enhance children's "critical literacy" (Calfee, 1991) or to promote children's text comprehension through explicit teaching of comprehension strategies, as in "reciprocal teaching" models (e.g., Palincsar and Klenk, 1991), have begun to demonstrate success in schools that serve children from low-income backgrounds.

- Alternative approaches to writing instruction. Writing instruction characterized by explicit strategy-focused teaching, the use of prompts to stimulate more demanding kinds of thinking, and modeling of the composing process have been shown experimentally to improve the writing of at-risk students (Bryson & Scardamalia, 1991).

These approaches to academic instruction share a family resemblance. Collectively, they feature meaning and understanding as central (though not sole) goals of academic instruction. Each, in its own way, deemphasizes the teaching of discrete skills in isolation from the context in which these skills are applied. Each rests on the assumption that knowledge is less discrete, less separable into distinct subject areas. Each fosters connections between academic learning and the world from which children come. And each views that world as a resource for learning. Whatever deficiencies may exist in the children's capabilities or life circumstances, the children are viewed as capable and possessing useful knowledge. To accomplish these goals, alternative instructional strategies in each area draw from a common pool of techniques, among them emphasis on discussion and extensive opportunities for engaging in the activity to which skills relate (writing, reading, solving mathematical problems).

Focus of Investigation and Study Questions

Many questions remain about these alternatives and their appropriateness for the children of poverty. Beyond the limited evidence available from demonstration studies to date, we know little about using these approaches in the variety of settings in which students from low-income families are taught. For example, many of the alternative approaches emphasizing meaning and understanding have been developed and promoted by scholars working in collaboration with a select group of practitioners. What form do these ideas take when imitated, adapted, or otherwise picked up by a wide variety of teachers working in more typical settings? What do these approaches demand of teachers, and are they up to the task? Do students in these settings actually improve their skills of reasoning, comprehension, and composition? What about their mastery of basic skills? How are features of the school setting implicated in the delivery of instruction based on alternative principles?

To pursue these matters, we undertook this investigation to answer four major research questions:

(1) How--and how much--does mathematics, reading, and writing instruction in schools serving the children of poverty reflect new research-based ideas about imparting advanced skills and challenging content?

(2) How do teachers manage the academic learning environment and respond to differences in student background? How do special programs supplement instruction in the regular classroom to accommodate diverse student populations?

(3) Which approaches to instruction in the three subject areas show promise for boosting students' mastery of advanced as well as basic skills? Do alternatives to conventional practice contribute as effectively to student learning as more traditional approaches?

(4) What factors in the school, district, and state context support or inhibit the introduction of alternative instructional approaches?

Subquestions related to each question appear in Table 1, along with the chapters in which answers to them are found.

Table 1

PRINCIPAL STUDY QUESTIONS

1. <u>How--and how much--does mathematics, reading, and writing instruction in schools serving the children of poverty reflect new research-based ideas about imparting advanced skills and challenging content?</u>

   1.1 What are the dominant patterns of curriculum and instruction across the study classrooms? Are there important variations across grades? (See Chapters III, VI, and IX)

   1.2 What alternatives to "conventional wisdom" regarding best practice are being tried? (See Chapters IV, VII, and X)

2. <u>How do teachers manage the academic learning environment and respond to differences in student background? How do special programs supplement instruction in the regular classroom to accommodate diverse student populations?</u>

   2.1 How do teachers manage the academic learning environment? What implications do management approaches have for the approach to instruction and student learning? (See Chapter XII)

   2.2 How do teachers respond to differences in student background? What implications do their responses have for instructional approaches and student responses to instruction? (See Chapter XIII)

   2.3 What roles does supplemental instruction play in academic instruction? Specifically, what is taught, how is it taught, and how is it connected to instruction in the regular classroom? (See Chapter XIV)

3. <u>Which approaches to instruction in the three subject areas show promise for boosting students' mastery of advanced as well as basic skills? Do alternatives to conventional practice contribute as effectively to student learning as more traditional approaches?</u> (See Chapters V, VIII, and IX)

   3.1 What associations are there between alternative approaches to instruction and children's mathematical understanding, problem-solving ability, reading comprehension, and competence at written expression?

   3.2 How do alternative instructional approaches influence children's mastery of basic skills in mathematics, reading, and writing?

   3.3 Do alternative instructional approaches work equally well with low-achieving and high-achieving children?

4. <u>What factors in the school, district, and state context support or inhibit the introduction of alternative instructional approaches?</u>

   4.1 In what ways do approaches to instruction reflect the nature of the student population and the teacher force in schools serving the children of poverty? (See Chapter XV)

   4.2 How do conditions and policies in the school, district, and state influence academic instruction in the classroom? (See Chapter XV)

Strategy of Investigation and Key Assumptions

To answer these questions, we conducted a study of "natural variation," in which we examined a variety of instructional practices that had developed in school settings. By contrast with studies that "plant" a promising practice or program in a set of classrooms and study its effects with appropriate experimental controls, we investigated the range of practices in place in a set of schools that appeared to be performing well, as far as this could be judged by evidence from standardized testing measures. We assumed that, across a large number of classrooms in such schools, important insights about effective practice could be derived by documenting, contrasting, and assessing the effects of the varying approaches to curriculum and instruction.

The design combines traditions of research that are not normally joined, especially in a study conducted on such a large scale. The quantitative design draws on the "process-product" tradition, but is integrated with an intensive design aimed at producing rich qualitative descriptions of instruction in action. Furthermore, the study examines three different content areas and, at the same time, cross-subject phenomena.

Because the study was intended to identify effective practices, we selected sites and classrooms that, taken together, would be likely to display such practices under a variety of conditions. Sites and classrooms were chosen for study through a several-stage process that led to a sample of 15 schools in 6 districts located in 3 states (California, Ohio, and Maryland). The school and district settings differ considerably in the kinds of student populations served and the school and district environment for academic instruction. Three districts serve primarily inner-city populations: one primarily African-American children, another primarily African-American and Hispanic, and the third with a mixture of ethnic and racial groups. A fourth district lies in a suburban setting adjacent to a large city and shares many of the characteristics of inner-city school districts. The remaining two districts are located in rural or semirural settings, one serving a population of white children and the other a mixed white and

Hispanic clientele. Within these sites, classrooms of experienced teachers were selected to maximize variety in instructional approaches undertaken (as explained at greater length in Chapter II).

The design focused attention on curriculum and instruction in the classroom (and related supplemental instruction rooms) across the school year. Data collection strategies were developed that concentrated on what could be learned from periodic direct observation of lessons, teachers' self-report of activities and attitudes, inspection of materials, repeated in-depth interviews with teachers and administrators, testing of students, and school records. In line with this focus, most of the data collection occurred at the classroom level. The study was not primarily a study of students, but rather of classrooms and the collective student response to instruction within classrooms.

We concentrated on curriculum and instruction within and across three subject areas. Selecting mathematics, reading, and writing as targets, we designed the study to get at the content of instruction (what children are taught), the delivery of instruction (how children are taught), and results of instruction (what children gain from what they are taught).

The study design combines qualitative and quantitative data sources, collected across a 2-year period (the 1989-90 and 1990-91 school years). Intensive observations of a subset of classrooms (40 in Year 1; 23 in Year 2) yielded detailed qualitative case reports, which were subsequently analyzed to identify cross-case patterns. These reports concentrated on three 2-week periods of instruction in Year 1 and three 1-week periods in Year 2. Observational visits, interviews, and inspection of materials for these and all other classrooms in the sample generated extensive coded data used in quantitative analyses, along with data from teachers' daily logs, school records, a survey of instructional staff (during Year 2), and the data from pre- and posttesting of students.

The design enabled the study team to examine all six grades in elementary school through two waves of data collection. During the first year, we concentrated on grades 1, 3, and 5, and the following school year on grades 2, 4, and 6. Second-year classrooms were chosen to include a large number of first-year children in them; however, nearly half of the students from Year 1 were not part of the second-year sample because they either had left school or had been assigned to classrooms not selected for study during the second year. The overlap in student samples permitted some forms of longer-term analyses to be done (e.g., of instructional effects across a 12-month period of time), although the scope and value of these analyses were limited by unavoidable attrition biases in the student sample across years. The 2-year design was more useful as a way of testing first-year patterns through replication in the second year.

Finally, the design and data collection strategy were exploratory. Rather than approaching the topic of study with a tight set of hypotheses and measurements that zeroed in on a small number of key concepts, we assumed that a wide range of instructional and curricular features should be considered. In addition, because part of the study mandate was to test the feasibility of this kind of investigative approach (for further possible studies conducted by the federal government), we experimented with ways to improve on the design across years. Finally, the study was intended to investigate various areas of the curriculum as well as questions about classroom management, supplemental instruction, and the school and district environment. As a consequence, the study design sacrificed some degree of depth for breadth of coverage; the study's results should be interpreted accordingly.

The details of the study design, our rationale for it, and our reflections on its execution appear in Volume 2.

Framing the Investigation

We built our investigation around certain key concepts that define settings and target population, principal units of analysis, and time frame for study. They serve to introduce the findings described in this report by delineating what in the complex world of classrooms and schools we have been paying attention to.

"Disadvantaged" Students--The study is, first of all, about the education of children who come from low-income families and who, in a statistical sense, are more likely to experience school failure than their more affluent counterparts. But in a broader sense, the study is about the education offered all students who attend schools serving large numbers of poor children, for it is in these schools that the conditions of learning tend not to encourage academic instruction of the sort alluded to above. Children from low-income families and, indeed, all children attending such schools are often referred to as "disadvantaged": in a demonstrable way they face a substantial disadvantage in access to learning and ultimately to productive careers or fulfilling lives.

The boundary of our investigation encompasses many more than those children officially designated as "educationally disadvantaged" (or "educationally deprived") and therefore eligible for participation in remedial or compensatory programs such as the federal Chapter 1 program or its state or local counterparts. Large numbers of such children attend the schools we are studying--on average, approximately two-fifths of the children in the sample classrooms are eligible for the Chapter 1 program--and we were especially interested in what schools have to offer them. But we were equally interested in the academic program as a whole available to the full student population in each school.

The Classroom as the Unit of Study--Within these schools we concentrated on the classroom, which is the principal unit of data collection and analysis. In our conception, this unit encompasses both what takes place within the regular classroom walls and in supplemental programs serving students from the classroom group. Conceptually, we view all supplemental programs, whether they operate within the classroom or elsewhere, as extensions of the academic program offered to the students in the classroom. This is not to say that these programs are coordinated or integrated with what goes on in the regular classroom, but in principle they can be.

Inescapably, they offer an additional (or substitute) academic experience to some or all of the students from the regular classroom group.

In schools that emphasize team teaching, subject area specialization, and cross-graded teaching arrangements, the "classroom" is not always a unitary group of students who remain together throughout the school day. Thus, for example, the homeroom group that gathers at the beginning of the day may well break into smaller groups that recombine in other teachers' rooms later in the day for instruction in one or more subjects. Or, if the homeroom group combines different grades, the classroom may in effect represent two smaller classes that occupy the same space and are taught differently.

The School Year as Time Frame--The time frame for data collection and analysis was the school year--that is, what is taught across the year and how it is taught. Thus, the story we have to tell has more to do with the "big picture" than the fine detail of relationships between a teacher and students at moments of time, although we use periodic slices of time to help us build a picture of instruction across the year. Our picture of what is taught across the year derives from three sources: teachers' daily logs kept across the year, periodic interviews with the teachers, and three periods (fall, winter, and spring) during which observations and other forms of intensive data were collected.

Organization of This Report

Volume 1 of the report is organized into five parts following this introductory chapter and Chapter II, which describes the study sample in greater detail. To help readers grasp quickly the major findings and conclusions, we present a chapter preceding the body of the report text in which we summarize what we learned regarding all major study questions. For easy reference; we indicate in this section where in the report more extended discussions of each point can be found. (A slightly expanded version of this chapter appears as a separately bound summary report.)

The first three parts of the main report review what we learned about instruction in mathematics, reading, and writing, respectively. In each of these parts, we first present an overview of curriculum and instruction across grades and across the school year, followed by a chapter describing alternative instructional approaches and then a chapter that reviews outcome analyses.

The fourth part of the report presents chapte[illegible] .g what we learned about managing the academic learning environment, responding to differences in student background, and supplementing instruction in the regular classroom. The fifth and final part of the report reviews evidence regarding the associations between instructional approach and the nature of the student population, teacher force, and school setting.

A brief appendix summarizes salient points about the study design. More details appear in Volume 2, which also discusses the feasibility of using this study design for other investigations, describes all measures used in the study, and provides examples of instrumentation.

II SCHOOLS, DISTRICTS, AND CLASSROOMS SERVING THE CHILDREN OF POVERTY

Schools and districts offer the first and most immediate environment or context for what goes on in classrooms. So, to understand what we found out about academic instruction in classrooms, the reader must first appreciate the kinds of schools and districts to which the data refer. We describe in this chapter the range of schools and districts chosen for the investigation, and the manner in which they were chosen.

The Sample and How It Was Chosen

Schools and classrooms serving the children of poverty are a diverse lot. In studying the academic instruction offered these children, we selected schools and classrooms that represented a wide range of conditions. At the same time, our intention to look intensively at instruction across the year limited the number of schools we could include in the sample.

The resulting sample of 15 schools in 6 districts captures many of the characteristics of schools serving high concentrations of low-income children. However, although the 15 faced conditions and challenges that are common across the land, the schools themselves by and large are not typical.

Because this was a study of naturally occurring effective practice, it was not our intention to represent in a statistical sense what is typical of all schools serving large numbers of poor children; therefore, sites were not chosen randomly. Instead, we selected schools that, during the year before we started data collection (1988-89), were performing well on conventional standardized tests compared with other schools serving a similar student population. A few of the sample schools were "average" in this comparison; most were notably above average. We systematically excluded cases in which school test scores were relatively low (although no formal cut-off score was set, we did not consider schools in which the average performance fell below the 25th percentile on standardized tests of mathematics and reading ability). As shown in Table 2, there was a range of student test performance, both across and within schools.

Classrooms were chosen on the basis of the following criteria:

- Teacher's experience. Beginning teachers were generally excluded on the assumption that most would be working out the many issues that new teachers encounter, a process that would obscure what we could learn about effective curriculum and instruction.

- General classroom management ability. Wherever we could, we avoided classrooms that, by reputation, were experiencing serious management problems or were dysfunctional in some other obvious way.

- Teacher's (and principal's) willingness to include the classroom in the study. Because we were asking a lot of participating teachers, it was essential to include those who wanted to be part of the project. Most teachers we approached were happy to participate. A few declined for various reasons, and in two instances principals virtually dictated which teachers could be included.

- Variation in instructional approach. To the extent possible, we selected classrooms to maximize the range of approaches to curriculum and instruction, based on what we could learn from principals and other reputable sources at the beginning of the year.

Using these criteria, we ended up with a set of classrooms taught by teachers of varying philosophies and apparent success with children. Given the numerous constraints in the sampling process at the school level, not all selection criteria were satisfied equally well: for example, a few teachers were less-than-enthusiastic participants; several others managed their classrooms so poorly that chaos reigned much of the time; and several teachers were on the verge of quitting teaching altogether because of deep dissatisfaction with teaching as a career or their particular assignments. For obvious reasons, there was relatively little to learn about effective curriculum and instruction in such instances, except the absence of critical conditions for good practice. But these were exceptions. On the whole, the sample classrooms were taught by experienced, committed individuals who were able to establish a basic level of order in the classroom and to focus children's energies on academic goals most of the time.

Table 2

PERFORMANCE LEVEL OF SAMPLE SCHOOLS AT THE BEGINNING OF THE STUDY (YEAR 1)

District	CTBS Reading Comprehension Score, Fall Pretest,[a] Classroom Mean NCE	Range in Scores[b] Within the School	
		Highest Classroom	Lowest Classroom
District 1 (Rural)			
School 1	51	59	37
School 2	51	56	48
District 2 (Urban)			
School 3	31	36	21
School 4	34	42	22
District 3 (Urban)			
School 5	44	61	27
School 6	38	39	38
School 7	37	47	24
District 4 (Urban)			
School 8	41	47	29
School 9	36	40	34
School 10	50	53	46
District 5 (Suburban)			
School 11	37	44	19
School 12	43	57	29
School 13	43	71	30
District 6 (Rural)			
School 14	49	59	45
School 15	47	63	30

a - Average of the mean scores on the pretest for the five or six sample classrooms in each school during Year 1. NCE = Normal Curve Equivalent.

b - Lowest and highest among the sample classrooms within the school.

Thus, the teachers we selected for study were not a random sample of the staff in each school, but instead represented the more experienced and generally more competent end of the continuum of staff expertise. At the same time, they reflected the full range of instructional philosophies and approaches within the school. In addition, because we chose two classrooms per grade in each year of the study, the sample included a majority of the teachers in the school (most schools we studied had three classes per grade; several had four or two).

Taken together, the classrooms in the sample reflect a level of academic performance at the beginning of the year slightly below national averages, although higher than most schools with similar demographic characteristics. As shown in Table 3, fall reading and mathematics scores place these students in the 40-50 Normal Curve Equivalent (NCE) range. The table also presents the overall demographic profile of the students in the sample, which indicates that most of the children in the sample classrooms were from low-income families (approximately two-thirds) and minority backgrounds (approximately three-quarters). Not surprisingly, a large proportion of these children (nearly half) were served by supplemental programs that address one or another targeted instructional need (see Chapter XIV).

The Six Districts

Schools and classrooms were selected for study within six districts located within three states. Each district provided a unique environment for academic instruction through the nature of the community served, curricular policies, configuration of resources, and other forms of support for schools, and characteristic relationships between central office and the schools. A capsule description of each district highlights the key differences and similarities among them, starting with the three urban districts:

- District 2 serves approximately 75,000 students in an industrial city with large concentrations of low-income African-American, Hispanic, and Asian immigrant children. Students attending many of the district's schools come from communities beset by problems of urban poverty, among them drug-related activities, violence, and gang

Table 3

CHARACTERISTICS OF SAMPLE CLASSROOMS
(YEAR 1)

Classroom Characteristics	Average of Classroom Measures (n = 85)
Fall pretest scores (classroom mean Normal Curve Equivalents)	
CTBS Reading Comprehension	43 NCEs
CTBS Mathematics Computation	49
CTBS Mathematics Concepts and Applications	42
Level of economic disadvantagement (average percentage of students in the classroom on Free or Reduced-Price Lunch Program)	65
Participation in supplemental programs (average percentage of students served)	
The Chapter 1 program	42
Other programs	12
Average class size	23 students[a]
Racial/ethnic composition of the class (percentage in each group)	
African-American	44
Hispanic	15
White	31
Asian	9
Other	1
	100

a - This figure reflects the fact that some "classes" on which we concentrated were in fact a subset of a larger homeroom group, due to teaming, departmental, or cross-graded arrangements.

activity. The district is undergoing a turbulent period in which top-level management has been in transition, finances have been in disarray, and there has been little clear direction for academic work. By default, schools have gained a certain measure of autonomy and, depending on the leadership at the school level, teachers can shape their own academic programs more than in districts that exert a tighter control over instructional affairs.

- District 3 serves a student population resembling that of District 2 in size and composition, although with higher proportions of Hispanic and Asian students. The poverty-related conditions that characterize this city's neighborhoods are less severe than those in District 2: crime statistics, for example, are lower here than in the first case. The district is also more centralized and, at the present time, more effectively managed, in the sense that there is continuity in leadership and reasonable stability in financial support. The district has moved aggressively to implement key features of statewide frameworks promoting alternative approaches to mathematics and language arts instruction.

- District 4 serves a diverse city with a substantial affluent population and an inner-city core that is predominantly composed of low-income African-American families, but with neighborhoods in which poor white families recently arrived from rural areas reside. Desegregation has been a major issue in this community and has been addressed (under court order) in part by a series of magnet programs scattered among the district's predominantly neighborhood-based schools. In addition, under the leadership of a dynamic superintendent, the district embarked several years ago on an ambitious revamping of curriculum that stresses new approaches to mathematics and language arts, as well as new approaches to instructional grouping. The improvement plan allows little room for school autonomy.

The fourth district, located in a large suburban county, resembles the urban districts in many ways:

- District 5 is very large, comprising more than 100,000 students spread across a county adjacent to a major urban center. The low-income areas of the district, located the closest to the neighboring urban center, are home to African-American families primarily. The community in which they live is tense: drug-related crime and other related problems are currently at epidemic levels, and the children attending schools are accordingly fearful. The district has strong centralized leadership that emphasizes mastery of basic skills and school-by-school accountability (for example, principals' salary increments are partially tied to the test score performance of their schools). Prescriptive curricular guidelines and regular districtwide testing cycles leave little room for schools or teachers to devise their own academic programs.

The two rural districts stand in sharp contrast to the preceding four, not only in size but also in their student composition and approach to curriculum improvement:

- District 1, nestled in an agricultural valley an hour away from a metropolitan area, serves a mixed population of Anglo and Hispanic students, approximately a third of whom come from low-income families. The community is relatively stable and suffers little from the afflictions that typify the urban centers included in the study. The district is actively encouraging the improvement of curriculum programs, along the lines of state frameworks that advocate conceptually oriented mathematics and whole-language-based literacy. However, the district has adopted a more facilitative, less controlling posture than found in other districts in the study. Principals are given wide latitude to shape the program in their schools, within broad guidelines established by the district.

- District 6 sits several hours' drive from a major metropolitan area. The district serves a student population of close to 12,000 students, the great majority of whom are white. The countywide district encompasses one small city and a number of small mountain towns. Poverty levels are lower than the average for urban and suburban districts in our sample. In its own way, the central office exerts "top-down" control of the academic program at the school level, but without a driving vision of curriculum or a clear conception of how to make it work for disadvantaged students.

The Schools

As a group, the schools we studied share various characteristics. In all, 40 percent or more of the student population live in impoverished circumstances; in 6 of the 15 schools, virtually 100 percent are from low-income families.
All the schools are organized to serve kindergarten through fifth or sixth grade and draw the majority of pupils from a neighborhood attendance area. With few exceptions, the schools are generally well regarded within their respective districts.

The schools vary in size (from fewer than 300 children to more than 800), level of resources, and quality of facilities; several occupy new and well-equipped buildings, while others are housed in decrepit quarters. During Year 1 of the study, one school was temporarily located in a previously vacant school building out of the neighborhood attendance area while its own plant was refurbished.

The set of schools in the sample include several variants on the conventional organization of elementary schooling, which may offer a different kind of academic experience to the students served.

- Year-round schools. Two of the 15 operate on a year-round schedule, meaning that students attend school for 3 months, then take a month off, then repeat the cycle in staggered "tracks" across the 12 months of the calendar year.

- Magnet programs. Two other schools contain formally designated "magnet" programs, one aimed at mathematics and science, the other offering bilingual education to children with limited English proficiency. While each draws some children from outside the neighborhood attendance area, they nonetheless serve a primarily neighborhood-based population.

- Desegregation-related programs. Not including the magnet programs described above, several schools receive extra resources and staff as part of a district effort to counteract the effects of racial imbalance.

Beyond these structural differences, the schools we studied vary in many respects. We made no effort to choose schools that resemble any particular profile of effectiveness. The quality of leadership, for example, varies considerably from cases in which principals have a strong instructional vision to those with none; similarly, principals' general management skills range from excellent to mediocre. Not surprisingly, the levels of staff commitment and cohesiveness differ considerably across schools.

Several brief portraits of schools in the sample illustrate how community factors, structural features, leadership, and staff combine to form an "ethos" with important implications for the school as a whole. The first two schools are generally considered exemplary:

- Jackson Park (School 8).* A small inner-city school in District 4, Jackson Park was thought of as "bottom of the barrel" until 5 years ago, when a new and forceful principal took charge with a mandate (and extra resources) to bring about change. The challenge confronting her was considerable: 100 percent of the children were from low-income, minority families; the school climate was chaotic; and

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*Names have been changed to preserve the anonymity of the school sites.

test score performance was abysmal. Through a concerted effort to enforce strict discipline, maintain a highly structured and demanding curriculum (albeit focused on "the basics"), and increase expectations for the students, the school has improved considerably: test scores are up and the school has received awards as an exemplary elementary school.

- Maple Grove (School 1). This school in District 1 stands in sharp contrast to Jackson Park, although it, too, has acquired a well-deserved reputation for the quality of its academic program. The school is large: the over 800 students are half Anglo, half Hispanic, many of whom have come to participate in the school's bilingual program (in half of the school, classrooms with English-dominant and Spanish-dominant children are paired and share instruction in various ways that lead to a gradual transition into English-only instruction). Staff morale is high, in no small measure reflecting the activities of the principal, who is an instructional leader in the full sense of the term. Although strong in many aspects of its academic program, the school has developed an identity as a "language arts" school, which takes special care and pride in its teaching of writing, reading, and other aspects of language instruction.

Not all schools in the sample are as "together" as these two. Two other schools demonstrate the range among sample schools, one from the suburban district, the other from an urban setting:

- Riverview (School 12). This large school in District 5 conveys a sense of disorganization to the observer. The school population, predominantly African-American, is bused in to achieve some degree of racial balance in a school located within a white residential neighborhood. Violence is a prominent feature of the community life most students know, which adds an additional challenge to the school's instructional task. Extra staff of several kinds are assigned to the school, but because of a somewhat "scattered" management style, these resources are orchestrated in a complex way that makes integration of instructional services difficult. The staff are somewhat demoralized, not only because of the lack of leadership but also because of the restrictive guidelines from the central office, which controls a great deal of what they can do in the classroom.

- Tidewater (School 7). This elementary school in District 3 serves a mixed population of students of African-American, Asian, and Hispanic backgrounds from a community undergoing rapid transition in its ethnic and linguistic makeup. The school has been struggling to devise appropriate approaches to this student population and has received some special funding for the purpose; however, the school is struggling to implement a new district language arts curriculum. The principal does not exercise an active instructional leadership role, although he is a reasonably effective manager of school operations.

Overall, the tone of the school is businesslike and orderly. Although not innovative or imaginative, the school program is solid and offers most students a reasonable chance to master the basics.

We explore the implications of school settings for academic instruction at greater length in Chapter XV, as we analyze the relationship between instructional approaches and the nature of the student population, teacher force, and school setting.

Classrooms

The bulk of this report will be devoted to an analysis of classrooms--how they differ in what is taught, how it is taught, and with what results. Numerous examples will be given, most of which will concern the teaching of a particular subject (Part Four, which addresses cross-subject issues, is an exception). Hence, examples often represent "slices" of the school day, and it is easy to lose sight of the fact that each classroom has a distinctive character--a collective "personality" of sorts that develops out of the interaction among instructional staff and students around a variety of common tasks across a year's time. The ethos of the rooms we studied differed markedly, both within and across schools. Before embarking on the analytic journey presented in this report, it is important to appreciate some of the variations in overall classroom ethos we encountered.

Four glimpses of classroom life suggest the range of what we observed. First, a second-grade classroom within a rural district, in which the teacher works with a student population half of whom are Hispanic (some with limited English proficiency), the other half Anglo.

- <u>Ms. Mandrell's second grade</u>. The physical environment in Ms. Mandrell's class is rich. All walls are colorfully adorned, mostly with teacher-made visuals, including numbers, months, and theme-related materials. Two wall spaces are reserved for student work, although that expands by the end of the year so that in May student work even hangs from the lights. Displayed student writing is rotated periodically and typically includes a written component and color illustration. Students sit in teams of four and five, with desks arranged in "pods" that form a semicircle, the center being

Ms. Mandrell's "hot seat." During instruction, students "move to the rug," which is closer to the blackboard and gives a better feeling of being one group.

Overall, the ethos of this classroom ranges from full attention to restlessness to disorder. Ms. Mandrell's power over the students appears alternately just within or beyond her grasp. Activities take place and learning happens, but one gets the feeling that this is more in spite of the teacher than because of her. Typically, interactions between students and teacher are superficial and for the sake of moving on in the lesson rather than for the purpose of meaningful communication. In one lesson, for example, Ms. Mandrell was completing a "web" on the word "solution." One of the strands was "Kinds of Solutions." She had listed "answers" and "explanations." "What [other] kinds of ways to find solutions are there?" she asked. One student responded, "Start a war." Ms. Mandrell said, "Let's talk about yourself," and moved on. A few minutes later, she did ask whether "start a war" would be a good or bad solution but, without exploring the topic, asserted that it would be a bad one and moved on.

A good deal of time within and between lessons seems taken up with management issues. Often, this means setting up activities so that students understand them. Typically, there is an inordinate amount of lead time setting up activities, so that by the time they are explained there is little time to do them. Other times, management has to do with maintaining attention during or between lessons. These students are by nature respectful and well behaved. But when they are bored they get wiggly and noisy, and they drift off task. Ms. Mandrell constantly has to call for their continued attention.

Two fourth-grade rooms from different schools within the same urban district contrast sharply with Ms. Mandrell's classroom and with each other. Each teacher has found one way of coping with the difficult conditions children experience in the inner-city neighborhoods within which they live. The first of the two is populated with students all but two of whom are African-Americans, who live in the neighborhood immediately adjacent to the school.

- <u>Ms. Davis' fourth grade</u>. On the walls and bulletin boards are posted a large number of math-related displays. One bulletin board bears the title "Our Best Work in Mathematics"; in another part of the room, a fraction chart, name-the-pattern poster, multiplication fact table, multiplication chart, mathematics vocabulary words, and other similar posters appear. Early in the year, few examples of writing are displayed, and though this changes later in the year, language arts materials are not so visible as those related to mathematics.

The class is set up in a traditional manner--rows of desks (six rows of five desks each), with a teacher's desk in the front of the room at the right-hand corner. During most visits, one student sits in the back away from the rest of the class, placed there in response to the child's mother's injunction that her son does not have to do any work if he doesn't want to.

Ms. Davis runs her classroom in a tightly controlled and closely monitored fashion. Students spend a substantial amount of time working on exercise sheets, but while students are working on their seatwork, Ms. Davis works with small groups of students at a table in the front of the class. These student groups vary across days and across subject areas; each group seems to be formed to address a specific need. While she is working with a small group of students in the front of the classroom, Ms. Davis positions herself so that she is facing the class and can watch the other students. The teacher does not allow any "nonsense" in her classroom. Students seem to like her, and the overall ethos of the classroom is positive. She exemplifies a traditional component-skills approach to teaching at-risk students. She has no "program" of classroom management, such as assertive discipline; student names are never listed on the chalkboard. The students know that she expects them to do their work and not to be disruptive. The only kind of behavior problems one sees in her room arise when students are not motivated to do the work and are "daydreaming" or attending to something other than the lesson. Ms. Davis reprimands these students and occasionally will tell them to stay in from recess or write a note to their mother stating that the student will need to stay after school in a day or two.

The teacher interacts with her students in a respectful manner and expects the same from her students. She expects students to achieve the standard she has set for them. For example, during a math lesson in which students were required to draw pie graphs, the teacher looked at one boy's paper and said, "Son, this is sloppy. This is garbage material. Do it over and you owe me for the extra piece of paper."

Ms. Davis describes her classroom as "just like family--we work real hard and then sometimes we play." Class parties are planned, and the teacher frequently gives her students treats after school. Nachos are a favorite! She keeps a crockpot in her room, so she can prepare the nachos there and give them out after school. One day she was giving nachos to all siblings of the students enrolled in her class.

The second fourth-grade classroom, located in a different part of town, serves an entirely different clientele--a mixture of Asian and Hispanic students, many of them recent immigrant families (approximately half are from Cambodia).

- <u>Ms. Washington's fourth grade</u>. The walls of this classroom reflect a mixture of language arts, mathematics, and social studies activity. There is also a mixture of student work, instructional and discipline guidelines, as well as informative posters. One wall section contains students' math and writing work, and elsewhere one sees different types of student work, such as a math quilt entitled "How many square centimeters in a square meter" and a birthday graph.

  The classroom is organized to foster interaction among students and between them and the teacher. The desks are grouped in clusters facing one another, and in one corner, students can retire to a new rug for silent reading and group discussions. The physical arrangement of the room supports the frequent use of interesting, cooperative group learning tasks, especially in mathematics and science. Ms. Washington's classroom reflects high expectations, self-respect, and organization. She struggles to provide children with a ray of hope and a solid educational foundation in an embattled environment. In spite of low parent participation, high numbers of limited English speakers, and neighborhood crime that sometimes spills over onto the playground, Ms. Washington tries to provide a positive learning environment.

  A number of elements contribute to this learning environment: the physical arrangement of the room, the nature of student/teacher and student/student interactions, and the nature of the learning tasks. Classroom interactions between students and between the teacher and students are guided by principles of mutual respect. These principles stem from a system of interpersonal relations and group interactions, which governs how students and teachers relate to one another and how they resolve conflicts. The setting for interpersonal relations starts with a community circle. Students and teachers start the day seated in a circle on a new rug, verbally sharing their feelings or important events. They end the sharing by expressing appreciation for one another. This circle allows the students not only to express their feelings, but also to clear up misinformation--as on the day that a dead body was discovered on the playground. Visibly shaken, the teacher encouraged each student to tell what they "knew" and how they felt about it. The teacher assured the class by stating, "...you need to be in control; keep calm and relaxed--focus on work to stay in control. We have to adjust." When a student asked, "What is adjust?" Ms. Washington's response exemplified her resolve, "Keep calm and keep going."

  In spite of the embattled world outside, Ms. Washington creates a fun place to learn. The students talk with each other a lot, working in heterogeneous groups. Relatively little time is spent on discipline--students are actively engaged in academic work, but occasionally they "lose it." Vigilant monitoring, extensive advance planning, and the regular use of the agreed-upon interaction principles help keep the students on track.

In a fourth classroom, serving sixth graders from a low-income white neighborhood in another city, the teacher strikes a different tone and balance across the school day.

- Mr. Buckley's sixth grade. The 30 students in this room sit at seven tables, which are arranged so that students can see chalkboards at opposite ends of the classroom. Bulletin boards display student spelling and vocabulary papers, names of students who have read a specified number of books, charts about persuasive writing, and charts containing stars (for good work habits) and "rubbies" (transfers "rubbed" off next to a student's name).

  Mr. Buckley's sixth grade is a structured environment that students enjoy. A daily routine is in place, and students know what to expect. After gathering on the playground each morning, students are met by Mr. Buckley at 8:15 and accompanied to their first-floor classroom. He collects the homework as students are emptying their backpacks. As students take their places, he directs their attention to the schedule for the day, highlighting such classes as science, music, physical education, and art, classes they do not have every day. By 8:20, the ESEA aide leads 22 of the 30 students out of the room to the reading lab on the second floor.

  Mr. Buckley's interaction with children is characterized by a high degree of "personalization" of instruction and a playful sense of humor. He relates whatever he is discussing to students' experience, especially through popular media (movies and television). He also makes statements or uses examples that he knows students will find humorous. Mr. Buckley handles managerial tasks, such as distribution and collection of materials, reminders about behavior, and formation of groups, within the context of instruction. Students are given directions for a task, so that their time is structured before he takes care of logistics. If students become unruly, he calls for "time out" and makes a simple statement, such as, "I don't want to hear anyone speaking while someone else is."

  Students interact with one another as part of every area of instruction. In reading, Mr. Buckley assigns each group of four students a different question about the selection. In math, they use manipulatives and work problems in their groups. In social studies, groups compete in contests to demonstrate that they have learned the major concepts. Student-student interactions comprise approximately one-fourth of the total class time.

  One student described what had happened in April as the class was preparing for the math part of the California Achievement Test (CAT). She said that their teacher had taught them everything they would need to complete all of the problems on the test. "We helped each other learn the stuff. It's like Mr. Buckley says: "We're in the army where the toughest survive!" During this time, Mr. Buckley had the students operating like a team, cheering one another on when they'd succeed in the competitions he set up for the practice sessions. The motto he had plastered on the front board was: THE CAT IS OUR SUPER BOWL!

These examples hint at the variety of factors that are part of the story we tell in this report--among them, the nature of the students and what they bring to the classroom, the teachers' beliefs about the children and the subject matter they teach, their way of organizing the classroom and academic tasks, their way of approaching children. Although these vignettes communicate a certain amount about the overall ethos of the room and the teacher's predominant instructional style, they do not indicate much about the way mathematics, reading, and writing are approached. In the next three parts of the report, we examine these issues more closely.

PART ONE:

MATHEMATICS INSTRUCTION

In the first part of this report, we present what we learned about different approaches to mathematics instruction and about the effects of these approaches on student learning.

In Chapter III, we document the predominant features of mathematics instruction across all grades in the 140 classrooms we studied. The data we synthesize allows us to describe the modal pattern of practice across the classrooms in both years of the investigation. The chapter makes clear a general tendency toward the "conventional wisdom" described earlier in this report. In other words, more often than not, teachers focused on arithmetic skills more heavily than other topics (or ignored other mathematical topics altogether), and did so with a narrow repertoire of instructional techniques, which was dominated by teacher explanation and independent seatwork.

Nonetheless, as described in Chapter IV, there were among the teachers we studied many who departed from conventional practices in greater or lesser degree. Some did more than teach procedural skills in arithmetic; they oriented their teaching of arithmetic toward conceptual understanding and applications to nonroutine problems. Others expanded the range of topics well beyond arithmetic, by giving substantial time in the curriculum to such topics as geometry, estimation, statistics, and logic. Still others did both--that is, taught multiple topics in mathematics and did so with emphasis on conceptual understanding and nonroutine applications. These departures from conventional practices are described and illustrated in Chapter IV with examples from our observational fieldwork.

In Chapter V, we consider the evidence linking these alternative approaches to student learning. In short, we found that instruction which departs the most from conventional practices boosts students' grasp of both advanced and basic skills at the end of the school year. What is more, across 12-month periods of time, there is some--although incomplete--evidence that the learning gains may be retained. Finally, the chapter demonstrates that low-achieving students benefit at least as much as their high-achieving counterparts from alternative forms of mathematics instruction.

III MATHEMATICS CURRICULUM AND INSTRUCTION IN SAMPLE CLASSROOMS

The mathematics curriculum and instruction in the classrooms we studied is best understood in the light of national trends and directions advocated by members of the mathematics education reform community. Many prominent groups--e.g., the National Council of Teachers of Mathematics (NCTM), the American Association for the Advancement of Science, and the National Academy of Sciences' National Research Council (NRC)--suggest that major changes are needed in the way that elementary mathematics is conceived and taught. According to a wide variety of studies and analyses, the most common goal of elementary mathematics education is that children should achieve proficiency in rapid and accurate arithmetic computation. Reformers aim to reduce the time and energy spent on reaching this goal, while placing a greater emphasis on higher-order thinking skills (such as solving novel or more complex mathematics problems than those traditionally taught). In addition, reformers seek to include in the elementary mathematics curriculum a far wider range of mathematics content than in the past, such as statistics and data analysis.

Table 4 summarizes the NRC's view of seven transitions that are needed in mathematics education; many groups believe that these transitions are, in fact, in the early stages of being implemented on a wide scale. Still, it is understood even by advocates of change that making a full transition to a new view of mathematics education is at best a lengthy and difficult undertaking. Mathematics education provided in most elementary classrooms today more closely resembles that provided 50 years ago than what the reformers hope to see in classrooms a few decades in the future.

The changes being advocated by the mathematics education community apply to all classrooms nationwide, regardless of the student population. However, in schools serving large numbers of poor children, curriculum and instruction in mathematics are even more likely than in other schools to focus on

Table 4

SEVEN TRANSITIONS IN MATHEMATICS EDUCATION[a]

1. The focus of school mathematics is shifting from a dualistic mission--minimal mathematics for the majority, advanced mathematics for a few--to a singular focus on a significant common core of mathematics for all students.

2. The teaching of mathematics is shifting from an authoritarian model based on "transmission of knowledge" to a student-centered practice featuring "stimulation of learning."

3. Public attitudes about mathematics are shifting from indifference and hostility to recognition of the important role that mathematics plays in today's society.

4. The teaching of mathematics is shifting from preoccupation with inculcating routine skills to developing broad-based mathematical power.

5. The teaching of mathematics is shifting from emphasis on preparation for future courses to greater emphasis on topics that are relevant to students' present and future needs.

6. The teaching of mathematics is shifting from primary emphasis on paper-and-pencil calculations to full use of calculators and computers.

7. The public perception of mathematics is shifting from that of a fixed body of arbitrary rules to a vigorous, active science of patterns.

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[a]Adapted from *Everybody Counts*, National Research Council, 1989.

computational "basics," to give short shrift to such goals as developing inquiry and problem-solving skills, and to ignore the need for students' active involvement in mathematics and science learning. There are many reasons why this occurs, including the fact that students in these schools less often have contact with teachers highly qualified to teach mathematics (Oakes, 1990). Another problem is that, as with reading and writing, many teachers, curriculum planners, and even many parents too easily slip into the belief that the students cannot, or should not, be expected to handle anything more. The vignette in the introduction to this volume of Mr. Gates' mathematics classroom illustrates what can result from such low expectations: students do not even get the basics, let alone anything more sophisticated.

All of this suggests that a random sample of classrooms serving high proportions of children from low-income families would show a rather depressing picture of mathematics curriculum and instruction. However, as was explained in Chapter II, the sample of classrooms included in this study was not selected at random. The goal was to include more classrooms than average in which alternative approaches to curriculum and instruction are in use, and more classrooms in which the achievement of disadvantaged students is high, relative to the general population of classrooms serving these children. As a result, the study has been able to focus in some depth, over a period of nearly two full academic years, on a number of classrooms in which interesting departures are being made from traditional or modal practices in elementary mathematics education.

In these mathematics classrooms, we looked carefully at various aspects of both curriculum and instruction to determine what different patterns of curriculum and instruction might exist and then to identify the factors that seem to explain best why a certain pattern prevails in some classrooms but not in others. Before identifying different approaches to mathematics instruction--which is the topic of the next chapter--we begin in this chapter with a description of mathematics curriculum and instruction in the full sample of classrooms by addressing three questions: What is taught in mathematics across grades and across the year? Who teaches mathematics? How is mathematics taught? We answer these questions descriptively, by presenting data for each grade. Because there were various differences in the way variables were defined or data collected across the 2 years of the study, we present paired tables for each section of the discussion, one table for grades 1, 3, and 5 (from Year 1) and the other for grades 2, 4, and 6 (from Year 2). In discussing these tables, we focus on patterns common to both, while noting important differences across years that may arise.

What Is Taught in Mathematics Across the Year

Mathematics--or arithmetic, at least--has long been considered one of the basic subjects in the curriculum, something that is necessary for all students to learn. Study data confirm what one would expect to find: that arithmetic computation dominates the curriculum. Tables 5a and 5b summarize data about what is taught across the year, by grade.

Teacher log data were used to determine the major topics emphasized day by day across the school year. Teachers were able to indicate any one or any combination of five topics each day (e.g., arithmetic, geometry), as well as a catchall "other" category. To discriminate further within the topic of arithmetic, teachers were instructed to mark which operations and quantities were involved (such as multiplication of decimals), using a matrix to represent various possibilities. (See Volume 2 for a copy of the teacher logs used in each year of data collection.)

Across the year in each grade from 1 to 6, about 75 percent of all days that mathematics was taught teachers marked "arithmetic" as one of the main topics of instruction. If anything, these data underestimate the emphasis on arithmetic. For example, the "measurement" category was to be marked only when specific units of measurement were being taught--such as feet and inches--but some teachers inappropriately marked this category if arithmetic problems involved measurements, even though students had long since learned the units and were instead being drilled on arithmetic computation.

No other topic besides arithmetic was marked as often as one-third of the time at any grade level. Measurement (including computation practice with units of measure) was the next most commonly marked topic by teachers--especially in the second year of data collection, and notably at the second-grade level (where it was taught 27 percent of all days). The few other topics that apparently account for large amounts of time--such as 21 percent for "other" in grade 1--actually represent multiple topics (in that case, including logic puzzles, odd versus even numbers, primes, properties such as commutativity, the definition of negative numbers, etc.). Taken as a whole, the curriculum in the typical classroom at all six grade levels places far greater emphasis on arithmetic computation than on any other topic. There was, however, significant variation in the curriculum among classrooms. For example, even though measurement was the second most frequently taught topic (after arithmetic), more than 30 percent of all the teachers in the first year indicated that they never taught measurement, while the comparable figure for geometry in that year was about 40 percent. The differentiation in mathematical topics taught from classroom to classroom--and the consequences in terms of student outcomes--is a theme to which we will return in the next two chapters.

Computer programming (e.g., learning the Logo computer language) is an example of a topic that one might have expected to see, but that was not encountered in any of the many dozens of site visits. Statistics and probability is another topic seldom addressed in these classrooms--during the first year, 70 percent of the teachers never taught it. Both of these topics (particularly the latter) are examples of content areas that the mathematics education community would like to see receive more time and attention in the elementary grades--as suggested, for example, in the NCTM's *Curriculum and Evaluation Standards for School Mathematics*. Although most topics other than arithmetic received little attention, the averages presented in Tables 5a and 5b mask some important differences, with some classrooms at each grade level covering a significantly broader array of topics than the majority.

Although the dominance of arithmetic computation was to be expected, it is still somewhat surprising how many years are devoted not simply to arithmetic, but to the arithmetic of whole numbers. Thus, even as late as fifth grade, nearly half of all the time spent teaching arithmetic is devoted to teaching the four basic operations as applied to whole numbers. Only one other topic in arithmetic--instruction about numeration of decimals (i.e., place value)--made it into the six most frequently taught arithmetic topics at the fifth-grade level (and with a rather low frequency, at that). This finding echoes those of many earlier studies that have emphasized the high degree of repetition and review found in the mathematics curriculum of the

Table 5a

WHAT IS TAUGHT IN MATHEMATICS ACROSS THE YEAR, BY GRADE (YEAR 1)

Variables	Grade 1 (n = 25)	Grade 3 (n = 24)	Grade 5 (n = 22)
Mathematical topics: Of all days of math instruction, the average percentage that emphasized--			
Arithmetic	73 (18)[a]	80 (18)[a]	75 (20)[a]
Geometry	7 (9)	13 (19)	8 (9)
Measurement	12 (12)	16 (15)	13 (21)
Statistics/probability	0 (1)	3 (7)	1 (2)
Graphs	4 (3)	11 (15)	6 (6)
Other (e.g., logic puzzles)	21 (25)	13 (16)	9 (15)
Focus of instruction: Of all days of math instruction, the average percentage that emphasized--			
Teaching basic skills	40 (23)	44 (25)	43 (26)
Developing conceptual understanding	47 (24)	48 (24)	45 (24)
Routine applications	34 (25)	44 (23)	38 (24)
Applications to novel problems	18 (23)	23 (20)	23 (23)
Six most frequently taught topics in arithmetic: Percentage of all "topic-days" in arithmetic[b]--			
Whole numbers:			
Numbers/numeration	22	15	5
Operations			
Addition	29	18	4
Subtraction	23	16	--
Multiplication	--	18	12
Division	--	7	16
Combination (+,-,x,/)	5	7	10
Other	10	--	--
Number sentences	3	--	--
Decimals: Numbers/numeration	--	--	6

a - Standard deviations appear in parentheses.

b - Teachers could indicate on the log up to three topics per day. The total "topic-days" thus exceeds the actual number of instructional days.

Table 5b

WHAT IS TAUGHT IN MATHEMATICS ACROSS THE YEAR, BY GRADE (YEAR 2)

Variables	Grade 2 (n = 22)	Grade 4 (n = 22)	Grade 6 (n = 16)
Mathematical topics: Of all days of math instruction, the average percentage that emphasized--			
Arithmetic	72 (14)[a]	74 (10)[a]	76 (13)[a]
Geometry	7 (5)	11 (11)	9 (7)
Measurement	27 (11)	22 (11)	17 (19)
Graphs/data/statistics	13 (21)	12 (12)	11 (12)
Logic problems, puzzles, problem-solving strategies[b]	22 (22)	32 (18)	23 (21)
Other	6 (7)	6 (6)	3 (3)
Focus of instruction: Of all days of math instruction, the average percentage that emphasized--			
Teaching basic skills	58 (20)	68 (13)	69 (21)
Developing conceptual understanding	64 (19)	64 (20)	60 (21)
Routine applications	23 (25)	33 (20)	36 (18)
Applications to novel problems	18 (19)	20 (18)	21 (17)
Primary focus of arithmetic instruction: Of all days on which arithmetic was taught, the percentage that emphasized--			
Whole numbers	99	80	31
Fractions	1	11	22
Mixed numbers	--	3	13
Decimals	--	6	34

a - Standard deviations appear in parentheses.

b - This item is different from the Log item used in Year 1. Because the teaching of problem-solving strategies is usually integrated with the teaching of particular content (such as arithmetic or geometry), the item as used in Year 2 may be misleading in apparently representing problem solving as a distinct topic. (See also Table 7b concerning teaching strategies in Year 2.)

United States.* It is only at the sixth-grade level that the arithmetic of whole numbers takes a clear back seat to arithmetic involving decimals, fractions, and mixed numbers. Nonetheless, arithmetic is still by far the dominant topic in mathematics at grade 6. Despite the recent NCTM *Standards* (which place greater emphasis on graphing, data analysis, geometry, and many other topics), long-standing practices are difficult to change.

It is important to focus not only on what is taught in mathematics, but also on what the goals of mathematics instruction are conceived to be. In this regard, it is noteworthy that at three of the six grade levels (1, 3, and 5), teachers say they devote fewer than half the days to developing conceptual understanding, while at two others (4 and 6) they report spending more time teaching "basic skills" than they do to developing conceptual understanding. This is troubling because it shows that students are being taught to perform computation without sufficient attention to what the operations mean, why they work, or when one would want to use them. Other study data are consistent with this conclusion. For example, during a round of visits in the first year of the study, observers found that in one-third of the classrooms the <u>entire</u> emphasis of mathematics instruction appeared to be on getting the right answer rather than on understanding the process by which problems are solved. Similarly the data in Tables 5a and 5b show that much of the arithmetic instruction is "context free," with teachers devoting attention to either novel or routine applications on only about half of all days. In other words, much of the time arithmetic computation is taught without reference to any application at all, making it impossible for students to use the context of the problem as a way to model or understand the arithmetic.

The balance between an emphasis on teaching skills in isolation and teaching for conceptual understanding is a matter of importance to which we will return in later chapters. Here, we simply note that many other studies, such as the National Assessment of Educational Progress, have found cause for concern about the lack of understanding of mathematical concepts displayed by

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*See, for example, *The Underachieving Curriculum* (McKnight et al., 1987).

students in the United States, and their inability to apply concepts to applications.

By teachers' own reports (on the logs) only about one day in five were students exposed to "novel" problems--and in both years observers reported a smaller percentage than this. The routine problems dominate. This means, for example, that while studying addition of whole numbers, students can expect virtually all the problems to require addition of whole numbers and, most likely, nothing else. This pattern of instruction does not seem optimal for development of thinking skills.

Who Teaches Mathematics

The typical teacher in the mathematics classrooms in this study has been teaching at the same grade level for many years and has substantial experience with students similar to the ones she (or he) is now teaching. The data in Tables 6a and 6b provide information about these and various other characteristics of the instructional staff, by grade level.

Data on the instructional staff from Years 1 and 2 of the study were derived from different kinds of sources--from observers' coding forms in Year 1 and from a staff survey in Year 2. In most respects, the data are comparable across years. However, teachers seem to report a richer background for teaching mathematics than what was estimated by observers, and teachers also seem to report slightly more optimistic expectations for their students than was perceived by the observers. These results are perhaps not surprising.

Sixth-grade teachers of mathematics report the least satisfaction with teaching, compared with those in other grades. One possible explanation is that social problems among the students--e.g., drugs, fighting, alienation from school--may be more pronounced at this level than in the earlier grades.

Table 6a

STAFF WHO TEACH MATHEMATICS IN SAMPLE CLASSROOMS, BY GRADE (YEAR 1)

Characteristics of Mathematics Instructional Staff	Grade 1 (n = 25)	Grade 3 (n = 21)	Grade 5 (n = 23)
Numbers and types of staff			
• Number of instructional staff in the regular classroom for mathematics	1.8 (.6)[a]	1.7 (.6)[a]	1.4 (.5)[a]
• Pupil/staff ratio	14:1 (6)	16:1 (8)	19:1 (7)
• Percentage of classrooms with additional staff--			
A second regular teacher	1 (7)	17 (37)	7 (22)
An aide	54 (40)	40 (43)	21 (33)
Staff expertise and experience			
• Number of years teaching--			
This grade	8 (5)	8 (8)	7 (7)
These kinds of students	10 (6)	10 (7)	9 (8)
• Richness of teachers' background for teaching mathematics: Index scaled from 1 (= least) to 6[b]	2.5 (1.0)	2.6 (1.4)	2.4 (1.5)
Attitudes			
• Teachers' satisfaction with teaching as a career and with support in current position: Index scaled from 1 (= least) to 4[c]	3.2 (.6)	3.1 (.7)	3.1 (.8)
• Teacher expectations for student success in mathematics: Index scaled from 1 (= most students won't be able to succeed) to 4 (= all can succeed at grade level)[c]	2.7 (.6)	3.1 (.9)	2.7 (.9)

a - Standard deviations appear in parentheses.

b - Index summing categories of preservice and inservice professional development activity related to mathematics, based on observer coding.

c - Observers' ratings of teacher satisfaction and expectations for student success.

Table 6b

STAFF WHO TEACH MATHEMATICS IN SAMPLE CLASSROOMS, BY GRADE (YEAR 2)

Characteristics of Mathematics Instructional Staff	Grade 2 (n = 22)	Grade 4 (n = 22)	Grade 6 (n = 16)
Numbers and types of staff			
• Number of instructional staff in the regular classroom for mathematics	1.8 (.7)[a]	2.1 (1.1)[a]	1.4 (.5)[a]
• Pupil/staff ratio	15:1 (7)	16:1 (10)	24:1 (8)
• Percentage of classrooms with additional staff--			
A second regular teacher	13 (34)	6 (25)	0 (0)
An aide	69 (48)	63 (50)	50 (55)
Staff expertise and experience			
• Number of years teaching--			
This grade	6 (5)	5 (3)	10 (7)
These kinds of students	9 (7)	10 (8)	11 (10)
• Richness of teachers' background for teaching mathematics: Index scaled from 1 (= least) to 6[b]	4.1 (1.7)	4.1 (1.5)	3.6 (1.3)
Attitudes			
• Teachers' satisfaction with teaching as a career and with support in current position: Index scaled from 1 (= least) to 4[c]	3.4 (.6)	3.3 (.7)	3.1 (.9)
• Teacher expectations for student success in mathematics: Index scaled from 1 (= most students won't be able to succeed) to 4 (= all can succeed at grade level)[c]	3.3 (.5)	3.4 (.5)	3.2 (.7)

a - Standard deviations appear in parentheses.

b - Index summing categories of preservice and inservice professional development activity related to mathematics, based on teacher self-report.

c - Teacher self-report of teacher satisfaction and expectations for student success.

Organization and Format of Mathematics Instruction

This study confirms what many earlier studies (e.g., Stodolsky, 1988) have found: that elementary mathematics instruction is heavily weighted toward a narrow spectrum of instructional techniques, especially teacher lecturing and seatwork. This holds true for the classrooms in this study, as shown in Tables 7a and 7b. For example, in Year 1 fully three-fifths of the mathematics period was typically used for seatwork by students, according to the observers. Many instructional techniques used in other subjects (such as use of reference materials and trade books, or project work) are missing in the typical mathematics class.

Teacher lecture/explanation was not only common, but (as indicated earlier) often was lacking in application to real-life problems (aside from basic financial transactions). Also, skills were typically taught in isolation from one another. As an example of the "one-dimensional" quality of much teacher presentation, observers noted during an early round of the observations that 40 percent of the teachers represented a mathematical idea in just one way during the observed lesson. Thus--to offer a concrete example-- instead of representing a fraction as a ratio, as a geometric picture (such as a pie sliced appropriately), and as a subset of individuals in the class compared with the whole class, many teachers selected a single representation (a ratio, say) and never provided alternative representations to unlock the imagination of the students.

Although the study data do show that some discussion occurred about 30 percent to 40 percent of the days in mathematics, most of the discussion was of a restricted form. A typical discussion of a mathematics word problem might focus on who in the class can identify the key words that supposedly indicate what arithmetic operation is called for (words and phrases like "how many more than," "have left," and "in all"), or who can define some specialized term (e.g., quotient, divisor). Few discussions in mathematics call on students' personal knowledge or ask students to pose questions of their own or respond to open-ended or complex questions posed by the teacher. The NCTM *Standards* call for teachers to use more such techniques, which require a different kind of student participation.

Collaborative work with peers sometimes involves enthusiastic participation in games (e.g., the mathematical equivalents of spelling bees), but most often it is a restricted activity, directed largely by the teacher. In contrast to open-ended problems that may be posed, say, to reading groups ("decide what is the main idea in the chapter and be ready to provide evidence for your choice"), student groups in mathematics most often work on the same short, one- or two-step problems they normally do by themselves. Typically, they work with the students seated just next to them (e.g., at a small cluster of desks). In a few cases, teachers in the sample classrooms made efforts to group students of different ability levels, but this was much more the exception than the rule.

The study data concerning mathematics homework are not consistent between the first and second years. According to the teacher logs, homework was assigned in grades 1 and 3 only about one-third of the time that mathematics was taught, and only slightly more often (39 percent) in grade 5. However, during the second year, teachers in grades 2, 4, and 6 reported that homework was assigned closer to 70 percent of the time.* In either case, assignments are typically very short, which is consistent with the low number of minutes the National Assessment of Educational Progress (NAEP) reports students spend weekly on mathematics homework--for example, 61 percent of third graders reported to NAEP that they do one-half hour or less of mathematics homework <u>each</u> <u>week</u> (Dossey, Mullis, Lindquist, & Chambers, 1988). A number of teachers in the study appeared to be ambivalent about homework, feeling that the students most in need of help and those with the least supportive home environment were least likely to complete homework--and thus would fall farther behind their peers if homework were frequently assigned. Therefore, these teachers felt that lengthy homework assignments would simply exacerbate differences among students.

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* The phrasing of the item concerning homework in the Year 1 logs made it more likely that teachers might inadvertently omit it. Adjustments to the Year 2 log probably mean the data from this year are a better representation of homework rates.

Table 7a

ORGANIZATION OF MATHEMATICS INSTRUCTION AND ASSOCIATED LEARNING ACTIVITIES, BY GRADE (YEAR 1)

Variables	Grade 1 (n = 25)	Grade 3 (n = 24)	Grade 5 (n = 22)
Teacher-directed instruction: Extent of responsibility given students to guide their own learning, on a scale from 1 (= entirely teacher-directed) to 5 (= entirely student-directed)	2.3 (.9)[a]	2.1 (.8)[a]	2.0 (.7)[a]
Grouping: Percentage of classrooms using some form of grouping for mathematics instruction	24 (35)	35 (43)	40 (45)
Student activities: Of all days of mathematics instruction, average percentage on which students--			
Did individual seatwork	54 (26)	60 (18)	56 (21)
Listened to teacher presentation or explanation	44 (28)	50 (25)	54 (23)
Engaged in class discussions	33 (23)	38 (26)	35 (23)
Worked collaboratively with peers	25 (20)	23 (22)	30 (22)
Took tests or other assessments	8 (6)	19 (13)	12 (7)
Homework: Of all days of mathematics instruction, average percentage on which new homework was assigned	37 (29)	37 (22)	39 (25)
Seatwork: Average percentage of class time spent on seatwork	60 (40)	59 (63)	64 (71)

a - Standard deviations appear in parentheses.

Table 7b

ORGANIZATION OF MATHEMATICS INSTRUCTION AND ASSOCIATED LEARNING ACTIVITIES, BY GRADE (YEAR 2)

Variables	Grade 2 (n = 22)	Grade 4 (n = 22)	Grade 6 (n = 16)
Teacher-directed instruction: Extent of responsibility given students to guide their own learning, on a scale from 1 (= entirely teacher-directed) to 5 (= entirely student-directed)	1.7 (.7)[a]	1.5 (.6)[a]	1.6 (.7)[a]
Grouping: Percentage of classrooms using some form of grouping for mathematics instruction	44 (39)	42 (41)	43 (44)
Student activities: Of all days of mathematics instruction, average percentage on which students--			
Did individual seatwork	66 (18)	68 (19)	66 (15)
Listened to teacher presentation or explanation	65 (24)	77 (19)	68 (17)
Engaged in class discussions[b]	58 (23)	64 (25)	55 (21)
Worked collaboratively with peers	35 (18)	36 (19)	29 (18)
Homework: Of all days in mathematics, average percentage on which there was--			
Arithmetic computation homework	48 (26)	57 (16)	61 (15)
Other mathematics homework	26 (25)	24 (19)	17 (12)
No mathematics homework	39 (26)	28 (15)	29 (12)
Seatwork: Average percentage of class time spent on seatwork[c]	48 (37)	41 (28)	35 (19)

a - Standard deviations appear in parentheses.

b - These data are based on teacher logs. Observers in Year 2 estimated that class discussions occurred far less often--about 40 percent of the days during which observations were made.

c - The increase in teacher-directed instruction in Year 2 may be explained partly by subtle changes in coding rules (see "Measurement Notes" in Volume 2), as well as a decrease in seatwork and a corresponding increase in teacher presentation or explanation.

These techniques--mainly seatwork and teacher lecture/explanation, plus class discussions, group work, and homework (including in-class review)--account for the great majority of instructional time in mathematics. Not only is the set of techniques a rather limited one (at least as implemented), but the net result is that, on average, teachers spend more days focusing on skills, procedures, and routine applications (such as simple word problems) than they do developing students' understanding of mathematical concepts or challenging students with complex or novel problems. The question of the appropriate balance between a skills approach and a conceptual approach to mathematics is considered below.

The total amount of time devoted to mathematics instruction was about 45 minutes (Year 1) to 50 minutes (Year 2) per day at each grade level (setting aside those few days on which mathematics was not taught at all). Most of the classrooms allocated more than twice that amount for instruction in language arts (including reading). Only in the school with the science and mathematics magnet program did the time allocated for mathematics differ significantly from the overall average. There, the typical time devoted to mathematics instruction was about 70 minutes per day.

In recent years, there has been an increasing interest in the use of two different sets of materials in mathematics instruction: mathematics manipulatives (such as Unifix cubes and Cuisenaire rods) and technological devices (notably calculators and computers). Most advocates of mathematics education reform believe that there should be a growing use in elementary schools of tools for doing, and for understanding, mathematics. Numerous meta-analyses show that manipulatives can increase student achievement in mathematics (see, for example, Walberg, 1990), and similar findings have been reported for calculators for more than a decade (e.g., Suydam, 1979). The use of calculators and computers is being promoted not simply to increase achievement, however, but for many other reasons, notably encouraging students to develop facility with the commonplace tools for doing mathematics that are now a routine part of the workplace and the home environment.

The study data show a mixed picture regarding use of these types of materials. As shown in Tables 8a and 8b, mathematics manipulatives were used quite often in Grade 1 (more than 40 percent of all days). However, their use declined in the upper grades. Although in an abstract way this seems appropriate, a review of NAEP data and many other sources suggests that very large proportions of students in the upper elementary grades still would benefit from concrete representations of such concepts as fractions, percents, speed and distance problems, and so forth.*

Calculator use occurred on very few days at any of the six grade levels under study. By contrast, computers were used by students in about two-thirds of the classrooms, although not necessarily on a regular basis. Few of the classrooms had their own computer. Instead, in nearly every instance computer use took place in a computer lab and featured the use of drill-and-practice software or arithmetic-based games providing such drill and practice. The use of software designed to teach higher-order thinking skills was very rare.

Teachers relied heavily on the mathematics textbook in most cases. In both years, the data show that the teachers in the earlier grades were more comfortable than those at the higher grades providing instruction that was not based directly on the text. Those teachers who either depart significantly from the textbook in use or who are following textbooks with an unusual orientation (as defined by modal practice) form an interesting subpopulation. (An example of a nontraditional text used by teachers in the sample is *Developing Mathematical Processes*, or DMP, developed by the Wisconsin Research and Development Center.) Often, nontraditional textbooks put a greater emphasis on topics besides arithmetic computation. Similarly, in one state, new textbooks adopted by the state for elementary mathematics do embody a somewhat broader conception of the content of the subject. (This issue is explored further in Chapter XV.)

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* For example, on the 1985-86 NAEP mathematics assessment only about 40 percent of seventh-grade students could correctly identify the point on a number line that represented a simple fraction, like 1-1/2, suggesting that at least 60 percent could benefit from more practice with concrete representations of fractions (Lindquist, 1989).

Table 8a

MATERIALS AND TECHNOLOGY USED IN MATHEMATICS INSTRUCTION, BY GRADE (YEAR 1)

Variables	Grade 1 (n = 25)	Grade 3 (n = 24)	Grade 5 (n = 22)
Teaching with manipulatives and educational technology			
• Of all instructional days, the percentage on which manipulatives (e.g., cubes) were used	43 (25)[a]	23 (22)[a]	14 (13)[a]
• Percentage of classrooms in which computers were used at some time during the year	64 (49)	72 (46)	76 (44)
• Of all days of mathematics instruction, the percentage on which the following were used:			
Calculators	0 (0)	3 (5)	5 (8)
Computers	7 (11)	8 (9)	9 (11)
Reliance on a traditional textbook			
• Observer ratings, from 1 (= little or no use of textbook) to 4 (= exclusive reliance on textbook)	2.5 (1.0)	2.0 (.9)	2.0 (.8)

a - Standard deviations appear in parentheses.

Table 8b

MATERIALS AND TECHNOLOGY USED IN MATHEMATICS INSTRUCTION, BY GRADE (YEAR 2)

Variables	Grade 2 (n = 22)	Grade 4 (n = 22)	Grade 6 (n = 16)
Teaching with manipulatives and educational technology			
• Of all instructional days, the percentage on which manipulatives (e.g., cubes) were used	44 (17)[a]	25 (14)[a]	17 (14)[a]
• Percentage of classrooms in which computers were used at some time during the year	73 (45)	62 (50)	63 (50)
• Of all days of math instruction, the percentage on which the following were used:			
Calculators	3 (5)	8 (9)	9 (10)
Computers	11 (10)	13 (11)	10 (11)
• Number of computers (in building) used for mathematics	13 (10)	12 (11)	13 (14)
Reliance on a traditional textbook			
• Observer ratings, from 1 (= little or no use of textbook) to 4 (= exclusive reliance on textbook)	2.5 (.8)	2.1 (.9)	1.8 (.6)

a - Standard deviations appear in parentheses.

Summary

To summarize, mathematics instruction in the sample classrooms is--on average--much like that provided throughout the United States. Arithmetic dominates the curriculum, which is repetitive from year to year. Instruction throughout a given year typically moves from topic to topic (addition of fractions, multiplication of decimals, etc.) without increasing the emphasis on thinking skills, conceptual understanding, or applications. However, different types or clusters of classrooms in the study represent several distinct ways of teaching mathematics, some of which offer students more than arithmetic-as-usual. In the next chapter, we discuss and illustrate the types of classrooms observed.

IV ALTERNATIVE APPROACHES TO CURRICULUM AND INSTRUCTION IN MATHEMATICS

In providing a descriptive overview of what is taught in mathematics and how it is taught, the preceding chapter may have conveyed an impression of uniformity across the classrooms we have studied. Nothing could be farther from the truth (a fact guaranteed by our sampling criteria, by which we sought to ensure variation in approaches). There were, in fact, substantial differences among classrooms in the way teachers viewed mathematics, constructed learning activities, and guided the learning of the students for whom they were responsible. Although, on average, many teachers tended toward a "conventional" profile of curriculum and instruction, others departed in various degrees from conventional practice.

The purpose of this chapter is to portray the most significant variations in approach to mathematics among the study's classrooms. To do so, we first discuss two broad strategies for introducing more challenging mathematics into the classroom. These strategies form the basis of a typology, by which classrooms in both years can be grouped. We then describe and illustrate each type, and finally show how the types are distributed among different student populations, categories of teacher, and school settings.

Overarching Strategies for Maximizing Mathematical Understanding and Problem-Solving Proficiency

Two overarching strategies for maximizing mathematical understanding and problem-solving proficiency form the basis for examining and analyzing what took place in sample classrooms: (1) orienting curriculum and instruction toward conceptual understanding of the material, and (2) broadening the range of the mathematical content studied. By selecting these two, we hypothesized that they would identify forms of mathematics instruction that were more powerful for the segment of the student population on which the study concentrated. Below, we discuss each overarching strategy in turn.

By focusing attention on these two strategies, we do not mean to imply that other dimensions of instruction (e.g., maximizing time on task, using educational technology) are unimportant. Quite the opposite is the case: many features of instruction having important effects on student learning have been well documented. Instead, we concentrated on these two strategies because they focus attention on the aspects of content and approach that are so often given short shrift in the schooling of children from low-income backgrounds (see Zucker, 1991).

Teaching for Conceptual Understanding: Beyond a Skills Approach

In the preceding chapter we raised the question of the relative attention paid to developing, on the one hand, skills or routine applications and, on the other, understanding of mathematical concepts or ideas. We noted that many teachers in the sample appear to overemphasize the former at the expense of the latter. Two contrasting examples may help to illustrate the differences in approach. (Somewhat extreme examples have been selected for the purpose of contrast.)

- A procedural skills approach: long division taught to remedial students. The math resource specialist at the school has gathered about a half-dozen fifth graders into his cramped office for a lesson before lunch. The students have a hard time concentrating. Mr. Koyashi asks the students to divide 52 by 6, in long division form. A number of the students make sizeable errors as they attempt to do the problem. As they finish, he comments to the group, "I had some of you do the steps in the wrong order. Remember, 'divide, multiply, subtract, bring down.' An easy way to remember this is as 'Daddy, mommy, sister, brother.'" This mnemonic refers to the steps in which long division problems should be done. Using the example on the board as a model, the students practice with some more problems.

- A conceptual approach: multiple solutions to word problems. Ms. Romero's questions are posed, she told the observer, to get her students to think and, when possible, to answer their own questions. On one occasion she asked a student to describe the process he used in arriving at the answer to an arithmetic-based word problem. Although the student's method (which he explained to the class) was correct, she asked the group if there was another way to solve the problem. A second student described a different approach, also correct. There was then a class discussion of the merits of solving the problem using the two techniques. During the course of the discussion, students in effect modeled for one another the process of understanding the problem and representing it in terms of arithmetic operations. Comparing the two approaches raised a number of interesting conceptual questions about the mathematical equivalence of what appeared superficially to be unrelated sequences of operations.

The latter example features a series of instructional strategies used by various teachers within the sample to enhance students' conceptual grasp of the mathematics they were learning:

- Constructing mathematical problems that had more than one correct answer.
- Focusing on the process of solving problems as well as the answer(s), and explicitly acknowledging alternative ways of arriving at solutions.
- Deemphasizing rote "formula" solutions to mathematical problems.
- Engaging students in discussion about the mathematical ideas or procedures involved.
- Teaching or modeling ways to probe the meaning of mathematical problems or procedures.

Other strategies, not illustrated in this vignette, had a similar purpose.

- Creating multiple representations of mathematical ideas.
- Applying mathematical ideas or procedures to "real-life" situations and nonroutine problems, in particular, those that children might encounter in their lives outside of school.

The use of these contrasting examples is not intended to imply that an emphasis on skills and procedures is "bad" and an emphasis on concepts is "good." All mathematics classrooms that we observed--perhaps all mathematics classrooms in the nation--include some emphasis on both. The questions that are important, and complex, have to do with the proper balance between these approaches, ways to combine and reinforce the two, and when to focus on one or the other.

The study's literature review (Knapp & Shields, 1990) and other work (e.g., Porter, 1989) strongly support the idea that developing students' conceptual understanding of the mathematics they are taught (a) should be a central goal of instruction and (b) too often is not, in fact, a central feature of classroom practice. This would certainly help to explain why students do poorly on conceptual items (in NAEP, for example).

Expanding the Range of Content Across the Year: Beyond Arithmetic

Of all of the transitions in elementary mathematics education that are under way, the one that seems most important is the increasing variety that is being introduced into the curriculum. Slowly, the curriculum is moving away from a single-minded emphasis on developing arithmetic computation skills. Some reports (e.g., McKnight et al., 1987) have claimed that the almost obsessive preoccupation with arithmetic is one of the central problems explaining the poor performance of American students, especially those from economically disadvantaged backgrounds. If these students are to think mathematically and solve problems in domains beyond arithmetic, then they must be exposed to these domains. Therefore, an important dimension on which to examine classrooms in the study is the range of content taught across the year--in particular, the extent to which this goes beyond arithmetic.

The teacher logs and the coding forms developed for the study, coupled with such other sources of data as teacher interviews and examination of materials (e.g., textbooks), allow the classrooms to be described on this dimension in fairly rich terms. The mathematics taught in the sample classrooms varies from a nearly total orientation toward arithmetic computation in some, to others in which a much wider range of material is taught (such as graphing, statistics and data analysis, geometry, measurement, and logic problems or puzzles). In some of the classrooms, surprisingly little time and attention are focused on arithmetic, per se.

Examples from two third-grade classrooms may help to illustrate how the differences in content covered across the year look to an observer:

- Arithmetic only: a focus on "basic skills." In the district where Ms. Thompson teaches, the scope-and-sequence for third-grade mathematics is one page long. Most of it focuses on arithmetic. The other strands (such as problem solving and geometry) consist of a single objective apiece (except for measurement, which has two objectives). For example, the only objective for graphs and statistics is "interpret a bar graph"--nothing whatever about constructing any type of graph, chart, or table. The observed curriculum in this particular classroom was even more narrow, focusing entirely on computation skills (including some drill-and-practice sessions in the computer lab). Problem solving, thinking skills, and word problems were simply not emphasized here.

  The textbook was the major source of materials used for instruction. During the year, Ms. Thompson focused on such skills as "carrying," "regrouping," and the multiplication facts. Some use was made of manipulatives; for example, the teacher used popsicle sticks to illustrate multiplication. However, she feels more confident about teaching reading and language arts than mathematics and used a very limited repertoire of instructional techniques in mathematics. Nonetheless, Ms. Thompson maintained a high degree of student engagement in mathematics and made it clear she felt that mastery of basic skills was important. Some of her comments to students were: "We have to keep at this," "I'm sure we can get it," and "I want to write 100 on every paper."

- A broader array of topics: variety by design. The curriculum in Mr. Chung's school was developed by the teachers. It is closely aligned to objectives set by the state (including statewide assessments of student achievement) and by the district. Textbooks are the source of some materials used, but many others were developed by the teachers themselves. The school's own scope-and-sequence for third-grade mathematics is lengthy (six pages) and detailed. The portion of the document covering "numbers and number systems," which includes arithmetic computation, is only one-third of the whole scope-and-sequence. That strand plus two others--geometry and measurement--are considered the "core" of the third-grade mathematics curriculum. In addition, five other strands are integrated into the year's work: problem solving, logical reasoning, statistics and probability, patterns and sequences (which are also called functions in some documents).

  Despite the lengthy list of topics and skills to be covered, Mr. Chung's class had completed the third-grade curriculum by May and began working on some fourth-grade skills. One of the teacher's key strategies for covering a lot of material was to present students with problems that require more than routine skills, are carefully sequenced, and involve groups of students. Student groups reported to the whole class about their success or lack of success in completing the problems, on their social interaction, and on their feelings. On occasion, students were asked to make up their own problems. Answers to many oral questions were expected to be made in complete sentences and while standing (a tradition in the country where this teacher had taught earlier). Each student's parent had to sign his/her homework sheet every night of the week.

Once again, it is important to clarify that teaching arithmetic is not "bad." Instead, the balance of the curriculum is what is of interest and, in particular, the extent to which teachers range beyond the all-too-common unitary focus on arithmetic. It should also be emphasized that arithmetic can easily be taught in a much broader context than in most classrooms, so that the teaching of graphs, statistics, data analysis, geometry, and other subjects includes continuing attention to mastery of arithmetic.

Setting up two overarching strategies allows us to look at the intersection of the two. For example, are the teachers who focus on a broad array of topics the same ones who teach for conceptual understanding? In the next section we develop further the idea of a matrix of classrooms.

Measuring the Overarching Strategies

We measured the extent to which classrooms adopted each strategy by creating index variables based on the teacher logs and observational data, as follows:

- Degree of focus on conceptual understanding. The first index measures the extent to which observed instruction focused on conceptual understanding. It is based on the coding form completed by an observer after each classroom visit. One item used to create the index asks, "In what ways did mathematics instruction during this period get at conceptual understanding?" Of the eight choices, only one indicates "no real focus on conceptual understanding," and this was assigned a value (for the index) of zero. Any other choice was rated a "1."

  Similarly, a second and third item ask about applications of mathematics to nonroutine problems* and (separately) to the life

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* In the second year of the study, a slightly different item on nonroutine problems was used to measure this index, also from the observer coding form. The distributions of values of the index in Years 1 and 2 are nonetheless very similar.

situations of the children. If either of these responses was affirmative (the teacher used this approach to instruction), it was similarly given a value of "1." The index is then the average of the sum of these three values across the visits. The maximum possible value is 3 (if all three approaches to instruction were used during each observed period), while the minimum is zero.

- Range of topics. The second index measures the extent to which content over the year includes topics besides arithmetic. The index is based on the teacher logs. The item used to create the index identifies which topic (or topics) was the focus of instruction for each day mathematics was taught. The index, for each teacher, is then formed by summing the proportion (of all days on which math was taught) of days on which each topic other than arithmetic was taught. The minimum value possible is zero, and the maximum possible (if all other topics were taught each day throughout the year) is 5.

There is considerable variation on both indices, and the two are not highly correlated with one another, although there is some degree of association. The indices correspond well to the reports of the observers who visited the classrooms. (Note that the total number of classrooms for which both indices are available is slightly fewer than the total number of classrooms in the study sample, primarily because teachers in one district did not complete teacher logs.)

Differences in Overarching Strategies by Grade

There was relatively little difference across grades in the average values for the indices measuring the use of strategies for maximizing mathematical understanding and problem-solving proficiency, as shown in Tables 9a and 9b. This fact is not surprising, given the fact that classrooms were selected for variation in approach (among other factors, as discussed in Chapter II). Although one might anticipate systematic differences in the indices reflecting the age level of the children, the data do not show this to be the case.

The table also presents generally low average values for the range-of-topics index across all the grades. This means that arithmetic dominates the curriculum, as noted earlier in the chapter; thus, very few other topics (such as measurement or geometry) are taught on the average day.

Table 9a

OVEARCHING STRATEGIES FOR MAXIMIZING MATHEMATICAL UNDERSTANDING AND PROBLEM-SOLVING PROFICIENCY, BY GRADE (YEAR 1)

Overarching Strategies	Grade 1 (n = 25)	Grade 3 (n = 24)	Grade 5 (n = 22)
Emphasis on conceptual understanding, novel problems, and real-life applications: Index ranging from 0 (= no emphasis) to 3 (= high emphasis)	1.6 (.6)[a]	1.1 (.7)[a]	1.6 (.8)[a]
Range of topics: Index ranging from 0 (= no other topics besides arithmetic ever taught) to 5 (= multiple topics besides arithmetic taught every day)	1.5 (.9)	1.8 (1.2)	1.2 (.9)

a - Standard deviations in parentheses.

Table 9b

OVERARCHING STRATEGIES FOR MAXIMIZING MATHEMATICAL UNDERSTANDING AND PROBLEM-SOLVING PROFICIENCY, BY GRADE (YEAR 2)

Overarching Strategies	Grade 2 (n = 26)	Grade 4 (n = 26)	Grade 6 (n = 16)
Emphasis on conceptual understanding, novel problems, and real-life applications: Index ranging from 0 (= no emphasis) to 3 (= high emphasis)	1.5 (.5)[a]	1.3 (.5)[a]	1.4 (.6)[a]
Range of topics: Index ranging from 0 (= no other topics besides arithmetic ever taught) to 5 (= multiple topics besides arithmetic taught every day)	2.1 (1.2)	2.4 (1.2)	1.8 (1.5)

a - Standard deviations in parentheses.

An increase in the average value of this index between Year 1 and Year 2 partly reflects a small change in the item on the teacher logs used to identify topics taught. In the second year, one topic was described as "Logic problems/puzzles/problem-solving strategies," whereas there was no mention of "problem-solving strategies" in the Year 1 item (teachers sometimes write this in the "Other" blank). The problem-solving strategies choice was relatively popular with teachers, although in retrospect it is not at all clear that this was a topic distinct from the other choices. In addition, the data may accurately reflect an increasing emphasis in the sample classrooms on topics besides arithmetic, since a number of state and district policies were in place to move teachers in this direction.

Four Types of Mathematics Classrooms

Taken together as independent dimensions of mathematics instruction, the measures of the two strategies for maximizing mathematical thinking and understanding generate a simple typology of classrooms. The first two types focused heavily or solely on arithmetic, one with an emphasis on conceptual understanding and the other without. The second two types aim at a broader array of mathematical topics, once again with or without an emphasis on conceptual understanding. Although this typology oversimplifies the situation somewhat by not revealing the continuous nature of each dimension, it captures important differences among the classrooms we are studying.

On the basis of index values, we were able to array the classrooms in the four cells of the 2-by-2 matrix implied by the typology, as shown in Table 10. The table presents data for both years combined; however, the pattern in each year was similar. Qualitative reports of visits to the intensive classrooms validated the indices and demonstrated that there is a close correspondence between what observers saw and described in detailed qualitative reports on the one hand and the classroom types as categorized in the matrix on the other hand. In the case of mathematics, more than three-fourths of the decisions about classroom types made in Year 1 on the basis of the qualitative reports alone (before the index numbers were even computed)

Table 10

TYPOLOGY OF MATHEMATICS CLASSROOMS IN THE SAMPLE
(Both Years, n = 137)

Degree of Focus on Conceptual Understanding:	Range of Mathematical Topics: Arithmetic Only	Arithmetic Plus Other Topics	
Skills Only	47	15	62 (45%)
Skills Plus Conceptual Understanding	38	37	75 (55%)
	85 (62%)	52 (38%)	137 (100%)

were consistent with decisions made on the basis of the indices. Where there was any disagreement, the former took precedence over the latter. For Year 2, the correspondence was even greater, and the index values alone were used to make decisions about the classroom type.

The four types of classroom differ in various ways. Features of the instructional approach differ systematically, by type, in ways that are shown in Tables 11a and 11b. For example:

- Multiple-topic classrooms (especially those emphasizing conceptual understanding) average more time on mathematics per day and make greater use of calculators than arithmetic-only classrooms.

- Whether or not they focus only on arithmetic or on a wider range of topics, teachers in classrooms emphasizing conceptual understanding rely less on textbooks than teachers emphasizing skills only.

- Classrooms in which multiple topics are taught with an emphasis on conceptual understanding are most likely to use manipulatives and least likely to rely on the textbook.

The four types of classrooms look and feel different in various ways that are not easily represented in these numbers. We describe each type below, with examples from qualitative reports of classrooms that were studied intensively.

Classrooms Focused on a Broad Array of Topics, with a High Emphasis on Conceptual Understanding

Thirty-seven classrooms (27 percent) were categorized as focusing on a broad array of topics, with a relatively high emphasis on concepts (teaching for understanding). In the overall sample, fewer classrooms were included in this category than in either of the two cells in the matrix that focused almost exclusively on arithmetic.

Not only are a wide variety of topics covered in the classrooms in this group but, in addition, the organization of the class and the materials in use are often different from what is found in the other types of classrooms. Two examples in inner-city settings located in different states provide a sense of what mathematics instruction in these classrooms is like:

- Ms. Gray's third-grade mathematics class: implementation of an ambitious state framework. Ms. Gray appears to be doing an excellent job of implementing the relatively new state framework for mathematics education. Although she emphasizes arithmetic computation skills throughout the year, she also integrates instructional strands relating to geometry, measurement, problem solving, logical reasoning, statistics and probability, and patterns and sequence. Ms. Gray frequently uses manipulatives to help teach concepts. Also, cooperative learning groups are used often in her class; in fact, about one-third of the class time is in some sense "student-directed," which is exceptionally rare. Ms. Gray consistently makes connections between one mathematics concept and another, thereby presenting mathematics as a unified discipline, not just a set of different skills. For example, when discussing one operation (such as multiplication) and its properties (e.g., the associative property), Ms. Gray often connects these with other arithmetic operations.

Table 11a

PATTERNS OF MATHEMATICS INSTRUCTION, BY CLASSROOM TYPE (YEAR 1)

	Classroom Type			
	Arithmetic Only		Multiple Topics	
	Skills Only (n=26)	Skills + Concepts (n=21)	Skills Only (n= 5)	Skills + Concepts (n=17)
Key strategies for maximizing mathematical understanding				
• Emphasis on conceptual understanding, etc.: Index from 0 (= no emphasis) to 3 (= great emphasis)	1.0 (.6)[a]	1.4 (.6)[a]	1.3 (.4)[a]	2.3 (.4)[a]
• Breadth of topics covered: Index from 0 (= no other topics besides arithmetic ever taught) to 5 (= multiple topics besides arithmetic taught every day)	.6 (.3)	1.5 (1.5)	1.2 (.3)	2.4 (.9)
Other variables				
• Time spent on mathematics: Minutes per day	38 (19)	40 (19)	67 (36)	48 (27)
• Use of manipulatives and educational technology--				
Manipulatives: Percentage of days used	14 (19)	36 (25)	19 (24)	45 (19)
Calculator use: Percentage of days used	1 (3)	3 (5)	2 (4)	6 (9)
[Percentage of classes using]	[12]	[10]	[20]	[24]
Computer use: Percentage of days used	8 (10)	7 (11)	12 (14)	8 (8)
[Percentage of classes using]	[65]	[67]	[60]	[65]
• Reliance on textbooks: Average observer rating, from 1 (= little or no use of textbook) to 4 (= exclusive reliance on textbook)	1.7 (0.6)	2.1 (0.9)	2.0 (0.8)	3.2 (0.7)

a - Standard deviations in parentheses.

Table 11b

PATTERNS OF MATHEMATICS INSTRUCTION, BY CLASSROOM TYPE (YEAR 2)

	Classroom Type			
	Arithmetic Only		Multiple Topics	
	Skills Only (n=21)	Skills + Concepts (n=17)	Skills Only (n= 10)	Skills + Concepts (n=20)
Key strategies for maximizing mathematical understanding				
• Emphasis on conceptual understanding, etc.: Index from 0 (= no emphasis) to 3 (= great emphasis)	1.0 (.3)[a]	1.7 (.3)[a]	0.9 (.3)[a]	1.8 (.3)[a]
• Breadth of topics covered: Index from 0 (= no other topics besides arithmetic ever taught) to 5 (= multiple topics besides arithmetic taught every day)	1.5 (.6)	1.2 (.3)	3.9 (1.5)	3.0 (.6)
Other variables				
• Time spent on mathematics: Minutes per day	47 (20)	48 (12)	44 (13)	59 (15)
• Use of manipulatives and educational technology--				
Manipulatives: Percentage of days used	28 (21)	27 (21)	31 (16)	33 (18)
Calculator use: Percentage of days used	3 (4)	7 (10)	10 (12)	7 (7)
[Percentage of classes using]	[57]	[59]	[80]	[95]
Computer use: Percentage of days used	13 (10)	6 (7)	18 (13)	11 (12)
[Percentage of classes using]	[76]	[53]	[50]	[75]
• Reliance on textbooks: Average observer rating, from 1 (= little or no use of textbook) to 4 (= exclusive reliance on textbook)	1.8 (.7)	2.3 (.9)	2.0 (.8)	2.5 (.8)

a - Standard deviations in parentheses.

- <u>Ms. Ziegler's third-grade mathematics room: a magnet school approach</u>. At this science and mathematics magnet school, mathematics is "departmentalized," so that some staff teach only mathematics. Third graders entering Ms. Ziegler's classroom are greeted with abundant displays of science and mathematics posters and materials, including math games, bulletin boards on mathematics, and a calendar (which is often integrated into instruction). Class usually begins with a "Mind Bender" problem placed on the overhead projector. Throughout the school's curriculum, there is a lot of emphasis on higher-order thinking skills, so that, for example, calculators are used to solve a variety of "realistic" problems (such as spending up to $200 at a make-believe toy store), and computers are used for logic problems (as well as for skill practice). Each quarter a schoolwide project in science or mathematics is incorporated into every classroom. The school uses the DMP mathematics series (*Developing Mathematical Processes*), which teaches mathematics through measurement and a "problem solving approach," and which includes units on topics not frequently taught (such as statistics and probability). Ms. Ziegler routinely likes to aim for two or three different representations of key mathematics concepts and procedures (even more than the number used in the DMP text), so that if children do not understand one representation, they are likely to understand another. About one and one-half hours are allotted to mathematics every day (far beyond the average nationally or in the sample).

These two examples illustrate classrooms in which there was a very strong emphasis on learning concepts, on learning to think (recall the student-directed activities in Ms. Gray's classroom), and on a wide variety of mathematical content. Although these classrooms display many of the features that reformers advocate, the full vision of mathematics teaching noted at the beginning of this chapter is not in place, at least not yet. For example, few classrooms in this group made much use of calculators, used computers for teaching advanced skills (as opposed to practicing arithmetic computation), emphasized the importance of problem formulation by students, or assigned students complex project work in mathematics similar to what is often assigned in social studies.

Nonetheless, the classrooms in this group constitute a kind of "existence proof" demonstrating what is possible in classrooms serving large numbers of students from low-income backgrounds. Suggestions that a curriculum including a broad array of mathematics topics, combined with a very strong emphasis on learning to think independently, cannot be sustained in schools serving poor children do not stand up in the face of evidence that such classrooms can be found even in difficult, inner-city environments.

This is not to say that creating and sustaining these environments is easy or that teachers are routinely provided the kind of support they need to accomplish this. The second type of classroom illustrates some of the pitfalls along the road to reform of mathematics education.

Classrooms Focused on a Broad Array of Topics with a Low Emphasis on Conceptual Understanding

Just 15 classrooms in the sample (11 percent) focused on a broad array of topics using a skills-only approach (that is, with little emphasis on conceptual understanding). The existence of even a small number of such classrooms shows that it is possible to use a skills-only approach to teach a broad array of topics, although it appears to be an unusual combination.

These classrooms might be characterized as failed efforts--or, at best, as partial successes--in the reform of mathematics education. It is unlikely that teachers would teach a broader array of topics than arithmetic in the absence of the current reform thrust, so the fact that the attempt is being made in these classrooms can be taken as a sign of success. At the same time, providing instruction in these topics that focuses only on skills misses half or more of what the reform effort is all about. For example, in one state, the state framework aims to have elementary mathematics students formulating problems, pursuing conjectures, experimenting, and appreciating the beauty of mathematics. None of this is likely to occur unless students are expected to master concepts and think for themselves about procedures--even to the point of inventing their own on occasion. Classrooms in which only skills are taught will not meet these expectations.

In a sense, the teachers of the classrooms in this group have "learned the words but not the tune" of reform. Not surprisingly, these classrooms are found in settings where new approaches to mathematics instruction are being actively advocated. Eight of the 15 cases were in the state in our sample that is pushing reform most actively; another is in a science/math magnet school (also pushing reform), but in a different state. An example of what such a classroom is like is provided by a case from an inner-city school in the most reform-minded state:

- Ms. Liu's third-grade mathematics class: uneasy with the state framework. Ms. Liu is fairly uncomfortable with mathematics--and she freely admits it. This creates particular problems, because the state and the district are pushing for reform. The district is using a new textbook, *Invitation to Mathematics*, which takes a more conceptual approach than many series. Also, the students at this school go to a central mathematics laboratory once a month, and the school's mathematics specialist helps to shape the curriculum. But Ms. Liu's reaction is that she must teach specific content (such as geometry) and must use particular approaches (such as manipulatives), whether she is comfortable with them or not. "I wanted to work on subtraction, but we are supposed to do whatever they are doing in math lab, so I'm doing geometry," she remarked in December. Ms. Liu did use manipulatives, but not in a meaningful way. She allowed students to play with materials (e.g., blocks), but seemed unable to use those materials to help students learn concepts. In general, her teaching of concepts was as something to be memorized ("this is a right angle and you have to learn it," she told the class). Such an approach makes the use of manipulatives far less useful. Over the year, little time was devoted to mathematics--another reflection of Ms. Liu's uneasiness with the subject.

The teacher in this example clearly felt torn between what the district, the textbook, and the school specialist represented as the right way to approach mathematics, as compared with her own, more narrow view of what effective mathematics curriculum and instruction should look like. As it happens, this teacher has long lived in one of the poorest housing projects in the area, and she has never taught or lived in any other kind of community. Despite her state university training and participation in inservice workshops, she is still uncomfortable teaching mathematics and appears to view the subject in rather narrow terms. She illustrates an obvious dilemma for those who would reform mathematics education: how to create change in classrooms in which the teachers are not only uncomfortable with mathematics but view an arithmetic-only, skills-only approach as basically good and appropriate.

Ms. Liu's experiences raise questions about the support that is provided to teachers as they implement new approaches to mathematics instruction. On the basis of data from this study, as well as from a national study of the Eisenhower Mathematics and Science Education Program (Knapp, Zucker, Adelman, & St. John, 1991), it seems that insufficient attention has been given to providing both initial training and follow-up support to teachers who may be uncomfortable--or at least unfamiliar--with the new topics and approaches that many districts and schools are promoting. The absence of good training and support naturally reduces the likelihood that substantial changes in curriculum and instruction will both take place and persist. For example, Ms. Liu did not attend any training sessions to familiarize her with the new and rather different mathematics textbook adopted by the district. Other research on the implementation of new state frameworks for mathematics have found that teachers may never even have seen the framework documents, let alone read and understood them (Guthrie, 1990).

Classrooms Focused on Arithmetic, with a High Emphasis on Conceptual Understanding

The third group (38 classrooms, or 28 percent of our sample) is characterized by a traditional focus on arithmetic computation, but these teachers also place a substantial, often explicit emphasis on the importance of understanding the mathematical concepts underlying the skills.

Among the classrooms studied intensively in Year 1, teachers in this group tend to be an interesting, impressive set of individuals. For example, a number of the teachers are recognized as exemplary or lead teachers (such as one third-grade teacher who was the school's lead science teacher, and who has now moved into a math/science magnet school in the same district). Many have what one researcher termed a "commanding presence." Students typically pay close attention to what is happening in these mathematics classrooms because the teachers insist on it.

Nearly all of the teachers in this group have established clear mathematical thinking as a prominent goal for their classes. For example, a teacher with a combined fifth/sixth grade stated that her general goals in mathematics were "to have the students think, problem solve, comprehend, and be creative." Such goals contrast sharply with those established by most teachers in the arithmetic-computation/skills-only group, who are more likely to emphasize mastery of discrete skills, doing well on tests, or covering the book.

The teachers in this group do not typically believe that there is a trade-off between teaching for mastery of skills and teaching for understanding (nor do the cells of our matrix imply an either-or dichotomy of this kind). Many of them include skill drills as well as activities (such as using manipulatives) and other instruction aimed at developing understanding of concepts. Several examples may help to provide a picture of the kinds of activities that characterize these classrooms:

- Ms. Smith's first-grade mathematics class: automaticity as well as understanding. This young first-grade teacher, who works with very impoverished children in an inner-city setting, sets as her major goals in mathematics that students develop an understanding of mathematics (primarily numbers, numeration, and arithmetic) and are able to perform arithmetic computations accurately. She includes exercises based on drill and repetition that are aimed at developing "automaticity" (e.g., practicing counting by fives and by tens is something done almost every day, with the class happily chanting aloud in unison). Drill-and-practice computer software is often in use by the students. These types of activities are oriented toward skills and procedures. Yet Ms. Smith also makes almost daily use of mathematics manipulatives to help children develop an understanding of mathematics concepts. Ms. Smith is an expert at using manipulatives, including Unifix cubes, Cuisenaire rods (to develop concepts of place value), and cardboard coins and clocks. She has been observed having students "act out" addition and subtraction problems before the class (to understand the meaning of the operations), and frequently asks students who are having trouble to "think about it" (e.g., "someone's taking it away from you ... will you have less or more?").

- Third-grade mathematics in Ms. Asante's room: mad minutes and word problems. In this third grade, math class often begins with a 2-minute timed test called "Mad Minutes," focusing on straight, numerical arithmetic problems. Students could advance from one level to the next (e.g., to more complex multiplication problems), and on a given day about four different levels of test are in use. This much is a skills approach to instruction. At the same time, during the teacher-directed portions of the class, Ms. Asante's questions typically focus on students' understanding of concepts (such as borrowing/regrouping). On most Fridays, instruction involves the use of calculators and is aimed at applications of mathematics using "real-world" (messy) numbers. Ms. Asante also places a lot of emphasis on word problems involving arithmetic, in part because the students did poorly on that portion of the statewide mathematics test the preceding year. But the word problems are also consistent with Ms. Asante's goal that students learn to apply mathematics in the world, not just do disembodied numerical problems on worksheets.

This group of teachers tends to place a high value on children's thinking and on their understanding of the material. However, the way that the teachers approached this goal differed significantly from one classroom to the next. For example, several of the teachers followed the textbook quite faithfully; others used the textbook often but supplemented it with other materials and approaches; and in the other classrooms, textbooks were hardly used at all. One of the teachers who abandoned the textbook as the year went on commented that "there's not much in there for them" (her first-grade students); she was enrolled in a mathematics methods course at a local university and became adept at devising her own lessons.

There was a similar diversity of approaches toward the use of calculators and computers. Several classrooms in this group made almost no use of these electronic tools, whereas they were regular features of instruction in others. Still, little application of computers to teaching advanced skills was observed in any of the classrooms in any group.

In both years, the use of manipulatives in the classrooms was highly correlated with grade level (a pattern that, as explained earlier, is true throughout the study sample). The first- and second-grade teachers in this group made extensive use of manipulatives (as in the example given above); the third- and fourth-grade teachers made less frequent use of manipulatives; and in the fifth- and sixth-grade classes there was almost no use of these kinds of items (Unifix cubes, beans or other counters, and so forth).

Classrooms Focused on Arithmetic, with Little Emphasis on Conceptual Understanding

Forty-seven classrooms (or 34 percent) focused almost entirely on arithmetic and concentrated on skills (with little or no emphasis on understanding mathematical concepts). In the overall sample, this is the classroom type with the largest number of classrooms.

These classrooms are characterized by a high priority placed on the goal of mastering computation skills. Doing the procedures rapidly and accurately is what is highly valued in these classrooms, rather than understanding why the procedures work or learning how to apply the knowledge to new situations. Worksheets consisting of groups of similar numerical problems form a handy symbol of this approach to instruction (although, of course, they are used in other types of classrooms, too).

At one extreme, the teachers in this group exhibit very little actual instruction, relying instead on worksheets to accomplish their goals. An example of this style is as follows:

- <u>Ms. Hayes' approach to first-grade mathematics: worksheets</u>. The typical mathematics lesson in Ms. Hayes' classroom consists of 10 percent lecture/demonstration and 90 percent seatwork. The worksheets cover what is in the textbook. However, in part because there is so little real teaching, there is almost no focus on the meaning of the skills and procedures conveyed by the worksheets. In the small amount of time that instruction does take place, there appears to be little connection between underlying concepts and the procedures for working problems. Throughout the year, it appears as if the teacher is just carrying out the curriculum without a lot of attention to whether children are really understanding what is being taught or grasping the underlying concepts (such what addition really means, and why or when one would want to do it). Ms. Hayes' main interest appears to be whether children can solve such problems as 6 - 3. Not only is there a great deal of seatwork, but there is almost no student- student interaction unless children surreptitiously help one another.

Although that classroom represents an extreme in the amount of seatwork assigned, the lack of student-student interaction is all too common (and further diminishes a student's already-low opportunity to rehearse what he/she has learned, ask questions, or learn from someone--another student--whose style is different from the teacher's). However, neither the use of more concrete materials nor the use of "game" formats (in which students have at least some minimal interaction) necessarily changes the restricted view of what constitutes mathematics that characterizes the classrooms in the group, as the following example illustrates:

- <u>Ms. Craig's approach to fifth-grade mathematics: variety in materials and activities, with a fragmentation of academic tasks</u>. Assertive discipline is a hallmark of Ms. Craig's classroom, and of this particular school as a whole. Her mathematics instruction moves quickly from one segment to another, and it appears this is in part a management device. Children are constantly kept "entertained," as activities shift rapidly before boredom sets in. During a 50-minute mathematics period, the students may have three sets of review exercises interrupted by presentation of a new arithmetic skill, as well as a game based on arithmetic computation drill. The emphasis during all visits was completely on computational skills and getting the correct answers. Instruction was almost entirely based on the textbook, with its pretests, chapter reviews, and chapter tests. However, play money was used occasionally, game formats (sometimes with teams) were a part of many lessons, and there were visits to the computer lab to use mathematics software (of the drill-and-practice, game-based variety). Because of the rapid pace, the fragmentation of segments, and the lack of extended discourse or interaction in the classroom, the researcher observed that "a typical mathematics class has the feel of a sluggish video game." Students in this classroom learn to see mathematics as a series of discrete, skills-oriented tasks to be completed for the teacher, punctuated by such "rewards" as use of the computer and occasional classroom games.

The teachers in these classrooms are a diverse group. For example, some like mathematics, and some do not; some are well liked by their students, and others are not. A few of the teachers in the group believe that they are aiming at higher-order thinking skills ("teaching the children to think"), even though the data suggest that they spend little time helping their students develop conceptual understanding. More often, however, teachers in this group express such opinions as, "These students need lots of drill and practice," or "The children cannot learn higher-order thinking skills if they don't have the basics," or "They cannot move on to division until they've mastered multiplication." These teachers adopt a linear view of instruction that is at odds with the alternative views of learning and instruction highlighted earlier in this report and in the study's first report (Knapp & Shields, 1990).

Some teachers in this group do make use of manipulatives, but most of those who do seem to do so to motivate students. One teacher said as much: she uses manipulatives simply because she thinks they capture students' interest and attention. By contrast, teachers in groups that focus on conceptual understanding are much more likely to point to cognitive reasons for using manipulatives (e.g., the first-grade teacher who said, "the concepts just aren't there yet; going back to the concrete is the only thing to do"). As a result, observations of classroom practice show that fewer teachers in this group seem to use manipulatives effectively; they use them, but don't necessarily understand how or why they should be used.

The great majority of the teachers in this group stick close to a traditional textbook. They tend not to supplement the textbook with puzzles, novel problems or other types of print-based mathematics activities drawn from the vast storehouse of such material that is available (e.g., through journals and specialized publications). In a few cases, the newer, less traditional textbooks are actually subverted by the teachers. For example, one third-grade teacher (who appears to be a poor teacher in all disciplines) said she "prefers texts with few words," and indeed she was observed to use a lot of very traditional worksheets to "supplement" the textbook.

Compared with the other groups, relatively few teachers in this group make use of calculators, despite the recommendation of the NCTM that "appropriate calculators should be available to all students at all times." One teacher interviewed for the study did suggest that she would buy a calculator out of each of her paychecks until she had a good supply, but she was the exception. Indeed, part of the story of non-use of calculators does seem to be that the schools and classrooms do not have them in stock. More than that, however, few teachers volunteered that they want to use calculators. Such a stance is most easily understood in the arithmetic-computation/skills-only classrooms, because these teachers may well believe that the use of a calculator defeats the purpose of mathematics instruction, namely, learning to compute. One fifth-grade teacher in this group, becoming frustrated with the poor performance of a student with a long division exercise, told her class, "This is the problem with calculators and parents who do homework and don't explain." Our data suggest that few, if any, of the students in her class have ever used a calculator in school.

On the other hand, the use of computers was quite common (occurring in nearly two-thirds of the mathematics classrooms in the sample). Only a few of the teachers in this group used computers extensively, but it was not unusual to find that students went to a centralized computer lab once a week or once every other week to practice arithmetic skills. Often, the software was in a game format of one kind or another, for example, rewarding students with laps around a simulated race track based on the number of arithmetic problems answered correctly.

How the Types of Mathematics Classrooms Are Distributed Among Students, Teachers, and School Settings

If classrooms of each type were evenly distributed among all possible school settings, with identical configurations of students and teachers in each type of classroom, the job of analyzing the effects of the different instructional strategies would be much easier. However, this is not the case; the classroom types are unevenly distributed across schools and instructional settings. In this section, we examine differences among the types of classrooms involving, first, the students and teachers, and then the school settings (including schools, districts, and states).

Students and Teachers in Mathematics Classrooms of Different Types

What are the students and teachers like in each of the types of classrooms just described? In particular, it is interesting to know whether the strategies used in classrooms of a particular type are associated with teachers and/or students who share distinct, identifiable characteristics.

The data displayed in Table 12 help to answer this question (the table shows data for Year 2 only; the pattern in Year 1 is very similar). For the most part, the student and teacher populations seem comparable in the different types of mathematics classrooms. However, the students in the multiple-topics, skills-and-concepts classrooms begin the year with somewhat higher achievement levels, suggesting that it will be important to "control" for this preexisting advantage in considering the outcomes associated with different types of classrooms.

Students in classrooms emphasizing concepts (as well as skills) are somewhat poorer (on average), but include a smaller percentage of nonwhites than do students in classrooms focusing only on skills. This finding is somewhat difficult to interpret and is likely to be explained by two distinct factors. First, there is some "tracking" within schools that may result in assigning students with different characteristics to different types of teachers and/or classrooms. Second, differences among classrooms in student demographics are explained partly by the population served by each school and district. As the next section shows, the classroom types are strongly associated with state, district, and school characteristics.

Nonetheless, the differences among the classroom types on these student and teacher variables are not especially large. In one sense, this suggests the comforting possibility that the alternative instructional approaches represented in this typology are not linked primarily with higher-achieving children (and, by implication, inappropriate for low-achieving children), a more affluent student population, better-prepared teachers, or those who are more satisfied with teaching.

School Settings for Different Types of Mathematics Classrooms

The different types of mathematics classrooms are associated with particular school or district settings. In fact, there is a set of state, district, and school factors that go a long way toward explaining why certain classroom types are found where they are. Data displayed in Table 13 show the contrasting pattern among the six districts and three states in the study.

To simplify the data in this table, consider the contrast between the number of classrooms of the most restricted, narrowly focused type (arithmetic only, skills only) and the number of classrooms with the greatest variety of techniques and topics (multiple topics, skills plus concepts). Without as yet considering the nature of the student outcomes associated with these types, we may nonetheless suggest that they represent two significantly different approaches to elementary mathematics instruction; indeed, they

Table 12

STUDENT AND TEACHER CHARACTERISTICS,
BY TYPE OF MATHEMATICS CLASSROOM (YEAR 2)

Variables	Classroom Type: Arithmetic Only — Skills Only (n=21)	Arithmetic Only — Skills + Concepts (n=17)	Multiple Topics — Skills Only (n=10)	Multiple Topics — Skills + Concepts (n=20)
Student characteristics				
• Poverty level: Percentage on the Free or Reduced-Price Lunch program)	55 (18)[a]	65 (26)[a]	61 (26)[a]	64 (28)[a]
• Initial achievement level: Pretest score in Normal Curve Equivalents on the CTBS/4 Concepts and Applications test	45 (8)	45 (12)	45 (14)	50 (9)
• Percentage nonwhite	83 (30)	58 (41)	80 (32)	70 (34)
Teacher characteristics				
• Richness of teacher's background in mathematics: Index from 1 (= lowest) to 6 (= highest)	4.3 (1.3)	3.9 (1.5)	4.7 (1.8)	3.6 (1.5)
• Teacher's satisfaction with teaching: Scale from 1 (= least satisfied) to 4 (= most satisfied)	3.1 (.8)	3.2 (.8)	3.2 (.4)	3.2 (.7)
• Teacher's expectations for students' success in mathematics: Scale from 1 (= most students won't be able to succeed) to 4 (= all can succeed at grade level)	3.2 (.8)	3.2 (.7)	3.4 (.7)	3.2 (.6)

a - Standard deviations are shown in parentheses.

Table 13

PATTERNS OF MATHEMATICS INSTRUCTION BY DISTRICT
(BOTH YEARS)

District/State (n of classrooms)	Number of Classrooms of Each Type: Arithmetic Only: Skills Only	Arithmetic Only: Skills + Concepts	Multiple Topics: Skills Only	Multiple Topics: Skills + Concepts
State 1 (n = 62)	(n = 15)	(n = 16)	(n = 8)	(n = 23)
• District 1 (Rural) (n = 21)	5	6	2	8
• District 2 (Urban) (n = 18)	6	8	2	2
• District 3 (Urban) (n = 23)	4	2	4	13
State 2 (n = 27)				
• District 4 (Urban) (n = 27)	11	4	3	9
State 3 (n = 48)	(n = 21)	(n = 18)	(n = 4)	(n = 5)
• District 5 (Suburban) (n = 32)	19	6	4	3
• District 6 (Rural) (n = 16)	2	12	0	2
TOTALS	47	38	15	37

represent the two extremes on the dimensions that we have constructed. Thus, the relative number of classrooms of each of these types may serve as one useful indicator of differences among states or districts in the sample (with the important caveat that the samples are relatively small and not truly random).

For the 2-year sample as a whole, the narrowly focused classrooms outnumbered the classrooms emphasizing variety by 47 to 37. Yet, the three states show quite different ratios. In State 1, the ratio is actually reversed, with more classrooms emphasizing variety, by a ratio of 23 to 15. In State 2 (represented by a single district in the study), the ratio is nearly equal to one: 11 narrowly focused classrooms to 9 of the classrooms emphasizing variety. Lastly, State 3 shows more than four times as many of the narrowly focused classrooms (21) as classrooms emphasizing variety (5). These data fit quite well with observations about state (and district) policies. In particular, State 1 is nationally known for its aggressive stance in adopting a new elementary mathematics framework strongly linked to the NCTM *Standards*, and for rejecting textbooks that did not measure up to its new goals. Neither State 2 or 3 has taken such firm measures in the past. (Although State 3 has just begun to implement required elementary mathematics tests that are heavily oriented toward applications, novel problems, and writing skills, the first such tests were administered only at the end of the second year of data collection and came as a shock to many teachers in the study.)

If it is true that the different pattern in State 1 is due at least partly to state policies (and there is evidence to suggest this), this should be an encouraging finding for those who believe that state policies are one important lever to affect classroom practice in elementary mathematics. The data do not show all classrooms in the sample from State 1 to be "falling into line" (in fact, just over one-third are of the most diverse type in our four-way typology). Yet, the pattern shows a higher proportion than in other states in the type most like the NCTM *Standards*. Some researchers who have suggested that state policies have little effect on elementary mathematics instruction (e.g., Guthrie, 1990) may not have corresponding data showing that in other states (without new frameworks and the like) practices are even more restricted!

Within State 1 there is still substantial variation among the three districts in the study with respect to the pattern of classroom types. The same is true for the two districts in State 3. Once again, as with the states, there are some strong associations between district policies (and demographics) and the observed patterns.

The influence of district policies can be illustrated most clearly by District 5, which has the highest concentration of classrooms emphasizing arithmetic skills only. The district has designed its own multiple-choice, criterion-referenced tests (CRTs), which heavily emphasize arithmetic computation. The CRTs alone are administered three times each year, in addition to standardized achievement tests, the new state assessments, and other mandated testing (such as for special education). Special efforts are made to prepare students for multiple-choice arithmetic tests. The district exercises a lot of centralized control; for example, chapter pretests in mathematics are mandated by the district, and teachers feel little latitude about what they are to teach in mathematics. Opportunities for professional development for teachers are relatively limited, and the mathematics specialists who do serve in several district schools in the sample felt more and more consumed each year with other administrative duties, such as acting as substitutes for absent teachers (a money-saving device specifically mandated by the district, despite objections from school principals).

It came as no surprise to the study team to find the highest proportion there of the most restricted type of mathematics classroom. It was unusual in this district to find teachers focusing much attention on conceptual understanding of arithmetic--let alone in conjunction with other mathematical topics. The mathematics specialists were concerned about this, but few others (including principals) spoke about it. "This is simply the way math is taught," seemed to be the unspoken opinion among those teachers and principals interviewed for the study. Not counting the brand new state mathematics assessment, no concerted state or district effort was under way to change mathematics instruction (aside from the ubiquitous CRTs). Sadly, although a district task force was established to review practices in mathematics, the departure of the superintendent who had been there for many years meant that all of the links between high-level liaisons from the district to the external task force were severed, at least temporarily.

Moving from the state and district levels to the school building, there are, again, some strong associations between characteristics of schools and the classroom types found there. A good example is in District 1. Although in both years the district had fewer narrowly focused classrooms than diverse classrooms, the pattern was quite different in the two schools that were part of the study. Table 14 shows the pattern for these schools in the second year of the study.

Table 14

PATTERNS OF MATHEMATICS INSTRUCTION IN TWO SCHOOLS WITHIN DISTRICT 1 (YEAR 2)

	Number of Classrooms of Each Type			
	Arithmetic Only		Multiple Topics	
School (n of classrooms)	Skills Only	Skills + Concepts	Skills Only	Skills + Concepts
School 1 (n = 6)	0	1	1	4
School 2 (n = 5)	2	2	1	0

In a report written by the team coordinator for that site, School 1 was described as follows:

> The school is characterized by stable leadership, a committed and experienced staff, and a very positive learning environment. The staff generally has a very "can do" attitude that has allowed them to take on numerous challenges throughout the years. ... [School 1] is the bilingual magnet school for the district. ... Cross-age tutoring is used to provide additional practice in computational skills. ... Other math skills such as measurement, probability, and graphing have been given some additional emphasis via the use of [a new science

> curriculum]. ... A mathematics resource teacher works with all other staff on a regular basis. The use of grade-level teaming promotes consistency of instruction for both language arts and mathematics, and there are also articulation meetings to provide continuity across grades.

The student population at School 1 comprises Anglo and Hispanic students, many of them poor, some from migrant families--not a population to whom a nontraditional approach to mathematics is typically offered. However, the school appears to have responded well to state and district policies (such as textbook adoptions and a districtwide problem-solving contest) that emphasize problem solving and the use of manipulatives.

School 2, which serves a similar population, looks and feels very different, as the following description by the team coordinator illustrates:

> At this school, the general attitude is fairly negative. There is a lot of antagonism between the staff and the principal, and students at this school have the reputation of being "bad actors." As a result of the poor school climate, the principal spent several years working to improve school safety, children's social skills, and the school's image in the community. Although he has tried to develop a larger number of instructional leaders among the staff, he still maintains fairly tight control over curriculum development. Mathematics curriculum has not been a focus of attention during the years we studied the school, except through planning for a future magnet program. There are no schoolwide specialists in this subject area as at School 1.

These brief snapshots of the two schools hint at various elements that enhance or inhibit the chances for alternative approaches to take root. Clearly, the strong team approach to instruction in School 1 supports innovative practice, as does the presence of a mathematics specialist who provides ideas and help on a regular basis to teachers throughout the school. The absence of these elements in School 2 works against the development of anything that departs from instructional practices already within teachers' repertoires. In addition, the attention to noncurricular matters saps energy from any concentrated efforts at developing new approaches to curriculum and instruction.

V WHAT CHILDREN LEARN FROM DIFFERENT TYPES OF MATHEMATICS INSTRUCTION

We are now in a position to examine the outcomes of mathematics instruction in the sample classrooms. The patterns described in the preceding chapters suggest several propositions about mathematics curriculum and instruction in schools serving the children of poverty, which we can test with the outcome measures we collected:

(1) In these settings, the more that classrooms exhibit strategies aimed at fostering mathematical understanding and problem solving in a range of mathematical topics, the more likely students are to perform well on measures that demonstrate grasp of mathematical ideas and ability to apply them to unfamiliar situations, once other factors are taken into account.

(2) Instruction aimed at mathematical understanding and problem solving will also prepare students in basic computational skills at least as well as instruction in classrooms aimed primarily or solely at arithmetic skill learning.

(3) Association between instruction aimed at understanding and students' grasp of concepts, capacity to solve problems, and computational proficiencies will not be limited to "brighter" children, but rather should be manifest among the lowest- as well as the highest-achieving members of the student population.

There are many reasons for believing that these propositions hold. First, an emerging literature on the teaching of advanced skills to educationally disadvantaged children asserts similar propositions, based on cognitive theory and some provocative demonstrations (e.g., Peterson, Fennema, & Carpenter, 1991; Resnick, Bill, Lesgold, & Leer, 1991). Second, the propositions make sense on logical grounds because they argue that students perform well on tests aimed at what they have been taught. Third, our fieldwork in classrooms suggested impressionistically that students were "getting it" in classrooms that made a point of emphasizing conceptual understanding, whereas elsewhere there was little or no indication that students were significantly engaged in mathematical thinking.

In some respects, these propositions call into question conventional views of mathematics instruction in the kinds of schools we have been studying. It is not obvious to all educators, for example, that focusing on mathematical understanding or problem solving will help to develop skill in computation. In addition, many teachers and others who deal with the slowest members in a student population deem them unable to grasp "advanced" mathematical skills, including problem solving, before they master basic skills, or ever.

In this chapter, we examine the propositions by analyzing student outcomes from the four types of mathematics classrooms described previously, controlling for key student characteristics that are likely to influence outcomes. We focus first on conceptual understanding and problem solving, and then we consider the evidence regarding the link between alternative instructional approaches and computational proficiency. Next, we contrast the results for students at the higher and lower ends of the overall achievement continuum. Finally, we consider other possible influences on outcomes--instructional time, teaching quality, other characteristics of teachers--that might account for the outcome patterns we have described.

Outcomes of Mathematics Instruction

We focused on the following mathematical learning outcomes:

- Conceptual understanding of mathematical ideas, as measured by a widely used standardized instrument, the Comprehensive Test of Basic Skills (CTBS)/Level 4, Mathematical Concepts and Applications Subtest. This outcome was measured for students in all elementary grades. For analyses, we converted the raw score into Normal Curve Equivalents (NCEs).

- Mathematical problem-solving ability, as measured by a test consisting of "mathematical problem solving superitems" developed and validated by the University of Wisconsin, Center for Research on Mathematics Education (Romberg, 1982). These items pose unfamiliar problems to students and then ask questions at varying levels of difficulty about the problems in an open-ended, rather than multiple-choice, format. The superitems tests were used with students in the third through sixth grades. For analyses, we used the percentage of correct items, because there is no way to create a norm-based score comparable to NCEs.

Examples of the items in these tests are shown in Figure 1 (the complete version of the mathematics superitems test appears in Volume 2 of this report). In addition, we gathered data on the students' proficiency in arithmetic computation, using the corresponding CTBS/4 subtest.

In each school year, we examined short-term (fall to spring) outcomes--those attributable to the school year itself--and, for those students remaining in the sample during the second year, longer-term (Fall 1 to Fall 2, Spring 1 to Spring 2) outcomes, which reflect not only what is learned during the school year but also what is retained, gained, or lost during the summer months. In analyzing outcomes, we concentrated on the absolute level of students' scores at the end of the school year or after the 12-month period, controlling for the students' pretest score and poverty level. We chose this indicator, rather than gain scores, because we did not have fall pretest measures for one of the two outcomes. In addition, by controlling for student pretest level (using the CTBS/4 Concepts and Applications test as a proxy for both outcomes), we could mathematically approximate what would have been learned from gain-score analyses.

In selecting these measures, we were well aware of their shortcomings, but given the constraints on the study design and the numerous other measurement and data collection tasks, it was not feasible to gather data on mathematical outcomes more intensively (e.g., through individual measures or with instruments that required more administration time). Nor did we use additional instruments to get at students' attitudes or beliefs about mathematics, which are arguably an extremely important outcome of instruction. In addition, our measures did not directly tap the extent to which students' metacognitive abilities were affected by mathematics instruction.

Outcome analyses were performed at the classroom and student levels (by attaching to each student's record the corresponding variables for the student's teacher and the instructional approach used by the teacher). The latter mode of analysis permitted us to approximate effects on students, although it is limited by the assumption that all students are

Figure 1

EXAMPLES OF TEST ITEMS INDICATING MATHEMATICAL UNDERSTANDING AND PROBLEM-SOLVING PROFICIENCY

CTBS/4, Concepts and Applications Subtest
First Grade

APRIL						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

16 5 21 22 30

17 Monday Wednesday Thursday Friday

ITEM 16
Say Find Number 16. Look at the calendar. Listen to this problem. You do not go to school on Saturdays or Sundays. Find the number of school days in April. Mark your answer.

ITEM 17
Say Number 17. Look at the calendar again. May is the month after April. Find the day on which May begins. Mark your answer.

CTBS/4, Concepts and Applications Subtest
Third Grade

8 Rounding a number to the nearest hundred makes it 300. Rounding the same number to the nearest ten makes it 320. The sum of all the digits in the number is 9. Which of these could be the number?

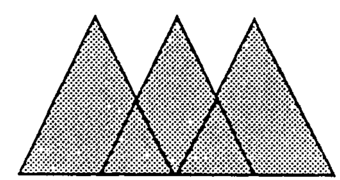
F 324

G 321

H 316

J 351

9 How many triangles are there in this figure in all?



A 3

B 5

C 6

D 8

Figure 1 (Continued)

EXAMPLES OF TEST ITEMS INDICATING MATHEMATICAL UNDERSTANDING AND PROBLEM-SOLVING PROFICIENCY

Mathematical Superitems Test
Third and Fourth Grade

D. Maria had a list of numbers—8, 7, 6, 4, 3, 2, and 1. She used three at a time to make bigger numbers.

First she made: 624

Then she made: 378

7. a. What is the smallest number that Maria could make, using three numbers from her list?

ANSWER ________

b. What is the largest number that Maria could make, using three numbers from her list?

ANSWER ________

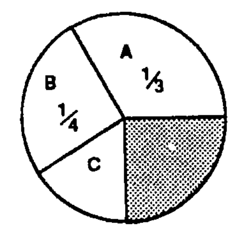
8. Add all the numbers in Maria's list. Then subtract your answer from the largest number Maria could make using three numbers from her list. What number do you get?

ANSWER ________

Mathematical Superitems Test
Fifth and Sixth Grade

E. Companies A, B, and C make 3/4 of the toys sold in one city.

The fraction sold by each company is shown below.



11. What fraction of the city's toys are made by Company B?

ANSWER ________

12. What fraction of the city's toys are made by Company C?

ANSWER ________

13. Company C joined Company B.

a. Which company—BC or A—would be larger?

ANSWER ________

b. How much larger is the bigger company?

ANSWER ________

independently--and equally--affected by instructional variables. (See "Notes on Analysis of Outcome Data" in Volume 2.)

Effects on Mathematical Understanding and Problem-Solving Proficiency

To discover whether different instructional approaches affect students' understanding of mathematical ideas and proficiency at solving nonroutine problems, we carried out multiple regressions that controlled initially for two characteristics of the students (their initial achievement level at the beginning of the year and their poverty level). We summarize the results of these analyses below.

Short-Term Results (Fall to Spring)--As can be seen in Tables 15 and 16, a clear pattern emerges from the analyses for Year 1: in the short term (fall to spring), compared with their counterparts in classrooms being taught arithmetic skills only, students exposed to instruction that departs the most from conventional practice perform better on tests of mathematical understanding and problem-solving proficiency. There is some evidence of this pattern for students exposed to other alternative forms of mathematics instruction, which depart less from conventional practices--instruction that focuses on multiple mathematical topics with a skills orientation or on arithmetic with attention to conceptual understanding--but the evidence is less consistent. For example, students whose mathematics instruction consisted of learning arithmetic with attention to conceptual understanding performed better on the test of problem-solving proficiency but about the same on tests of mathematical understanding, compared with those taught only arithmetic computation skills.

The results presented in the tables represent the difference at the end of the school year in learning outcomes for students in each alternative form of mathematics instruction, compared with students exposed to conventional practices after controlling statistically for initial differences among students in achievement and poverty level. (The table does not present full regression results; these may be found in the Regression Tables in

Table 15

ASSOCIATION BETWEEN APPROACH TO MATHEMATICS INSTRUCTION AND MATHEMATICAL UNDERSTANDING OVER THE SHORT TERM (FALL TO SPRING)

	Difference in scores (in NCEs) on the CTBS/4 Concepts and Applications Test at the end of the school year, controlling for initial differences in achievement and poverty level.	
Focus of Mathematics Instruction	Year 1: Grades 1, 3, 5 (n = 1,061)	Year 2: Grades 2, 4, 6 (n = 1,172)
Multiple topics with conceptual understanding[a]	6.4*[b]	1.7[b]
Multiple topics, skills only[a]	1.7	2.2
Arithmetic, skills plus conceptual understanding[a]	0.2	-0.6

*Statistically different from zero at $p < .05$.

Table reads: "By comparison with their counterparts in classrooms exposed to arithmetic skills only, students exposed to multiple topics with emphasis on conceptual understanding perform 6.4 NCEs better in the spring of Year 1, controlling for initial differences in achievement and poverty level. This result is statistically different from zero at the .05 level...."

a - These variables indicate students' presence in classrooms with each type of approach to mathematics instruction, compared with students in classrooms focusing on arithmetic skills only.

b - Figures in the table are unstandardized B-weights for dummy variables indicating each type of mathematics instruction. Regression equations include students' pretest score, poverty level, and a dummy variable indicating grade level. Coefficients for all variables are in Regression Tables in Volume 2.

Table 16

ASSOCIATION BETWEEN APPROACH TO MATHEMATICS INSTRUCTION AND MATHEMATICAL PROBLEM-SOLVING PROFICIENCY OVER THE SHORT TERM (FALL TO SPRING)

	Difference in scores (in percentage correct) on the superitems test[a] at the end of the school year, controlling for initial differences in achievement and poverty level.	
Focus of Mathematics Instruction	Year 1: Grades 3, 5 (n = 707)	Year 2: Grades 4, 6 (n = 742)
Multiple topics with conceptual understanding[b]	6.7*[c]	1.6[c]
Multiple topics, skills only[b]	5.3*	-1.3
Arithmetic, skills plus conceptual understanding[b]	7.0*	1.9

*Statistically different from zero at $p < .05$.

Table reads: "By comparison with their counterparts in classrooms exposed to arithmetic skills only, students exposed to multiple topics with emphasis on conceptual understanding perform 6.7 percent better in the spring of Year 1, once initial differences in achievement and poverty level are taken into account. This result is statistically different from zero at the .05 level...."

a - Test based on mathematical problem-solving "superitems" developed at the University of Wisconsin (see Volume 2). Test items were available only for students in grades 3 and above.

b - Focus of instruction was represented analytically by dummy variables that indicate students' presence in classrooms with each type of approach to mathematics instruction, compared with students in classrooms focusing on arithmetic skills only.

c - Figures in the table are unstandardized B-weights for dummy variables indicating each type of mathematics instruction. Regression equations include students' pretest score, poverty level, and a dummy variable indicating grade level (see Regression Tables in Volume 2).

Volume 2). Thus, compared with students in arithmetic-skills-only classrooms, students exposed to multiple topics with attention to conceptual understanding perform 6.4 NCEs better at the end of the first year and 1.7 NCEs better at the end of the second year. The first of these results is statistically different from zero at the .05 level; the second is not (although it approaches significance).

We note that the apparent size of effect in Year 2 is consistently smaller than in Year 1. There are various possible explanations for this fact, among them the uneven implementation of alternative forms of instruction in the second year. For example, when one controls statistically for several characteristics of teachers in Year 2, as summarized later in this chapter, the size of effect increases and does so with a higher probability of nonzero findings.

Curiously, the results in Year 2 for the test of mathematical problem-solving proficiency are noticeably small and are not statistically different from zero at the .05 level. This may, in part, reflect a sensitization to the test--unlike the CTBS, the exact same superitems test was administered in both years. Those students from the most effective types of classrooms in Year 1 who remained in the study sample were dispersed among various types of mathematics classrooms during the second year; the second time around, they may have performed better than might be expected regardless of their classroom location simply because of familiarity with the test.*

<u>Longer-Term Results (Fall to Fall, Spring to Spring)</u>--The short-term effects just described do not show up as consistently across periods of time that include the summer months. Still, as shown in Table 17, students exposed to instruction that departs the most from conventional practice--

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* The choice of cutpoints that define which classrooms fall within each classroom type in Year 2 may have affected the results: exploratory analyses with a higher cutpoint on Index 2 (thus setting a stricter standard for "high" emphasis on conceptual understanding) result in substantial, statistically significant differences for both types of classroom that emphasized conceptual understanding.

in classrooms focusing on multiple topics with attention to conceptual understanding--perform consistently better 12 months later than their counterparts in arithmetic-skills-only classrooms, after initial differences in student achievement, poverty level, and participation in a year-round school are statistically controlled.* The same is not true of students exposed to the other alternative forms of mathematics instruction, who appear to perform the same or somewhat better in one instance and somewhat worse in the second. Neither of these latter two results is statistically different from zero at the .05 or even .10 level, which suggests that differences between forms of instruction are not very great.

Our 12-month analyses thus indicate that some degree of "summer fall-off" may have occurred, especially for students exposed to alternative forms of mathematics instruction that depart only moderately from conventional practice. Thus, as has been demonstrated many times regarding educational interventions, the benefits apparent at the end of the school year are not necessarily maintained until the following year. This possibility does not negate the value of the benefits children derive within any given school year, nor is it particularly evident for students who have been most extensively exposed to alternative practices. Nonetheless, the fact that many students exposed to different forms of mathematics instruction perform more alike over time raises the possibility that the most powerful educational interventions may not be confined to the conventionally scheduled school year, or to any single school year, however scheduled.

These findings must be viewed as somewhat inconclusive, however, in light of substantial limitations in the data available for 12-month analyses. More than half of the Year 1 sample had left the study by the time of the fall pretest in Year 2. Many had moved away from the school; some had been assigned to classrooms that were not included in the study during the second year. This high level of attrition introduces many possible biases that are

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* Because two of the schools offered instruction year-round--that is, without a substantial summer break--we controlled for this factor in all analyses involving 12-month periods of time.

Table 17

ASSOCIATION BETWEEN APPROACH TO MATHEMATICS INSTRUCTION AND MATHEMATICAL UNDERSTANDING OVER THE LONGER TERM (FALL TO FALL, SPRING TO SPRING)

Focus of Mathematics Instruction	Difference in scores (NCEs) on the CTBS/4 Concepts and Applications Test at the end of a 12-month period, controlling for initial differences in achievement, poverty level, and participation in year-round school. Fall 1 - Fall 2: Grades 1, 3, 5 (n = 463)	Spring 1 - Spring 2: Grades 2, 4, 6 (n = 394)
Multiple topics with conceptual understanding[a]	4.3 (*)[b]	1.6[b]
Multiple topics, skills only[a]	0.0	2.4
Arithmetic, skills plus conceptual understanding[a]	-3.8	-3.5

(*) Statistically different from zero at $p < .10$.

Table reads: "By comparison with their counterparts in classrooms exposed to arithmetic skills only, students exposed to multiple topics with emphasis on conceptual understanding perform 4.3 NCEs better after the 12-month period ending in the fall of Year 2, once initial differences in achievement and poverty level have been taken into account. This result is statistically different from zero at the .10 level...."

a - Focus of instruction is represented by dummy variables indicating students' presence in classrooms with each type of approach to mathematics instruction, compared with students in classrooms focusing on arithmetic skills only.

b - Figures in the table are unstandardized B-weights for the dummy variables indicating each type of mathematics instruction. Regression equations include students' pretest score, poverty level, and a dummy variable indicating participation in year-round school and grade level (see Regression Tables in Volume 2).

not well understood and cannot be fully explored in a study of this kind, which did not make longitudinal analyses the primary basis for sample or data collection design (see discussion of these issues in Volume 2).

The longer-term analyses also reveal a curious and anomalous finding, which replicates itself across both years: over a 12-month period, students in classrooms focusing on arithmetic with attention to conceptual understanding performed less well on measures of mathematical understanding than those who had been in classrooms focusing on arithmetic skills only. This finding is quite at odds with what one would expect and what we observed in classrooms in which skill practice was supplemented by the attempt to convey understanding, as described in Chapter IV. The instruction we observed would be most likely to provide students with a base of understanding that should, theoretically, exceed the lesser grasp of mathematical ideas likely to result from skills-oriented instruction. We have no satisfactory explanation for this finding (possibly it is an artifact of analytical decisions such as the choice of where to place cutpoints that define which classrooms are and are not placing emphasis on conceptual understanding).

Effects on Students' Grasp of Basic Computational Skills

Understanding mathematical ideas and solving nonroutine problems are not the only important outcomes of mathematics instruction. Arithmetic computational skill--the "basics" of most elementary mathematics programs--is still an important learning goal. The question arises immediately: what effect does instruction emphasizing mathematical understanding and problem solving have on students' computational proficiency? We pursued this question by running the multiple regressions described above with CTBS/4 Computation test scores as the outcome. (This was done only in Year 1 of the study, because the computation subtest was not administered in Year 2; thus, we have no way of checking our findings for the first, third, and fifth grades through replication.)

The results, summarized in Table 18, parallel what we found for analyses of the Concepts and Applications test. Students in classes emphasizing multiple mathematical topics and conceptual understanding--that is, the classes that departed the farthest from an exclusive focus on arithmetic skills--performed substantially better, a statistically significant 6.1 NCEs above the level of students in classrooms focusing on arithmetic skills only, all other factors being equal. That is an important finding: it says, in effect, that improving basic mathematical skills of the student population we are studying is not a matter of focusing single-mindedly on these skills. The skills can be learned better in settings that balance and enrich the children's mathematical learning diet.

As was noted in Chapter IV, classrooms that focused on multiple topics and conceptual understanding did not necessarily do significantly less arithmetic skill building. In other words, teaching skills is not necessarily in a trade-off relationship with improving conceptual understanding or problem-solving skills.

It is noteworthy that the other types of classroom shown in Table 18 show only small estimated gains or losses, which are not statistically different from students' performance in classrooms concentrating solely on arithmetic skills. It is particularly puzzling, for example, that classrooms focusing on arithmetic skills with conceptual understanding perform no better and perhaps even a little worse than the arithmetic-skills-only classes. There is no easy explanation for this finding, and without a second year of data for this outcome measure, there is no way to check it, as was the case with other outcomes. The simplest way of interpreting the finding is that what these classes have in common with arithmetic-skills-only classrooms--large amounts of time devoted to practicing arithmetic skills--is probably the factor that makes the most difference in tests of these skills. But why then are students in classes with a wider and richer array of mathematical learning opportunities performing significantly better on these same tests? Perhaps it is a motivational difference or the fact that, having encountered the application of these skills in a wider variety of contexts, students develop a more thoroughly grounded and secure knowledge of the basic skills themselves.

Table 18

ASSOCIATION BETWEEN APPROACH TO MATHEMATICS INSTRUCTION AND ARITHMETIC COMPUTATIONAL SKILLS OVER THE SHORT TERM (FALL TO SPRING)

Focus of Mathematics Instruction	Difference in scores (NCEs) on the CTBS/4 Computation Test at the end of the school year, controlling for initial differences in achievement and poverty level. Year 1: Grades 3, 5 (n = 821)[b]
Multiple topics with conceptual understanding[a]	6.1*[c]
Multiple topics, skills only[a]	1.8
Arithmetic skills plus conceptual understanding[a]	-1.1

*Statistically different from zero at $p < .05$.

Table reads: "By comparison with their counterparts in classrooms exposed to arithmetic skills only, students exposed to multiple topics with emphasis on conceptual understanding perform 6.1 NCEs better in the spring of Year 1. This result is statistically different from zero at the .05 level...."

a - These variables indicate students' presence in classrooms with each type of approach to mathematics instruction, compared with students in classrooms focusing on arithmetic skills only.

b - Data unavailable for Year 2 (computation tests were not part of the second-year testing battery).

c - Figures in the table are unstandardized B-weights for dummy variables indicating each type of mathematics instruction. Regression equations include students' pretest score, poverty level, and dummy variables indicating grade level. Coefficients for all variables are in Regression Tables in Volume 2.

Differential Effects on Low- and High-Achieving Students

So far we have examined influences on outcomes for the total pool of tested students. Conventional wisdom holds that instruction emphasizing understanding and problem solving may be too "advanced" for lower-achieving students and is thus most appropriate for brighter, apparently more capable students. By this line of reasoning, low-achieving students would do better in curricula that emphasized arithmetic skills or other more "basic" aspects of mathematics. By implication, the alternative approaches being tried in our sample of classrooms would have different effects on high- and low-achieving students.

We explored this possibility by dividing the overall student population into thirds based on their fall pretest scores and running parallel regressions for each third with the same variables. The data, summarized in Table 19, suggest that the alternative approaches to mathematics are equally effective for the highest third (students with pretest scores of approximately 52 NCEs or greater) and the lowest third (students with pretest scores of 35 NCEs or less). In both years of the study, alternative forms of instruction appeared to have the same or similar effects on the highest and lowest third of the student population, with one exception--the multiple-topics, skills-only classrooms in Year 1, in which high-achieving students benefited more than comparable students in arithmetic-skills-only classrooms, while their low-achieving counterparts did not.

The finding can mean different things. For one thing, low performance on pretest scores is not the same thing as low ability. Especially in the kinds of schools we have been studying, the lowest-achieving group of students are likely to include individuals who have a great deal of ability and who might blossom given the right kind of instruction. The finding may also indicate something about the appropriateness of alternative instructional strategies for students who are, in fact, less able than their peers--namely, that "slow" students can gain from instruction that places greater emphasis on meaning and understanding. Indeed, similar findings have been reported for elementary science instruction (Bredderman, 1985).

Table 19

ASSOCIATION BETWEEN APPROACH TO MATHEMATICS INSTRUCTION AND MATHEMATICAL UNDERSTANDING, FOR HIGH- AND LOW-PERFORMING STUDENTS, OVER THE SHORT TERM (FALL TO SPRING)

Focus of Mathematics Instruction	Difference in scores (NCEs) on the CTBS/4 Concepts and Applications Test at the end of the school year, for students in the upper and lower third of the achievement distribution, controlling for initial differences in achievement and poverty level.			
	Year 1: Grades 1, 3, 5		Year 2: Grades 2, 4, 6	
	High (n=379)	Low (n=355)	High (n=410)	Low (n=388)
Multiple topics with conceptual understanding[a]	5.7*[b]	8.2*[b]	2.8[b]	2.7[b]
Multiple topics, skills only[a]	5.8*	-1.4	2.0	3.1
Arithmetic, skills plus conceptual understanding[a]	-0.8	0.8	-1.7	-1.8

*Statistically different from zero at $p < .05$.

Table reads: "By comparison with their counterparts in classrooms exposed to arithmetic skills only, students in the upper third of the achievement distribution who are exposed to multiple topics with emphasis on conceptual understanding perform 5.7 NCEs better in the spring of Year 1; students in the lower third of the achievement distribution do 8.2 NCEs better than corresponding students exposed to arithmetic skills only. These results are statistically different from zero at $p < .05$...."

a - These variables indicate students' presence in classrooms with each type of approach to mathematics instruction, compared with students in classrooms focusing on arithmetic skills only.

b - Figures in the table are unstandardized B-weights for dummy variables indicating each type of mathematics instruction. Regression equations include students' pretest score, poverty level, and dummy variables indicating grade level. Coefficients for all variables are in Regression Tables in Volume 2.

Other Factors That Might Influence Mathematics Outcomes

Our analyses included other factors besides the type of mathematics instruction. In addition to characteristics of students (pretest score and poverty level) used throughout the preceding analyses as covariates, we considered other features of instruction and teacher characteristics known to influence instructional outcomes: (1) instructional time, (2) teachers' proficiency at managing instruction, (3) the richness of the teachers' background in the subject area and how to teach it, (4) teachers' expectations for students' success, and (5) teachers' satisfaction with teaching.

Based on research over the past several decades, there were grounds for believing that these variables, first, might explain why our findings came out as they did and, second, might influence student learning in their own right, independent of any influence that instructional approaches might have. To check out the possibilities, we included the variables one at a time in equations that had produced the results described earlier in this chapter. As we did so, we examined regression coefficients to determine whether the presence of the variable in the equation altered (or even eliminated) the association between instructional approach and outcomes and also whether the variable itself was significantly associated with variation in the outcome scores.

Regarding the first issue, the findings were unequivocal: the presence of instructional time and characteristics of teachers do not substantially change the relationship between instructional approach and outcomes. As Table 20 displays, the coefficients indicating the relationship between outcomes and instruction that departs the most from conventional practices (that is, instruction aimed at multiple mathematical topics and conceptual understanding) remain relatively unchanged, either in absolute size or in statistical significance, when other variables are introduced into the regression equation. (The table does not present the full regression equations, which may be found in the Regression Tables in Volume 2.) A slight exception to the general pattern occurs in Year 2: there, by considering characteristics of the teacher, the relationship between instructional approach and outcomes is strengthened somewhat. This can mean that the implementation of alternative approaches was more uneven in the second year, for example, because it was attempted by more teachers who were less proficient at managing instruction, less well prepared, and so forth. By controlling for these variables among teachers, the regression analyses help to isolate the relationship between approach and outcomes that is independent of these factors.

At the same time, some of these variables are independently associated with outcomes, as reviewed below with regard to factors pertaining to other features of instruction and to teachers.

Other Features of Mathematics Instruction

During the course of classroom observations, we counted the amount of time spent in mathematics instruction by simply noting the actual number of minutes spent in mathematics-related activities. As noted in Chapter IV, classrooms that departed the most from conventional approaches to mathematics instruction tended to spend more time teaching this subject than classrooms focused only on arithmetic skills. Thus, it was not surprising to find that, in both years, the amount of time spent in instruction was positively linked to outcome scores. Although the increment was small (on average, 10 more minutes of math instruction per day is associated with a 0.5 to 0.8 NCE difference between alternative and conventional approaches to instruction), it is still statistically different from zero at the .05 level.

Besides approach to instruction and instructional time, there are other features of mathematics instruction that could be included in these regression analyses. However, our fieldwork, summarized in Chapters III and IV, suggests that many of these features tend to cluster within the types of approach. For example, teachers' use of manipulatives to represent mathematical ideas, attempts to foster discussion in math class, emphasis on multiple correct answers, and multiple representations of mathematical concepts are among the instructional strategies that distinguish alternative from conventional approaches. There seemed to be little to gain from a more

Table 20

ASSOCIATION BETWEEN APPROACH TO MATHEMATICS INSTRUCTION AND MATHEMATICAL UNDERSTANDING, CONTROLLING FOR OTHER INSTRUCTIONAL AND TEACHER VARIABLES, OVER THE SHORT TERM (FALL TO SPRING)

	Difference in scores (NCEs) on the CTBS/4 Concepts and Applications Test at the end of the school year, for students exposed to multiple topics and conceptual understanding, compared with students exposed to arithmetic skills only.	
	Year 1: Grades 1, 3, 5	Year 2: Grades 2, 4, 6
When controlling for students' fall pretest score and poverty level and for:		
• Time for instruction (minutes/day of math)	5.7*	1.0
• The teachers' proficiency at managing instruction	5.7*	2.0 (*)
• The richness of teachers' backgrounds in subject area, expectations for student success, and satisfaction with teaching	6.0*	2.4*

*Statistically different from zero at $p < .05$. (*) Statistically different from zero at $p < .10$.

<u>Table reads</u>: "By comparison with their counterparts in classrooms focusing on arithmetic skills only, students exposed to multiple topics with emphasis on conceptual understanding perform 5.7 NCEs better in the spring of Year 1, once initial differences in achievement, poverty level, and the amount of time spent in mathematics instruction are taken into account. This result is statistically different from zero at the .05 level...."

a - Figures in the table are unstandardized B-weights for dummy variables indicating students' exposure to multiple topics with emphasis on conceptual understanding, compared with students receiving instruction in arithmetic skills only. Coefficients for all variables are in Regression Tables in Volume 2.

microscopic analysis that attempted to isolate independent effects for each of these instructional strategies. If anything, our qualitative fieldwork convinced us that no single strategy by itself would make a noticeable difference in a year's learning, whereas the clustering of strategies into a more global approach to instruction might make a difference, as turned out to be the case.

Characteristics of Mathematics Teachers

Teachers pursuing each approach to instruction varied considerably in backgrounds, expectations for students, and general competence at managing learning activities. Although it is difficult to disentangle a teacher's approach to a particular subject area from his or her general competence at managing instruction across the school day (see Chapter XII for further discussion of this issue), it is still possible to rank order teachers by their overall level of success in securing on-task student behavior in all subject areas. This more general competence at managing instruction could account, in principle, for some of the variation in outcome scores, independent of the type of approach to the subject. Our analyses indicate that this may be the case, although the results are inconsistent across years. Teachers' proficiency at managing instruction was linked to outcomes significantly and positively in Year 1 and negatively (although not statistically different from zero at $p < .05$) in Year 2.

The results of further analyses indicate that the richness of mathematics teachers' backgrounds, expectations for student success, and satisfaction with teaching may be linked to student outcomes, but less strongly or consistently than we might have supposed. Nonetheless, these variables do appear in some cases to bear some relationship to outcomes. For example, in Year 2, richness of teachers' background in mathematics had a significant and positive association with both mathematical understanding and problem-solving proficiency, independent of other factors.

The general lack of clear and consistent associations between teacher characteristics and outcomes can be understood in several ways. First, these qualities of the teacher are not necessarily independent of the approach taken to teaching mathematics (further analysis of this point appears in Chapter XV); as such, the association of the variable need not manifest itself in this kind of analysis independent of other factors. Second, because of the sampling criteria we used (see Chapter II), the range of variation on these variables in our sample is not great--most teachers we studied were relatively satisfied and well trained, and had moderately high expectations for their students. Given this fact, the variable would not appear to exert the kind of influence it does in the full population of elementary school mathematics teachers.

Interpreting the Results of Mathematics Outcomes Analysis

Taken together, our findings permit us to draw important conclusions about the appropriateness of different approaches to mathematics instruction for the children of poverty. Overall, there seems to be confirmation that strategies aimed at fostering mathematical understanding and problem solving do just that. Furthermore, they appear to do so without sacrificing the mastery of computational skills, and they even appear to enhance the learning of these skills for students in classrooms emphasizing multiple mathematical topics and conceptual understanding. Finally, for the lowest-achieving children in the student population we have been studying, alternative instructional approaches work at least as well as they do for the highest-achieving ones.

There are important qualifications to the mathematics outcome story we have to tell. First, as noted earlier in the chapter, we have investigated a restricted range of outcomes related to mathematical understanding and problem solving. Furthermore, the tests we used are only a superficial way of getting at the kinds of thinking that powerful mathematics curricula are designed to convey. Because of the constraints on data collection, our paper-and-pencil measures were not as extensive as they might have been, and even had they been, group-administered paper-and-pencil measures simply do not tell all that one might want to know about the way students approach, process, or carry out mathematical activities.

Second, the size of the effects we have identified is modest; they come nowhere near the dramatic NCE gains that have been reported in some demonstrations of alternative mathematics teaching in schools that serve concentrations of children from low-income families (e.g., Resnick, Bill, Lesgold, & Leer, 1991). But such demonstrations are typically carried out in settings that provide a small number of talented teachers with extensive and continuing support and, along with it, a comprehensive program for improving mathematics skills. In these situations, the results can be demonstrated by experimental or quasi-experimental contrasts, which permit a large number of relevant factors to be carefully controlled. By contrast, we are engaged in a study of natural variation and our evidence is correlational. Given that the classrooms we have studied are not the focus of any particular demonstration and display considerable variation across a large number of relevant variables, the fact that we found statistically significant difference in the range of 2 to 7 NCEs strikes us as an educationally significant finding.

Third, it is a mistake to attribute to the instructional strategies alone too much influence over the outcomes of instruction, even though key student and teacher characteristics have been taken into account. The instructional strategies are linked to, and in some sense dependent on, other things happening that support this kind of instruction--in particular, an adequate amount of time for mathematics instruction, appropriate support for teachers, and curricular decisions that place priority on the kinds of mathematical thinking outcomes that we were testing. We will explore these kinds of influences more extensively in Chapters XV and XVI.

But even with these qualifications, the message of the study's findings regarding mathematics is clear: the results suggest that a sizable group of teachers have found a range of ways to improve substantially the mathematical proficiencies of a population of students who are often assumed to be unable to handle the more "advanced" aspects of mathematics.

PART TWO:

READING INSTRUCTION

In this part, we turn to reading instruction. This part parallels the preceding one, with a chapter characterizing typical practices across the elementary grade classrooms in the sample, another chapter describing alternatives to conventional practice that emphasize comprehension, and a third chapter summarizing the effects of alternative practices on students' ability to understand what they read.

In Chapter VI, we describe modal patterns of practice among the teachers. Here, we demonstrate that, on average, teachers in the sample made extensive use of basal reading series (especially the "literary readers" of recent vintage), taught discrete skills extensively, and often organized their reading instruction around homogeneous ability groups, especially in the early grades. Teachers displayed more variation than in mathematics instruction regarding how they approached reading.

Chapter VII examines a series of instructional strategies used by teachers in the sample to maximize children's ability to comprehend what they read--among them, integrating reading with writing, focusing on understanding of text below the literal level, and explicitly teaching students strategies to use in attempting to understand text (e.g., by using context clues or making predictions). The chapter demonstrates that teachers often used these comprehension-oriented techniques in conjunction with one another. We group and describe classrooms that made little, moderate, or extensive use of these instructional strategies.

As we show in Chapter VIII, the degree of emphasis on comprehension-oriented instruction makes a difference in how well students learn to understand what they read, although not necessarily in students' mastery of basic reading skills (however, regarding the latter, there is no clear evidence that emphasizing comprehension impedes the learning of these skills either). As in the case of mathematics, there is mixed evidence regarding the longer-term retention of learning over 12-month periods of time. In addition, low-achieving students appear to benefit as much from alternative forms of reading instruction as their high-achieving peers.

VI READING CURRICULUM AND INSTRUCTION IN GRADES ONE THROUGH SIX

As in the case of mathematics, reading instruction in the classrooms we studied takes place at a time when national concern about improving literacy skills is high and sweeping proposals for reforming reading instruction--indeed, language arts instruction as a whole--are being given serious consideration in many quarters. Although reading experts are more often divided than mathematics educators on the nature of the problem and its solution, there is nonetheless widespread support for certain broad principles guiding the approach to reading instruction.

In particular, when considering the task of teaching the children of poverty to read, there appears to be increasing encouragement for teachers to depart from a traditional model of reading instruction that emphasizes the teaching of "basic" reading mechanics skills (e.g., decoding words out of the context of actual text). Many experts currently advocate a view of reading curriculum and instruction that (1) emphasizes meaning and deemphasizes discrete skills taught in isolation, (2) encourages wide exposure to appropriate and interesting text, and (3) focuses on material that connects with students' experiences and backgrounds (Knapp, Turnbull, & Shields, 1990). Reading instruction of this kind represents a significant departure from what has been the norm in schools serving the children of poverty (Knapp & Needels, 1991).

The classrooms in our sample are spread across a continuum from those that have approached reading and language arts instruction in the "tried-and-true" manner that has long been thought to work for disadvantaged children to those that are attempting a variety of nontraditional approaches. In this chapter we provide a baseline for understanding this continuum of practices by presenting an overview of what is taught, and how, across the school year, by grade. In succeeding chapters, we describe instructional strategies that appear to maximize children's understanding of what they read, and, finally, we examine student outcomes in the context of the types of reading curriculum and instruction that students have experienced.

In the first section of this chapter, we provide a broad-brush look at the nature of reading instruction in the sample classrooms. As in the preceding chapter concerning mathematics, we answer three questions: What is taught? Who teaches it? How is it taught? Each table in this section has two parts. Part a presents results of data analysis for grades 1, 3, and 5; these data were collected in school year 1989-90. Part b represents the results of analyzing data for grades 2, 4, and 6, which were collected in school year 1990-91.

What Is Taught in Reading Across the Year

Previous research has indicated that instruction in reading is the centerpiece of the elementary school curriculum, consuming on the average 30 percent of the typical 5- to 6-hour school day (Anderson, Hiebert, Scott, & Wilkinson, 1985). Our data confirm this. If anything, in the schools and classrooms that we visited, reading and reading-related instruction played an even more prominent role in the overall curriculum.

Table 21a presents indicators related to the content of reading instruction across the school year in first-, third-, and fifth-grade classrooms. With one exception (degree of reliance on a basal series), all data in this table are drawn from logs completed by the classroom teachers participating in the study. Data from the logs represent an average proportion of instructional days in the school year when a particular aspect of reading instruction occurred. For the one variable based on researchers' observations, observers' estimates of teachers' reliance on basal reading textbooks were derived by averaging ratings (on a 4-point scale) taken at selected points in the school year.

The Nature of the Basal Readers

As Table 21a shows, teachers in first-grade classrooms reported that students used their basal readers on 62 percent of the days that school was in session. The average proportion of days that students read from a reading textbook declined steadily across the grades. At all three of the grade levels studied in Year 1, teachers indicated that reading instruction included having students read in trade books (i.e., books such as one might purchase in a bookstore or borrow from a library) on about one-fourth of all school days. Taken together, these two types of reading materials accounted for over 60 percent of student interactions with text at all three grade levels. Older students, however, appear to be spending more time with other types of materials* than are children in the primary grades.

In most of the classrooms where we studied reading instruction intensively, during the formal reading instruction period, children most frequently read from a commercially published textbook series that included a teacher's edition with suggested activities and questions for each selection, and assorted related materials such as workbooks and reproducible worksheets. Typically, teachers proceeded through the units of these basal readers in order and followed the publisher-developed line of questioning to determine whether students were comprehending what they read.

However, two distinct types of basal readers were in use in these classrooms: (1) standard basals, where the introduction of new words is tightly controlled and some or all of the selections are prepared by textbook writers/editors to emphasize particular discrete reading skills or (2) a new format often referred to as a "literary reader."

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* These materials may include, for example, supplementary materials that accompany a basal series, textbooks in the content areas (e.g., social studies, science, health), or materials with a newspaper format such as those published by Scholastic Press.

Table 21a

WHAT IS TAUGHT IN READING ACROSS THE SCHOOL YEAR, BY GRADE (YEAR 1)

	Grade		
	1 (n = 25)	3 (n = 24)	5 (n = 20)
<u>What children read</u>			
• Of all days of reading instruction, percentage that students read in--			
Published basal reader	62 (33)[a]	55 (27)[a]	40 (27)[a]
Trade books	26 (27)	23 (24)	24 (26)
• Degree of reliance on basal series: Scale from 1 (= exclusive reliance) to 4 (= no reliance)	2.0 (0.6)	2.1 (0.8)	2.5 (0.9)
<u>Attention paid to skills, comprehension, literary analysis</u>			
• Of all days of reading instruction, percentage on which these reading mechanics skills were taught--			
Explicit phonics	31 (32)	5 (8)	6 (13)
Implicit phonics	39 (39)	16 (24)	12 (25)
Whole-word recognition	56 (34)	43 (28)	32 (30)
Word analysis	32 (32)	30 (23)	23 (27)
Fluency practice	42 (34)	28 (25)	20 (23)
• Of all days of reading instruction, percentage focused on--			
Recalling/locating information	47 (24)	42 (22)	40 (25)
Literal understanding/summarizing	40 (28)	33 (18)	34 (22)
Deeper understanding	29 (27)	26 (19)	25 (15)
• Of all days of reading instruction, percentage with instruction on literary forms, genre, or analysis--			
In conjunction with reading	24 (28)	20 (26)	19 (25)
Out of context	7 (11)	5 (12)	5 (9)

a - Standard deviations appear in parentheses.

The literary readers are a new addition to materials used for reading instruction. In developing them, textbook publishers have responded to a number of new ideas about effective reading instructions emerging from the reading research community. Smith (1982), for example, argues that young children must understand that print is meaningful as a precondition to becoming actual readers. To gain this understanding, they need to be exposed to printed material that is real to them, rather than the stilted, controlled vocabulary of stories in traditional basal readers. Other research suggests that reading and writing (as well as speaking and listening) are so interrelated that they should be conceptualized and taught as an integrated literacy curriculum (Goodman, 1986). In response to these and other research-based recommendations, publishers produced a new type of basal reader specifically designed to offer children more interesting, higher-quality reading material, with accompanying supplementary materials that, if used as specified, engage students with interesting material and require them to do a great deal more writing than the norm. In more than half of the classrooms studied intensively during the first year of the study, teachers were using the literary readers for the first time. By Year 2 of the study, these reading series were being used by most teachers in all but one of the school districts in our sample.

In contrast to traditional basals, the literary readers do less to control the readability level. They adhere instead to an author's original words rather than editing out and rewriting to a formula that introduces new vocabulary words very gradually and deliberately. Each thematically organized unit in the text is usually accompanied by a longer piece of literature, with paperback copies for each child. Supporting materials emphasize comprehension skills and require considerably more student-generated extended writing than the old short-answer workbooks and worksheets.

Because of the prevalence of the newer reading texts, in the second year of data collection we altered the teacher log item on the types of material that children read. The primary distinction not captured by the first-year instrument concerned the category "children's literature." With the new basals, students were indeed reading good children's literature, albeit within the covers of a hardcover textbook.

To accommodate this new reality, the teachers' log for Year 2 asked teachers to distinguish between "passages created to teach reading" (including the standard kind of worksheets addressing skills such as "Finding the Main Idea") and "children's literature," including literature incorporated into a basal anthology. Table 21b shows that the teachers of grades 2, 4, and 6 in our sample reported that their students engaged in reading children's literature on a majority of school days, with the frequency somewhat higher for second graders.

The individual lines under the variable "Types of material read" are not intended to sum to 100 percent, since teachers often have students interact with several kinds of reading material in a single day. Overall, however, across second, fourth, and sixth grades, fourth graders seemed to encounter the most variety in reading material on a regular basis, while sixth graders experienced the least. Reasons for this pattern may include the fact that the sixth-grade curriculum becomes overcrowded in many districts. In addition to the core subjects, teachers of this age group commonly must, for example, incorporate drug awareness programs and study skills programs in preparation for junior high school. Since instructional time is fixed, there is simply less of it available for reading anything at the upper grade levels.

As different as their look and overall philosophy of literacy are, the literary readers remain basal texts, and teachers tend to treat them as such. The manual tells teachers what to do and what to ask--if the teacher opts to use it. There are units to get through more or less on schedule. Although the parts of lessons related to introducing or reinforcing decoding skills in traditional readers are largely omitted from the literary readers, the units do include skill lessons on vocabulary, reference skills, syllabification, and other topics that parallel the more conventional texts.

In the districts that have recently adopted literary readers, most teachers felt committed to giving the new books a fair trial (although we did encounter one classroom where the teacher flatly rejected the new set of books and surreptitiously resurrected the traditional basal series).

Table 21b

WHAT IS TAUGHT IN READING ACROSS THE SCHOOL YEAR, BY GRADE (YEAR 2)

	Grade		
	2 (n = 22)	4 (n = 22)	6 (n = 17)
What children read			
• Of all days of reading instruction, percentage that students read in--			
Passages created to teach reading	34 (31)[a]	37 (25)[a]	28 (23)[a]
Children's literature	64 (31)	55 (26)	56 (26)
Textbooks/materials in content areas	31 (26)	42 (24)	32 (21)
• Degree of reliance on basal series: Scale from 1 (= exclusive reliance) to 4 (= no reliance)	2.3 (0.7)	2.3 (0.7)	2.7 (1.0)
Attention paid to skills, comprehension, literary analysis			
• Of all days of reading instruction, percentage on which these reading mechanics skills were taught--			
Explicit phonics	22 (26)	11 (16)	10 (22)
Implicit phonics	49 (26)	25 (21)	24 (26)
Whole-word recognition	57 (28)	53 (26)	45 (29)
Word analysis	32 (25)	39 (24)	35 (26)
Fluency practice	43 (28)	46 (23)	28 (26)
• Of all days of reading instruction, percentage focused on--			
Recalling/locating information	59 (30)	42 (22)	40 (25)
Literal understanding	60 (28)	53 (23)	49 (24)
Summarizing	45 (28)	39 (20)	44 (22)
Deeper understanding	35 (26)	40 (21)	41 (24)
• Of all days of reading instruction, percentage with instruction on literary forms, genre, or analysis--			
In conjunction with reading	33 (33)	41 (26)	39 (19)
Out of context	4 (10)	20 (26)	17 (18)

a - Standard deviations appear in parentheses.

However, a number of them expressed reservations about the difficulty level of the selections and accompanying activities, particularly in situations where the new books were accompanied by a mandate to use whole-class instruction. According to some teachers, the difficulty of the materials forced them to concentrate on making sure that students understood the literal meaning of the text, at the expense of developing students' capacity to interpret or analyze what they were reading at a deeper level. Whether or not it was because of the textbooks, our observations do indicate that even among very good teachers, the pattern of teacher questioning about reading passages focused heavily on having students recall factual information.

Although the literary readers and supporting materials are designed to create greater instructional integration of all aspects of language arts, it is also possible for teachers to use them without significantly altering any of their traditional beliefs about the need to drill students on discrete skills. For example, in a number of classrooms, teachers sometimes skipped over workbook exercises requiring extended writing, focusing instead on the pages that were skill oriented and supplementing these with additional practice sheets drawn from other sources, including previously used traditional basal texts.

The tendency to use literary readers for their content without "buying into" any real changes in instructional approach seemed to be related to two factors: (1) limited training in the specific use of the new materials and (2) lack of intensity in a district's commitment to the goal of integrating reading, writing, and other aspects of the language arts. Districts varied in the amount of training provided to teachers on the philosophy and use of the literary readers. Textbook publishers typically include an introductory workshop for teachers as part of the purchase price of a new textbook series. This tends to be a half-day event for participating teachers--certainly no more than one full day. If teachers are unable to attend at the scheduled time, they are on their own. For two districts in our sample, support for using the new materials was at this minimal level.

In other places, the literary readers fed into a coherent and sustained initiative to change the overall approach to reading instruction. Professional development activities--including task forces, committees, and workshops--that predated the actual availability of the new reading books created a context and some personal commitment to a new reading curriculum.

Although basal reading texts of one type or the other continued to be the primary reference for reading instruction in this group of classrooms, we did note a trend toward greater use of complete novels, biographies, and other types of books. Among the 44 teachers studied intensively in Year 1, only 2 had abandoned textbooks entirely:

- A teacher-designed curriculum based on novels in a fifth-grade classroom. In an urban, multiracial, fifth-grade classroom, Ms. McCray uses a literature-based curriculum that she and a colleague designed themselves, supported by a grant. All the novels read in her class promote ethnic and racial understanding. Her goal is to help children comprehend big ideas such as prejudice and justice while continuing to develop their reading skills. Through discussions and other interactions with the students, she models the principles of tolerance and fairness that she hopes will become part of their value system as a result of the reading program.

- Trade books and class-generated text in a first-grade classroom. In one first-grade classroom, Ms. Koyama uses a basal reader only at the very end of the year, and then only to give her students exposure to what she knows they will encounter in second grade. During first grade, this teacher uses a combination of trade books and text that she or the class generates. Every morning, for example, the whole class dictates the daily "newspaper," which includes the day, the date, the weather, and several personal contributions from individual children. Students and teacher read the newspaper aloud as a whole group, and individual students are asked to find particular words (perhaps beginning with some specific consonant sound) or read individual sentences. Finally, an aide types the daily newspaper into a computer and produces copies for each student to take home and read to a parent.

In the second year of the study, 7 out of 23 teachers observed intensively had created their own reading curricula, only occasionally drawing on basal materials to reinforce certain skills or concepts. In addition, many--perhaps even most--teachers that we observed over the 2-year period broke the march through the basal text with an occasional trade book of some type.

As data from both years indicate, teachers' reliance on basal readers decreases somewhat across the grades--a quite predictable pattern. As students acquire mastery and fluency, "reading" becomes less of a subject to be taught and more of a tool to be used--in social studies, science, and health segments of the day, for example.* Nevertheless, even in fifth-grade and sixth-grade classes, teachers on the average continued to make considerable use of the reading textbooks available to them.

The Content of the Material Children Read

Overall, we did not find that what children read during reading instruction varied much across the districts in our sample. Given the same publisher, traditional and literary basals seemed to carry many parallel selections--albeit with different vocabularies. The major variations between the two types of texts were in the kinds of pre- or postreading activities emphasized; the literary readers offered teachers a planned structure for presenting reading, writing, listening, speaking, and thinking in an integrated fashion rather than as discrete skills.

There was considerable variation, however, in the content of reading at the classroom level, both within and across districts, that is masked by the aggregated data represented in Tables 21a and 21b. For example, as we noted earlier, an increasing number of teachers had completely or partly abandoned their former exclusive reliance on texts in favor of other types of reading materials--teacher-made text, text generated by children, novels, nonfiction works. In some of these situations, children were exposed to a much wider variety of reading experiences than the norm. For example, in one first-grade class, the teacher frequently used stories in a traditional basal reader as a jumping-off point for reading other versions of the same tale or other literature with a similar theme.

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*Observers did not systematically record information on the reading students did during periods of the day allocated to the content areas.

Unfortunately, in some other classrooms, children rarely held a basal reader of any kind in their hands and had very little opportunity to read extended text, although a basal series was available. Particularly in situations where the curriculum is heavily test-driven, teachers feel compelled to spend the majority of reading instruction time on the discrete skills that they know will appear on standardized tests. In operation, this can mean that children read only the very brief sentences or paragraphs on workbook pages or worksheets.

Discrete Skills in Reading

Tables 21a and 21b also give an overview of the types of reading skills emphasized at the six grade levels. Despite the stress on reading comprehension that is prevalent in the newer basal readers and in many of the schools and classrooms that we visited, instruction in the "tools" of reading, such as phonics and word analysis skills, continues to be an important part of the reading curriculum. Traditionally (and particularly for the children of poverty), reading instruction has been organized in a linear fashion leading from part (letters, words) to whole (sentences, paragraphs, whole stories). This approach sets mastery of letter sounds, blends, vowel rules, and a basic sight word vocabulary--frequently taught totally out of any meaningful context--as a precondition for "real" reading. When students fail to master these skills easily, they often receive supplemental drill and practice in small groups or individually (see Chapter XIV).

Newer theories about how children learn to read by no means completely eschew the need to help students develop strong decoding skills. As one team of researchers points out:

> We...do not know how much of the comprehension curriculum should be spent on the teaching of reading strategies versus other types of activities. How, for example, should strategy instruction time be balanced against such things as decoding skills, free reading, authentic reading and writing activities, and teacher-led discussion of stories? (Dole, Duffy, Roehler, & Pearson, 1991)

In other words, many different types of instructional opportunities contribute to the development of competent readers.

Research has not yet defined, and may never define, the optimum combination of strategies. Nevertheless, there is strong evidence that the traditional part-to-whole approach, which results in withholding meaningful text until skills are mastered, is counterproductive. A number of reading specialists suggest that just the opposite approach should be taken: all skills instruction should proceed from whole to part (Bridge, 1988). Once children are engaged with a story or other genuine text, then the teacher can focus their attention on features of individual words or patterns within the text. Several teachers in our sample had adopted this approach, including the first-grade teacher described on page 147. Ms. Koyama taught phonics nearly every day, but only in the context of an authentic reading or writing activity.

As Tables 21a and 21b show, all types of reading mechanics skills receive less attention as students proceed through the grades. The logical interpretation of this pattern is that children have mastered decoding and acquired a substantial sight word vocabulary by the upper elementary years; therefore, instruction in reading mechanics is no longer needed. The pattern is also in line with the National Commission on Reading's exhortations about phonics instruction: do it early (Anderson et al., 1985). Indeed, the planned structure of virtually all basal reading series--particularly the literary readers--relies on this assumption.

If upper-grade students spend less time on reading mechanics skills such as phonics, they presumably have more of some other type of instruction. These data cannot precisely determine what fills that gap. However, as the last two variables on Tables 21a and 21b make clear, there is no particular difference in emphasis at the upper grade levels on "higher-order" aspects of reading instruction such as attention to deeper understanding of text or study of literary forms and genre. Actually, according to our observations in classrooms, primary-grade teachers (who commonly develop units on fairy tales, folk tales, and fables) seemed to emphasize genre more than upper-grade teachers.

One further point must be made about the prevalence of teaching discrete skills across the grade levels. Some fifth- and sixth-grade students in a number of the classrooms we visited quite obviously had not achieved mastery or fluency in reading. Some continued to receive drill and practice in reading mechanics through supplemental instruction (see more extensive discussion of this point in Chapter XIV) or some other type of grouping arrangement that took them outside the observed classroom for their reading instruction. Many others did not receive such attention to basic skills and were struggling with grade-level materials and content, particularly in districts where policy required that all students in a grade should be exposed to the same curriculum materials at the same time. It was not clear to us or to teachers how 10- and 11-year old students with missing skills would acquire them without direct instruction.

Who Teaches Reading/Language Arts

As Tables 22a and 22b indicate, on average, students in the sample classrooms received reading instruction (or assistance with reading tasks) from more than one person. Configurations of personnel varied. In a very few classrooms (especially those with ESL students), the teacher had a full-time or nearly full-time aide. In others, an aide or special program teacher came into the classroom or took groups of children out only for some portion of the scheduled reading/language arts period (see Chapter XIV). Whatever the configuration, however, the striking result is that in this group of classrooms, on average, the ratio of pupils to instructional staff during reading instruction is considerably lower than we might have expected--13:1 and 12:1 in first and second grades, respectively, and 15:1 for the middle years of elementary school. Not surprisingly, the ratio rises for sixth-grade classrooms, where regular assistance from aides is much less prevalent.

At all grade levels, the pupil/staff ratios for reading instruction are somewh-+ lower than the corresponding figures for math, indicating that districts or schools tend to focus the resources that they have for hiring

Table 22a

WHO TEACHES READING/LANGUAGE ARTS
IN THE REGULAR CLASSROOM, BY GRADE (YEAR 1)

	Grade 1 (n = 25)	Grade 3 (n = 22)	Grade 5 (n = 21)
Number and type of instructional staff			
• Average number of instructional staff in the room	1.9 (.7)[a]	1.7 (.5)[a]	1.7 (.5)[a]
• Average pupil/staff ratio for language arts	13:1 (6)	15:1 (6)	15:1 (7)
• Percentage of classrooms in which teacher is assisted by--			
Another regular teacher	5 (16)	10 (24)	26 (44)
An aide	59 (44)	45 (41)	29 (40)
Expertise and experience			
• Average number of years teaching--			
This grade	9 (6)	7 (8)	7 (7)
This type of student population	10 (6)	10 (7)	8 (8)
• Richness of background in language arts: Index from 1 (= least) to 6[b]	2.8 (1.0)	2.7 (1.3)	2.4 (1.3)
Attitudes			
• Satisfaction with teaching: Scale value from 1 (= least) to 4[c]	3.2 (.6)	3.1 (.7)	3.0 (.7)
• Expectations for student success: Scale value from 1 (= most students won't be able to succeed) to 4 (= all can succeed at grade level)[c]	2.7 (.6)	3.1 (.7)	2.3 (.9)

a - Standard deviations appear in parentheses.

b - Index summing types of inservice and preservice professional development activity relevant to language arts, based on interviews and observer ratings.

c - Observer ratings.

Table 22b

WHO TEACHES READING/LANGUAGE ARTS
IN THE REGULAR CLASSROOM, BY GRADE (YEAR 2)

	Grade 2 (n = 24)	Grade 4 (n = 26)	Grade 6 (n = 17)
Number and type of instructional staff			
• Average number of instructional staff in the room	2.4 (1.0)[a]	2.2 (1.3)[a]	1.6 (.7)[a]
• Average pupil/teacher ratio for language arts	12:1 (7)	15:1 (10)	20:1 (9)
• Percentage of classrooms in which teacher is assisted by--			
Another regular teacher	6 (24)	6 (25)	11 (33)
An aide	83 (38)	81 (40)	78 (44)
Expertise and experience			
• Average number of years teaching--			
This grade	14 (10)	20 (12)	16 (11)
This type of student population	9 (7)	8 (8)	11 (10)
• Richness of background in language arts: Index from 1 (= least) to 6[b]	4.4 (1.2)	4.3 (1.4)	4.1 (1.1)
Attitudes			
• Satisfaction with teaching: Scale value from 1 (= least) to 4[c]	3.6 (.5)	3.2 (.7)	3.0 (.9)
• Expectations for student success: Scale from 1 (= most students won't be able to succeed) to 4 (= all can succeed at grade level)[c]	3.2 (.4)	3.2 (.4)	3.2 (.6)

a - Standard deviations appear in parentheses.

b - Index summing types of professional development activity relevant to language arts, based on teacher survey.

c - Teacher self-report.

instructional assistants or specialists on the reading/language arts area. These data reflect both the high priority placed on reading and the fact that schools were deliberately selected because they served large numbers of disadvantaged children and therefore qualified for certain special categories of additional personnel.

As a comparison of Tables 22a and 22b shows, the cohort of teachers in grades 2, 4, and 6 had, on the average, more experience teaching at a specific grade level than the sample that taught grades 1, 3, and 5, although both groups are comparable in terms of years of experience teaching the types of children served by their particular schools. More years of experience teaching a specific grade level might result in more entrenchment and therefore more resistance to new curriculum materials and instructional strategies. However, our analyses of how reading is taught (the next section of this chapter) do not bear out this hypothesis.

In both years of data collection, our samples of teachers included some very new teachers as well as some who were verging on retirement. Generally speaking, however, the classrooms were in the hands of teachers who were highly experienced at a particular grade level and with the types of students served by the school.

In Table 22a, the index of extent of teacher background in language arts is derived from data based on interviews with the instructors. Study team members asked teachers about their preservice preparation and professional development experiences related to language arts and completed coding form items based on these interviews. In the second year of the study, the items related to teacher background and experience were removed from the observer coding form to create a teacher survey. The two data sources are thus not quite comparable, although the specific items remained the same. The index for richness of background in language arts ranges from 1 (least) to a maximum of 6. On the average, observers judged that first- and third-grade teachers fell at about the midrange and fifth-grade teachers a little lower. Ratings for second-, fourth-, and sixth-grade teachers (who completed a questionnaire and thus perhaps had more opportunity to systematically recall their professional development activities over the years) are considerably higher.

The last set of variables in Tables 22a and 22b--teacher attitudes about their chosen profession and the students that they teach--is also derived from observer data in Year 1 and teacher self-report in Year 2. On average, observers found that these teachers were moderately satisfied with their careers. This finding holds true across all six grade levels, although first-grade teachers appeared to be somewhat more satisfied than their colleagues. The first-year sample in particular included a small number of teachers who were on the verge of leaving the profession; among these were some excellent instructors who were just plain tired out, as well as a few who were unable to cope with classroom management issues. In general, the types of factors that kept many teachers from saying that they were very satisfied with teaching tended to be external to the teacher/pupil instructional relationship: excessive paperwork, too many meetings, too little support from parents, etc. Most continued to take pleasure in their actual interactions with children.

Finally, observers talked with first-, third-, and fifth-grade teachers about their expectations for the children in their classes, particularly the lower-achieving students; second-, fourth-, and sixth-grade teachers responded to a parallel questionnaire item. Comparison of data across years shows that scale values for the second-year group are somewhat higher--that is, these teachers were more likely to report that they believe all children can succeed at grade level. However, we urge caution in interpreting these results. The scale values on expectations for student success for the first-year teacher cohort may represent a more objective measure since they are based on observed teacher behaviors rather than simple statements of belief alone.

On the average and across all grades, teachers believed that all students can succeed but that goals must be adjusted for low achievers; few believed that all could succeed at performing at grade level by the end of the year. They thus did not hold equivalent expectations for all students, even though a high proportion employed whole-group instruction and used the same materials with all children in the room.

Organization and Format of Reading Instruction

Tables 23a and 23b look at some basic variables that help describe how the teachers in this sample organize and orchestrate reading instruction in their classrooms. If there is one strategy that has dominated conventional wisdom in the teaching of reading, it is the fact of ability-based reading groups. For years, particularly in the primary grades, teachers have made the task of teaching reading to a large group of children more manageable by breaking them into small groups of students reading at approximately the same level. (The 1988 NAEP reading assessment found that fourth-grade students in mixed-ability classrooms spent more time in small-group instruction than in classrooms characterized as either high or low ability.) The general term associated with this practice is "ability grouping," but that is somewhat misleading since group assignments under this system are actually made on the basis of achievement or mastery of previously taught material rather than any measure of innate ability.

In recent years, homogeneous grouping for reading instruction has come under increasing fire for a variety of reasons, but principally because of the perceived educational inequalities that it fosters. According to some research evidence, students in lower "ability" groups receive different content, have fewer opportunities to practice higher-order skills, get locked into a lower track at an early age, and may be stigmatized by the combination of within-class ability grouping and pullout models of supplemental instruction.

To address these problems, many school districts (including the majority of those we visited) are encouraging or mandating different organizational arrangements for teaching reading--for example, whole-class instruction using the same materials for all students, heterogeneous cooperative groupings, and in-class supplemental, small-group assistance. Some of the precepts of the integrated language arts movement foster this trend as well, recommending that teachers group children in many different ways as they read and reread stories--whole group, nonstatic small groups, pairing stronger and weaker readers, and so on.

Looking at Tables 23a and 23b separately, the pattern on homogeneous grouping for reading instruction is similar: the lower the grade level, the more ability grouping is used. However, comparison between the two years of data collection tells the more interesting story. At least in the classrooms that formed our sample, homogeneous grouping seems to be on the wane, with a parallel increase in heterogeneous grouping practices over a 2-year period. These findings--based on data from teacher logs--indicate that significant numbers of teachers are changing their ways of organizing reading instruction. In most cases, they are doing so in response to new state or local policies that discourage ability grouping. It is also important to bear in mind that these data describe what is happening <u>within</u> classrooms but may mask any homogeneous grouping that goes on <u>among</u> classrooms at a given grade level in a school building.

Rejection of homogeneous grouping does not mean that all or even most reading instruction is exclusively delivered to the whole class at once. Rather, new kinds of grouping practices are being employed. For example, across all of our observed classrooms, the prevalence of paired (partner) reading and cooperative groupings as instructional strategies in reading is striking. Teachers seem to use these strategies to provide variety during reading lessons. It is not clear from our observations that the deliberate pairing or grouping of better and poorer readers for specific reading-related activities particularly contributes to improved performance or self-confidence for struggling readers or a sense of group responsibility for better readers. However, it is clear that students seem to enjoy the activities that take place in these configurations. This motivational factor by itself probably makes these practices worthwhile.

Where homogeneous grouping for reading does persist, we observed a number of configurations. Sometimes children from several classrooms are

Table 23a

ORGANIZATION OF READING INSTRUCTION, BY GRADE (YEAR 1)

	Grade 1 (n = 25)	Grade 3 (n = 22)	Grade 5 (n = 21)
Grouping: Percentage of classes that regularly group students for reading--			
Homogeneously, by ability	75 (43)[a]	57 (44)[a]	44 (50)[a]
Heterogeneously to mix ability groups	9 (29)	24 (37)	24 (44)
Degree to which instruction is teacher-directed: Scale from 1 (= completely teacher-directed) to 5 (= completely student-directed)	1.7 (0.6)	1.8 (0.9)	2.0 (0.6)
What students do in class: Of all days of reading instruction, percentage on which students--			
Read orally	42 (29)	31 (18)	23 (21)
Read silently	20 (29)	27 (17)	32 (22)
Did seatwork	32 (30)	28 (21)	28 (19)
Listened to material read aloud	27 (28)	26 (25)	13 (22)
Had group/class discussion about what was read	35 (28)	37 (22)	33 (20)
Homework: Of all days of reading instruction, percentage on which new reading-related homework was assigned	31 (29)	16 (19)	19 (26)

a - Standard deviations appear in parentheses.

Table 23b

ORGANIZATION OF READING INSTRUCTION, BY GRADE (YEAR 2)

	Grade		
	2 (n = 22)	4 (n = 23)	6 (n = 18)
Grouping: Percentage of classes that regularly group students for reading--			
Homogeneously, by ability	41 (36)[a]	25 (35)[a]	25 (31)[a]
Heterogeneously to mix ability groups	35 (32)	37 (35)	34 (32)
Degree to which instruction is teacher-directed: Scale from 1 (= completely teacher-directed) to 5 (= completely student-directed)	1.6 (.6)	1.4 (.6)	2.0 (.8)
What students do in class: Of all days of reading instruction, percentage on which students--			
Did prereading activities[b]	35 (28)	30 (23)	28 (22)
Read orally	50 (26)	48 (23)	31 (17)
Read silently	59 (33)	52 (28)	47 (24)
Did seatwork	--	--	--
Listened to material read aloud	59 (31)	44 (28)	28 (28)
Had group/class discussion about what was read	55 (29)	56 (22)	41 (19)
Homework:[c] Of all days of reading instruction, percentage on which--			
Reading mechanics homework assigned	45 (29)	59 (23)	41 (25)
Assignment was to read text	39 (27)	50 (31)	51 (20)

a - Standard deviations appear in parentheses.

b - Measured only in Year 2.

c - Figures for Year 2 are based on somewhat different items than in Year 1.

regrouped during the reading period for the purpose of forming specific reading classes where all students are at the same stage of progress through a basal reading series. In other cases, teachers continue to form two or more reading groups within a heterogeneously assigned homeroom structure. Sometimes, even when homerooms or reading classes are homogeneously organized according to reading achievement levels, teachers find it useful to form either stable smaller groups based on students' work habits or motivation levels or ad hoc groups to work on particular skills. Generally speaking and based on our sample, few teachers believe that whole-class instruction using the same materials for all the children all the time can meet the reading instruction needs of individuals. One school participating in the study used an unusual grouping arrangement that had different reading groups starting and ending their school day at different times. "Morning readers" came to school an hour before "afternoon readers"; afternoon readers stayed an hour after morning readers went home. These groupings were homogeneous and based on proficiency or achievement. During the main body of the school day, all children received an additional hour or more of whole-class reading instruction. This schedule has the potential virtue of allowing teachers to focus all their attention on a smaller group of children for part of reading instruction.

The second variable in Tables 23a and 23b shows the variation in the teacher-directedness of reading instruction across the six grade levels. Over both years of the study and at all grade levels, observers found instruction to be mostly teacher-directed--meaning that teachers plan, assign, and guide nearly all the reading activities in which students engage.

We expected some kinds of specific reading activities to vary by grade level--for example, younger children would read aloud more frequently than older children, and older students would read silently more often than younger students. The first-year data on what students do in class (the third variable in Table 23a) generally supported our hypotheses: first graders read orally nearly twice as often and listened to the teacher read over twice as often as fifth graders; fifth graders were more likely to be assigned silent reading than younger children. Other activities such as seatwork and group discussions appeared to be employed quite evenly across all grades. As a group and on average, no single type of instructional approach dominated what went on in these classrooms. The proportion of days on which fourth-grade teachers in our sample had students read aloud (48 percent) is considerably higher than the occurrence of that activity in classrooms of students participating in the 1988 NAEP reading assessment (28 percent) (Langer et al., 1990).

When we come to the second-year data presented in Table 23b, the pattern of a decline in oral reading as students get older holds. However, the frequency of silent reading is highest at the second-grade level and declines across grade levels. This may be an artifact of the particular second-grade classrooms in our sample, but it seems more likely that the greater emphasis on silent reading at all grade levels is a result of changes in instructional strategies associated with the philosophy of the literary readers. The increased emphasis on group discussion and on listening to material read aloud across all grade levels may also stem from suggestions accompanying the new curricular materials.

As in the case of mathematics, reading homework was assigned relatively infrequently by teachers participating in the first year of the study. The last variable in Table 23a indicates that in these classrooms, teachers assigned reading-related homework on no more than one-third of all instructional days, and first graders were more likely to receive an assignment than older children. (In interpreting these statistics, it is important to bear in mind that, in contrast to their older and more jaded schoolmates, first graders often beg to be given homework!) However, on the basis of our interview data with first-, third-, and fifth-grade teachers, we also knew that in some cases teachers had simply stopped assigning homework because students did not or would not do it.

Homework played a much larger role in classrooms participating in the second year of the study. This time we asked teachers to distinguish between assignments that involved reading text and those that involved reading mechanics exercises such as completing worksheets. According to the teachers, students at all grade levels received homework assignments in reading on most days, and frequently the assignment required them to actually engage with text. Again, the reasons for this increase in homework are not clear-cut but probably involve some combination of (1) recommendations in the teachers' editions of new reading textbooks, (2) new district or school policies, and (3) unanalyzed anomalies between the two samples of teachers. It is also possible that this study had some impact on homework practices in these schools. Preliminary findings from the Year 1 data were shared with school staff during debriefing sessions. At least one principal was horrified by the low levels of homework assigned, particularly by upper-grade teachers, and vowed that changes would occur.

VII ALTERNATIVE APPROACHES TO CURRICULUM AND INSTRUCTION IN READING

One of the key issues for this study is the degree to which classrooms serving large proportions of poor children do, in fact, establish higher-order reading comprehension skills as a curricular priority. In this chapter, we turn our attention to instructional strategies that teachers employ to increase students' ability to understand what they read. Our analysis identifies a set of factors that can be used to create a typology of reading classrooms that has some predictive relationship with student outcomes.

Our analysis is driven by a concern, increasingly voiced by reading experts, that the children of poverty may not be sufficiently exposed, on average, to instruction that helps them make sense of what they are reading. Correspondingly, they may be receiving more instruction than is necessary in the "basic skills" of reading. The analysis presented in this chapter can be thought of as part of the search for alternatives to this conventional pattern of practice.

The alternatives we identified are all instructional strategies that attempt to maximize understanding. We review these briefly, then discuss each with descriptive data (from Year 1) and case examples (from both years). Next, we present a typology of classrooms based on an index combining these strategies. Finally, as in the case of mathematics, we explore the way classrooms of each type are distributed across students, teachers, and school settings within the study sample.

Strategies That Attempt to Maximize Understanding

Drawing on our qualitative observations and on variables derived from both the teacher logs and coded data from classroom visits, we identified six instructional strategies that distinguished groups of classrooms in terms of their emphasis on understanding in reading. The strategies summarized in Tables 24a and 24b include the following:

(1) maximizing the opportunity to read;

(2) integrating reading with writing and other subjects;

(3) focusing on deeper meaning;

(4) teaching comprehension strategies;

(5) embedding skill teaching in reading activities;

(6) providing opportunities to discuss what is read and extend knowledge.

Each strategy presented in these tables captures a different dimension of reading instruction. Teachers may use the strategies singly or in combination (including all at once) as they attempt to teach their students to read. We look first at them for variation across grade levels and then turn to a closer examination of each strategy (based on Year 1 classrooms only).

The first strategy--maximizing the opportunity to read--is based on a simple premise: students learn to read well by actually reading text on a regular basis. One indicator of this dimension is obviously the number of minutes spent reading--in contrast to other activities such as seatwork or direct instruction that may also take place during the reading block. Another is observational data on the relative importance of oral and silent reading among a constellation of reading-related instructional activities that might take place on a given day. As Table 24a indicates, on the average, the students in the first-, third-, and fifth-grade classrooms in our sample spent about a half hour per day reading text during the reading/ language arts block of time. (This does not include reading that may have occurred during social studies, science, or other periods of the day.) There is relatively little variation in this figure across the three grade levels.

By the second year of the study, the average daily time that students spent reading text, either orally or silently, was higher (Table 24b). Based on the time that we spent observing in classrooms, our analysis is that this increase in the time students spend directly engaged with text is a real finding and results directly from the fact that more teachers embraced instructional strategies promoted by the literary basal readers. Where in Year 1 teachers would have students read a passage orally _or_ silently, they more commonly had children do both in Year 2, using approaches such as paired or partner reading to vary the routine. We suspect that had we returned to first-, third-, and fifth-grade classrooms in Year 2 of data collection, we would have found similar increases in the time children spend actually reading.

Instructional strategies that encourage students to write about what they read represent a second strategy that reportedly enhances reading comprehension. Indeed, this is one of the premises behind the supplementary materials, such as workbooks, that accompany the new literary readers. Instead of fill-in-the-blanks and other short-answer exercises, these materials (if used properly) require children to compose sentences and paragraphs about reading selections. The act of composing itself causes the writer to review mentally what he/she knows or understands about the story or passage. The approach also gives teachers a window on student misunderstandings or misinterpretations about the reading material. The classrooms in our sample appear to integrate reading and writing activities quite frequently (on over one-third of all instructional days in Year 1 and over one-half of the instructional days in Year 2)--certainly more often than we would have predicted before data collection. This finding is probably related to the fact that all districts in the sample have either adopted the literary readers or are otherwise promoting more integration among the language arts. We look at this strategy more closely later in the chapter.

Three more strategies have to do with helping students focus on the meaning of what they read. In particular, the third strategy pushes students to dig for meanings below the literal level. Teachers vary in the extent to which they ask questions or promote discussions that encourage children to read between the lines or try to interpret what may be implied but not directly stated. Facility with these types of skills becomes all-important

Table 24a

STRATEGIES AIMED AT MAXIMIZING UNDERSTANDING, BY GRADE (YEAR 1)

Instructional Strategies	Grade 1 (n = 25)	Grade 3 (n = 22)	Grade 5 (n = 21)
Maximizing the opportunity to read			
• Average minutes/day spent reading text	26 (22)[a]	31 (20)[a]	31 (22)[a]
Integrating reading with writing			
• Of all days of reading instruction, percentage on which writing and reading were integrated	42 (26)	35 (29)	40 (27)
Emphasizing the meaning of what is read			
• *Focusing on deeper understanding*: Of all instructional days, average percentage on which class or groups focused on deeper understanding of text	28 (25)	27 (19)	24 (15)
• *Teaching comprehension strategies*: Average percentage of observation periods during which comprehension strategies were explicitly taught	65 (40)	66 (42)	70 (32)
• *Embedding skill teaching in reading activities*: Degree to which skill teaching is embedded in teaching of reading; average value on scale from 1 (= skills taught primarily out of context) to 3 (= skills taught primarily in context)	1.8 (.6)	2.1 (.7)	2.2 (.7)
Providing opportunities to discuss reading and extend knowledge			
• Of all instructional days, average percentage on which class or groups discussed what they were reading to explore its meaning	35 (28)	37 (22)	33 (20)

a - Standard deviations appear in parentheses.

Table 24b

STRATEGIES AIMED AT MAXIMIZING UNDERSTANDING, BY GRADE (YEAR 2)

Instructional Strategies	Grade 2 (n = 25)	Grade 4 (n = 26)	Grade 6 (n = 17)
Maximizing the opportunity to read			
• Average minutes/day spent reading text	33 (18)[a]	38 (38)[a]	42 (21)[a]
Integrating reading with writing			
• Percentage of observed days on which reading, writing, and other types of language arts instruction were integrated in some way	58 (42)	54 (35)	63 (45)
Emphasizing the meaning of what is read			
• Focusing on deeper understanding: Of all instructional days, average percentage on which class or groups focused on deeper understanding of text	35 (26)	40 (21)	41 (24)
• Teaching comprehension strategies: Average percentage of observation periods during which comprehension strategies were explicitly taught	69 (45)	79 (35)	76 (34)
• Embedding skill teaching in reading activities: Degree to which skill teaching is embedded in teaching of reading; average value on scale from 1 (= skills taught primarily out of context) to 3 (= skills taught primarily in context)	2.2 (.7)	2.1 (.6)	2.3 (.5)
Providing opportunities to discuss reading and extend knowledge			
• Of all instructional days, average percentage on which class or groups discussed what they were reading to explore its meaning	55 (29)	56 (22)	41 (19)

a - Standard deviations appear in parentheses.

on college entrance examinations such as the SAT and the ACT. But even more important, the ability to interpret an author's meaning from one's own perspective adds to the satisfaction derived from reading.

Students do not acquire the ability to search for deeper meaning by osmosis. Teachers must structure opportunities for children to analyze and think about what they have read. Above all, they must be patient. Comparison of data across years in Table 24a on the "Focusing on deeper understanding" variable shows that teachers reported that they worked with students on more than the literal meaning of text on about 25 percent of all school days. For second-year classrooms, the average rose to 35 percent to 40 percent. Once again, the increase over the 2-year period seems right. Teachers' editions of the literary basals encourage more attention to inference and analysis. Nevertheless, these data (for both years) should be treated with a little caution. Asking a probing question and knowing how to elicit the kind of student responses you hope for are two quite different teaching skills. Frequently, according to our observations, teachers posed (or read) good, thoughtful questions but settled for inadequate answers when students had difficulty. This caveat leads directly to the fourth strategy.

We asked observers to pay particular attention to the ways in which teachers explicitly modeled or otherwise helped students to develop comprehension skills, particularly the skills that lead to deeper understanding of text. Although cognitive psychologists continue to debate the efficacy and transferability of direct instruction in higher-order thinking skills, reading specialists suggest that classroom teachers can help children improve their comprehension by explicitly teaching or modeling the mental steps involved in particular aspects of reading comprehension, such as interpretation, prediction, or analysis of a situation (e.g., Garcia & Pearson, 1991). As Table 24a shows, observers found that third- and fifth-grade teachers did something related to explicit instruction on comprehension strategies on over two-thirds of the total observation days. The proportion is even higher for the grades studied in Year 2 (Table 24b), where observers noted explicit comprehension instruction on over three-fourths of the days that they spent in fourth- and sixth-grade classes.

A fifth strategy lies in the way discrete reading skills (e.g., decoding) are taught. Much of the reading research literature tends to present an emphasis on reading comprehension versus an emphasis on reading skills as dichotomous instructional approaches. Although our sample of classrooms does represent just about the full range on a continuum from exclusive emphasis on reading for understanding to exclusive emphasis on the "reading" skills that are often so hard to separate from other types of language arts instruction (i.e., vocabulary development, reference skills, syllabification), the majority of teachers teach both reading for meaning and discrete skills. However, some teachers (especially those who are becoming skilled in an integrated approach to teaching all the language arts) find ways to teach skills, such as phonics, in the context of reading authentic text. Others continue to view skills work and "reading" as essentially divorced. By embedding the teaching of skills in context, it is argued, students are more likely to integrate skill learning into their developing ability to make sense out of text.

Although the range of average scale values is not great across the six grade levels, first-grade teachers appear to be somewhat more apt to teach reading skills out of context. This suggests that even in first-grade classrooms where teachers are moving into an integrated language arts approach, some still find a need to work separately with beginning readers or nonreaders on the discrete skills that are the basis of decoding our language.

The final strategy that may maximize understanding in reading involves the opportunities that students have to talk about what they have read. The indicator for this strategy is drawn from the teacher logs and represents the frequency of group or class discussions to explore the meaning of what has been read. On average, in the first year of the study students at the three grade levels discussed reading selections with some or all of their classmates and their teacher on about one-third of all school days--or somewhat less often than they write about what they read. By the second year, discussion appeared to have acquired more importance as an ingredient in reading instruction. Numbers such as these, however, need richer qualitative data to give them substance. The intensity of discussions, and therefore what they add to students' understanding of material read, can vary a great deal.

We turn now to a more in-depth look at the variation among classrooms in opportunity to read, integration of reading and writing, focus on the meaning of what is read, and opportunities to discuss what is read. Qualitative observational data from the intensive classrooms are used to describe or explain some of the variations suggested by statistics in the tables.

Maximizing Opportunity to Read

Although most children in this country spend approximately 6 hours per day, 5 days per week in school, where they presumably are engaged for much of the day in activities that involve reading, some children have much more opportunity than others to become immersed in actual reading of whole text. The time we have spent in classrooms for this study has made it clear that there is great variation in the depth and intensity with which students interact with the printed word. Some classrooms seem to offer students an abundance of opportunity to read all day, in all areas of the curriculum, with very skilled teachers taking every occasion directly or subtly to increase student facility in understanding and interpreting text. Others severely restrict student access to print, sometimes--but not always--for reasons that are largely beyond the control of the individual classroom teacher, such as fragmentation of the day and the curriculum.

Table 25 stratifies the classrooms in the first-year sample on an opportunity-to-read variable that represents a weighting of the number of minutes that some or all students in a class actually spent reading silently or orally. According to our observations, students in classrooms that fall in the low group, on the average, read text less than 10 minutes per day. The midrange classes averaged in the 10- to 25-minute range and the high classrooms over 25 minutes a day of direct student engagement with text. Classrooms representing the three grade levels are quite evenly distributed across the opportunity-to-read groupings; grade level thus does not appear to explain much of the variation.

Table 25

MAXIMIZING OPPORTUNITY TO READ:
PROFILE OF DIFFERENT GROUPS OF CLASSROOMS (YEAR 1)

	Opportunities to Read		
Characteristics of Instruction	Low (n = 8)	Medium (n = 30)	High (n = 30)
Average minutes students actually read text (during reading/language arts block)	5 (3)[a]	18 (4)[a]	48 (16)[a]
Average minutes allocated to reading instruction, overall	28 (18)	44 (18)	59 (22)
Instructional approach emphasizing oral or silent reading: Average percentage of observation periods	40 (34)	29 (31)	58 (32)
What students do: Of all instructional days, the average percentage on which students--			
Read orally	25 (14)	32 (18)	37 (30)
Read silently	16 (22)	27 (26)	25 (23)
Listen to teacher or tape read aloud	29 (23)	20 (23)	26 (30)

a - Standard deviations appear in parentheses.

Some readers of this report may be astonished that in some classrooms, students read text less than 10 minutes per day. Of course, the children in these classes do read, but most of the reading they do is related to seatwork assignments--workbook or worksheet pages emphasizing discrete skills outside the context of reading for meaning. Here is an extreme example:

- <u>Worksheets as the reading material in an upper elementary classroom</u>. Ms. Lennon, who taught a combined fifth/sixth-grade class, rarely had her students (who read at their grade level) use the reading book at all. Nearly all reading instruction in this class focused on the discrete skills (word analysis, reference and study skills, identifying main ideas, etc.) that appeared on unit tests associated with the reading series. Students did workbook and worksheet assignments for perhaps 80 percent to 90 percent of reading instruction time--and passed their tests with flying colors. They did not, however, do any sustained reading on a regular basis.

Table 25 indicates that, in addition to differences in the time devoted to reading extended text, classrooms in the three categories varied a good deal on the average total time allocated to reading instruction. This statistic includes all reading instruction time, excluding transitions and time taken up with management issues at the beginning or end of a reading block. Clearly, over a school year, some children are spending a great deal more time in reading instruction than other children.

As Table 25 shows, when we used the classroom groupings created by the weighted "opportunities to read" measure to look at some other key reading variables such as instructional approach (observer data) and what students do (teacher log data), no clear relationships emerged. Students in low-opportunity-to-read classrooms do appear to have fewer chances to read orally than students in midrange and high-opportunity classrooms. However, the differences are not huge.

Nevertheless, the magnitude of the differences in time spent reading text among the three groups is striking. Common sense alone dictates that there must be effects of spending 48 minutes per day reading paragraphs, stories, and books, in contrast to an average of 5 minutes. The differences become even more marked if we think about what this means over a full school year. On the average, students in the "low" group of classrooms in Table 25 spend about 15 hours (or about 3 instructional days) reading--assuming a 100 percent attendance rate (which itself is highly improbable). In contrast, students in the "high" group read for 144 hours (or about 29 instructional days). At a minimum, this disparity is bound to have an impact on what students think reading _is_. For some, it is a series of seatwork assignments involving short answers and unrelated words or sentences. For others, reading period is an opportunity to read another chapter in a novel or a selection in a basal reader.

Although the variance on this dimension is clearly not simply a matter of minutes allocated to reading instruction, our quantitative data are less helpful in pinning down differences than our qualitative information. The following brief example suggests what large amounts of time spent reading can mean:

- Multiple reading blocks across the day. In a second-grade classroom, reading occurs throughout the day. Of the 80 minutes devoted to reading activities each morning, about half involve actual reading of text. Other activities during this time include pre- and post-reading discussions, reading-related writing, and reinforcement of reading mechanics skills. After lunch, students spend another hour directly engaged with text, either reading silently to themselves, reading aloud to classmates, or listening as peers or the teacher read to them.

Descriptions such as this from case studies are quite clear about variations in ambiance between high- and low-opportunity-to-read classrooms. Many high-opportunity-to-read classrooms offer children an environment suffused with a literary richness. Regardless of their skill levels or personal backgrounds, students in these settings are surrounded by the written word, spend a great deal of time with books (of all types) in their hands, read or look at picturebooks (sometimes when they should be doing something else), and generally seem to have assimilated the notion that reading is a desirable activity. In other classrooms, many in the mid-range group of Table 25, this richness is less evident, yet students still seem to read a great deal--either by choice or because of assignments.

From observational data, there does seem to be some correlation between opportunities to read and other factors--for example, classrooms where trade books are used as the content of instruction some or all of the time seem to offer students more overall opportunity to read as well. In the case studies, one strong correlate with opportunity to read is regularly scheduled times when the teacher reads aloud and children listen. (Sometimes teachers do this as part of regular reading instruction. Several teachers in our intensive sample took their own turn during oral round-robin reading, modeling the pleasure that comes from reading well-written words with meaning and expression.) Yet Table 25 indicates that, according to teacher reports, students in low-opportunity-to-read classrooms are slightly more likely to spend time listening to a teacher read. When anomalies such as these occur between quantitative and qualitative reporting of data, we are inclined to go with the case studies. Observers' records of classroom events were extraordinarily complete, and although the number of observation days was relatively small, they were deliberately scheduled to capture "typical" episodes of reading instruction.

According to the qualitative data, the amount of time that children spend reading text can also vary at the student level within classrooms, which may lead to differences in student outcomes. Individual children "catch on" to the concept of reading at different rates. Particularly in districts where whole-group instruction is emphasized, teachers worry about both the children who inevitably start to fall behind the pace and those who could go faster. The most typical responses to individual differences such as these are extra attention for the slower learners and enrichment for those who are ahead of the class. For example:

- <u>"Triple dose" for the slowest readers</u>. In one first-grade classroom that falls in the high-opportunity-to-read group in Table 25, the lowest of three reading groups gets a "triple dose" of reading daily. They read the day's assignment first with an aide, then with the school's reading specialist. With this head start, they participate in the classroom teacher's presentation of the day's reading to the whole class. As a result of this extra reading instruction, the lowest reading group spends somewhat more time engaged with text and somewhat less than other children on writing and other language arts activities.

Coping with the different pacing needs of students does not always result in more time reading text for the slowest children, however, as the following case illustrates.

- <u>Less reading time for the slowest group</u>. In another first grade--this time one that falls in the midrange on opportunity to read, the teacher continued to rely principally on small-group instruction (three reading groups established on the basis of achievement), presenting the same content to each group in the sense that the groups use the same book. However, the instructional experiences of the groups varied a good deal. The "top" group always worked with the teacher first and for the longest amount of time. The middle reading group moved at a slower rate and did more word-by-word oral reading. According to the teacher, the lowest group was "complete frustration." They spent most of the time reading orally together because she believed that the material "was too hard for them to do silent reading."

There is some evidence from case studies that students in split-grade classes (e.g., a room where half the children are third graders and half are in fourth grade) tend to have fewer opportunities to read text. For example, one combined first/second grade also had some ESL students at both grade levels. Although the teacher attempted to implement the whole-class instructional approach that her district preferred, she essentially had four reading groups with very different needs and skill levels. Trying to ensure that each group had adequate opportunity to work with her and engage with text became an extremely frustrating experience for the teacher. In another combined classroom--this time at the fifth/sixth-grade level, the teacher was not given enough of the literature-based textbooks and accompanying trade books to go around. As a rule, her 33 students were rarely able to have a book to themselves and never were allowed to take books home. Obviously, the children's opportunities to read were severely curtailed in comparison with other situations.

Integrating Reading with Writing and Other Subjects

During the design phase of this study, the study team could not have predicted the frequency with which reading and writing activities would be related to each other in the sample classrooms. Our initial hypothesis was that little writing of any kind would be found in the sample classrooms. In the majority of classrooms, that did not prove to be the case. Largely, we suspect, because of district adoption of the new literary readers and/or new curriculum and instruction guidelines emphasizing an integrated approach to language arts, many teachers routinely engage children in activities that require them to write about what they have read.

Table 26 stratifies the sample classrooms on the basis of the frequency with which reading and writing are integrated. For the group designated "low," related reading and writing activities occurred on fewer than a quarter of all days in the school year. In the "high" group of classrooms, teachers integrated reading and writing on over half of all days. The midrange falls between 25 percent and 50 percent of instructional days. As the table indicates, the frequency with which students have the opportunity to write about what they read varies widely across the three groupings. If the integration of writing with reading helps children develop reading comprehension skills, as some literary experts might claim, then students in the high-group classrooms may be gaining a significant edge on their peers who do less writing (see, for example, Snow et al., 1991).

The first variable in Table 26 was originally created for use in analyses of writing (see Chapter X). It represents a more global measure of opportunity to write--not just writing activities that are related to reading. Although the differences are not great, there does appear to be a slight relationship between overall emphasis on writing and the degree to which reading and writing are used to complement each other. The second variable in the table indicates the parallel between connecting reading with writing and with other subjects in the curriculum.

Observations in classrooms studied intensively gave us some insights into ways in which teachers use writing activities to reinforce or extend children's grasp of material that they are reading. For example:

- <u>Connecting writing and reading thematically</u>. In one third-grade class, containing equal numbers of Anglo and Hispanic students, the entire morning--nearly 3 hours--is allocated to reading, writing, and language arts instruction. Although Ms. Malick thinks of her use of this time in terms of a reading segment and a writing/language arts segment, all aspects of language instruction are organized around a literary reader and closely interrelated. In fact, she often finds ways to thematically coordinate nearly all the curricular areas she is responsible for teaching. During one reading unit based on the novel *Charlotte's Web*, students wrote poems about the story as well as factual papers about farm animals and spiders (related to science and social studies lessons).

- <u>Writing as a tool for understanding difficult novels</u>. In a fifth-grade classroom where the reading curriculum includes some quite difficult novels, the teacher found that having children write about what they have read facilitates comprehension. At one point in the year, students read two stories centering on the experiences of African-Americans during the Revolutionary War period. Ms. Barlow gave the class the following writing assignment in conjunction with their reading: *Write about what is not fair in this story. Is one character treated badly? Does one character have too many problems? Is your sense of what is just offended by events in this story? Tell about it.* At a later time, the students shared the results of their written efforts with each other. As she guided this group of preteens in the presentation of their own thoughts about the books to peers, Ms. Barlow simultaneously taught the class how to compliment and support each other in a group setting: "Think about the thing you heard that you like. You might get an idea from what I compliment. I'd like you to compliment each other." As individual children read their own words, she found something encouraging to say to each before offering constructive criticism and suggestions for expansion or rewriting.

Table 26

INTEGRATING READING WITH WRITING AND OTHER SUBJECTS: A PROFILE OF DIFFERENT GROUPS OF CLASSROOMS (YEAR 1)

Characteristics of Instruction	Frequency with Which Reading and Writing Are Integrated: Low[a] (n = 8)	Medium[a] (n = 30)	High[a] (n = 30)
Degree of opportunity to write extended text: Average value on a scale from 1 (= very little) to 3 (= a great deal)	1.6 (.7)[b]	2.0 (.8)[b]	2.4 (.7)[b]
Of all instructional days, percentage on which reading is combined witn:			
Writing	10 (8)	36 (6)	68 (13)
Other subjects	29 (32)	45 (29)	52 (32)

a - Low = fewer than 25 per:ent of all instructional days; high = 50 percent or more.

b - Standard deviations appear in parentheses.

These teachers and some others whom we visited tended to create their own reading-related writing assignments. Most teachers who had children do substantial writing related to reading relied more heavily on the prepared exercises or suggested activities that accompanied their literary reading series. As we noted earlier in the chapter, publishers of these texts have restructured workbooks and worksheets to include many more occasions when students are asked to respond to questions or ideas about a reading selection in sentence or paragraph form. The source of ideas for reading-related writing assignments is less important, however, than the fact that the trend toward integration of reading and writing is so pronounced across the classrooms in the sample.

Emphasizing the Meaning of What Is Read

As we indicated earlier, the skills-versus-meaning debate is a nonissue for the vast majority of teachers in our sample. They want their students to become "good" readers, by which they mean independent readers who can use the printed word for their own pleasure and to obtain information. Whatever it takes to achieve these ends, they will do. In general, they are seeking some optimum but often not clearly defined mix of skills instruction and development of comprehension strategies. Nevertheless, there are significant differences among classrooms in the goals of instruction, the relative emphasis on activities or instructional approaches that might be expected to promote children's ability to read for understanding, and the degree to which skill instruction is "embedded" within the act of reading text.

Teaching students to grasp the meaning of what they read is especially relevant to a study on academic instruction for the children of poverty. In many classrooms, there is an obvious temptation to spend a great deal of time on teaching discrete reading skills when working with this segment of the student population, particularly if tests indicate that these skills have not been mastered. But too much time on skills taught in isolation can only detract from time spent putting all the skills to work to make meaning.

Table 27 clusters the sample classrooms into three groups: those with little or no explicit teaching of reading comprehension strategies, those that offer a moderate amount of this type of instruction, and those that offer a great deal. By teachers' own reports via their logs, more emphasis on explicit teaching of comprehension strategies is associated with a greater proportion of days on which students were encouraged to read for deeper meaning. Observers also found a relationship between the balance of attention given to reading comprehension versus reading mechanics skills and the relative attention paid to teaching comprehension strategies directly.

Further, teachers who do little explicit teaching of how to go about understanding a piece of text also tend to teach reading mechanics skills out of context. Conversely, teachers who emphasize comprehension strategies are

Table 27

EXPLICIT TEACHING OF COMPREHENSION STRATEGIES:
PROFILES OF DIFFERENT GROUPS OF CLASSROOMS (YEAR 1)

	Degree of Explicit Teaching of Comprehension Strategies		
Characteristics of instruction	Little or None (n = 12)	A Moderate Amount (n = 17)	A Great Deal (n = 32)
Focus on deeper understanding of text: Percentage of days on which this was emphasized	18 (13)[a]	20 (14)[a]	33 (22)[a]
Balance of attention to comprehension versus mechanics: Average value on a scale from 1 (= exclusive focus on mechanics) to 5 (= exclusive focus on comprehension)	4.1 (.8)	4.3 (.7)	4.4 (.6)
Embeddedness of skill instruction: Average value on a scale from 1 (= skills taught primarily out of context) to 3 (= skills taught primarily in context)	1.6 (.6)	1 8 (.6)	2.3 (.6)
Frequency with which reading mechanics skills were taught: Index indicating the emphasis on reading mechanics across the year, from 1 (= least often) to 5 (= most often)	1.4 (1.4)	1.4 (1.0)	1.4 (1.0)

a - Standard deviations appear in parentheses.

more likely to find ways of embedding skill instruction in their actual reading activities, as the following example indicates:

- Teaching reading mechanics while discussing text. In her sixth-grade classroom offering a literature-based reading curriculum, Ms. Rodriguez does not use separate texts to teach other aspects of language arts such as spelling, grammar, or punctuation skills. However, the skills do get taught and reinforced--in the context of the day's reading, writing, and discussion. On one observation day, the language skill to be covered was changing indirect statements to direct quotations:

Teacher: [Reads statement from novel] "Karana told her sister to be careful around the Aleuts." Could you tell me how to write this as a direct quote?

Student: Karana said, "Be careful around the Aleuts."

Teacher: We could even add her sister's name, since she's speaking directly to her, couldn't we?

The lesson proceeded with more examples of this kind. When students had difficulty changing the indirect statement to a direct quote, Ms. Rodriguez reminded them of a writing assignment that they had on an earlier chapter in which they had to retell the story, in the first person, from the point of view of a character.

Teacher: Remember how we put the whole story in the first person? We used . . . ?

Students: I, me, my, we.

Teacher: That's what we have to do here.

With regard to the teaching of reading mechanics, it would be wrong for this report to give the impression that, in the search for new approaches to curriculum and instruction that emphasize reading for meaning and understanding, the teaching of reading skills is not important. No teacher in our sample would argue that children learn to read simply by being exposed to high-quality material. As the table indicates, teachers' focus on reading mechanics does not depend on the degree of attention to comprehension strategies. Rather, the issue concerns the way the skills can be presented so that students can make immediate use of them in constructing meaning.

Teachers in the classrooms studied intensively varied a good deal in the attention they paid to teaching, reteaching, or reinforcing isolated, reading-related skills such as phonics. Phonics played very little role in the fifth-grade classrooms and occupied relatively little time in the third grades, although teachers at these levels continue to instruct or remind students about word attack skills, the meaning of prefixes and suffixes, and homonyms or homophones, for example. Some third and fifth graders in these classrooms continued to receive some phonics review in supplemental instruction classes. However, if the supplemental instruction consists of worksheets in workbooks rather than direct instruction, students are unlikely to make progress in internalizing letter-sound relationships (Adams, 1990).

According to the case studies, at the first-grade level, the importance of teaching phonics and other beginning reading skills is not a debatable point. The great majority of first-grade teachers said that the introduction to reading must combine and balance skills instruction with reading of real and meaningful material. Providing children with many opportunities to read also gives them many opportunities to apply and practice the discrete skills that they have been taught in other segments of instruction. For example, one first-grade teacher articulated a four-pronged philosophy of teaching literacy skills to young children:

(1) Make reading an activity that children want to take on.

(2) Expose them to a lot of reading.

(3) Teach basic decoding skills.

(4) Give children an opportunity to manipulate words, to own them, through writing.

On the basis of our observations of their classrooms, we suspect that all the first-grade teachers in the intensive sample would endorse these statements. This specific teacher spent about equal amounts of time on skill building and reading comprehension. However, the skills were taught mainly out of context, whereas in other first-grade classrooms studied, all or much of the skill teaching was accomplished as part of reading text.

One issue that our interviews and observations have not resolved is the intentionality behind the instructional strategies that caused observers to decide that a teacher was more or less focused on reading for meaning and understanding. Our primary window in making this distinction was a teacher's strategies for questioning students about what they had read. Many teachers did rely on the questions formulated in teachers' editions of textbooks; some read them directly from the pages while others paraphrased. There is some variety to the level of comprehension addressed by these questions. In addition to questions that draw attention to specific details of a reading passage, the publishers include items that encourage teachers to have children predict what will happen next, to put themselves in a character's shoes, to analyze character traits, and so on. If the question is there on the page, teachers will usually ask it. Some teachers seem to ask "higher-order" questions because they are there in the teacher's manual, without any particular recognition either that there is a qualitative difference among the questions posed or that the strategies students might have to call on to answer predictive or analytic questions are any different from the skills needed to locate a phrase in the text. Others (but not many) very consciously and deliberately pose a range of questions and activities and can talk articulately about why they do so.

Providing Opportunities to Discuss Reading and Extend Knowledge

We use this heading to look at a group of instructional strategies and activities that allow teacher-student or student-student verbal interactions about topics related to reading. Some observers of elementary school education speculate that talking--like writing--may be an important ingredient in any formula to improve the reading capabilities of disadvantaged children (see, for example, Snow, 1991).

Table 28 places the sample classrooms into three groups based on teacher-reported data about the proportion of school days on which class discussions about reading material were held. The low group reported such discussion on fewer than 20 percent of instructional days. In the high groups of classrooms, discussion occurred over 50 percent of the time.

In the best of all possible worlds, we might envision many classrooms where teachers and students together read good literature and pursue extended discussions of meaning and interpretation of text. In fact, among our case studies, we have a few examples of highly stimulating and extended student-teacher discussions about reading selections--either to set the context before reading begins or to analyze what was read. The table, however, suggests that discussion is a low priority in a large number of classrooms.

Table 28

PROVIDING OPPORTUNITIES TO DISCUSS READING AND EXTEND KNOWLEDGE: PROFILES OF DIFFERENT CLASSROOM GROUPS (YEAR 1)

	Frequency with Which Classes/Groups Discuss What They Read		
Characteristics of Instruction	Low[a] (n = 25)	Medium[a] (n = 27)	High[a] (n = 16)
Of all instructional days, average percentage on which classes/groups discuss what they read	12 (5)[b]	37 (8)[b]	69 (11)[b]
Giving context for reading through class discussion about reading topic: Average percentage of observed classes	36 (36)	42 (38)	54 (38)
Connecting reading to students' backgrounds or lives through class discussion of personal meaning of what was read: Average percentage of observed classes	12 (19)	17 (26)	39 (43)

a - Low = fewer than 20 percent of all instructional days; high = 50 percent or more.

b - Standard deviations appear in parentheses.

In 25 classrooms--over a third of those for whom we had usable data on these variables--students discussed what they were reading, on the average, only 12 percent of the days that they attended school--about once every 2 weeks. Others discussed what they had read on 69 percent of days, or about 3 days each week.

According to our observations, teachers do slightly better in terms of providing children with a context for reading. Usually this means offering some background information related to the setting or situation that students will meet in a story. Sometimes, but not as often, it can also mean questioning children to learn previous knowledge they have about the topic.

Observers reported that, across the three categories of classrooms represented in Table 28, teachers engaged students in this type of preparation for reading about one-third to one-half of the time.

Another possible correlate with the amount of teacher-student discussion is greater "personalization" of instruction through explicitly drawing attention to the parallels between real lives and literary lives. As the third variable in the table indicates, this is not a frequently used strategy in our sample of classrooms, although in classrooms with a high degree of discussion, connections between reading and students' lives are made nearly 40 percent of the time, or 2 days per week, on average. In theory, increased discussion time would allow teachers to build on and expand students' background knowledge and experiences. We did observe a number of occasions when teachers explicitly drew students' attention to aspects of a story that might relate to real events or experiences in their lives. However, we saw few instances where a teacher capitalized on students' cultural backgrounds to enhance learning. Student-student discussion is somewhat more common but does not appear to explain any of the differences between the groupings around which the table is organized.

As in the dimension that places meaning and skills at polar ends of a spectrum, discourse vs. no discourse is conceptually too restrictive a framework to be of much use in describing what happens in elementary school classrooms. Much of what goes on during teacher-student interactions in reading is in a rapid-fire question-and-answer format that anyone would be hard pressed to define as "discourse." Yet children seem to enjoy it, and it allows teachers to form some judgments about how well students are understanding what they read--at least on a literal level. In fact, even in classrooms where virtually no real discussion goes on, the times when teacher and pupils interact instructionally in any way--even direct instruction on rather tedious skills--seems to engender exceptionally high student engagement.

We were fortunate to observe several classrooms where teachers believed in the importance of class discussions and thus had a sense of the possible power of this tool for helping children augment their understanding of an author's meaning. The context for such discussions was as either a prereading or a postreading activity--or both. An example from a sixth-grade classroom illustrates the power of discussion to get at important--and difficult--ideas encountered in relation to reading:

- Probing the personal meaning of story events. In Ms. Carter's class, students have just viewed a film version of a children's book entitled *Annie and the Old One*, in which a little girl attempts to forestall the inevitability of her grandmother's death. The teacher led the class through a discussion that began with identifying the main idea (that the grandmother will die when the weaving of a certain rug is completed). Moving to a different analytic level, the teacher helped students identify the problem in the story: Annie's attempts to keep the rug from being finished. Next, she encouraged students to think about how they would deal with the problem, until one child said, "But the grandmother is still going to die--you can't stop time." The teacher affirmed this reality and drew student attention to another book that they had read involving death.

Use of discussion seems to bear little relationship to whether a teacher's basic approach to reading instruction is traditional or innovative in some way. For example:

- Discussion in a conventionally organized reading classroom. In a classroom organized by conventional, ability-based reading groups, a traditional basal reader, lots of worksheets, and little integration of reading and writing, the teacher nevertheless talked a great deal with the students. Her particular technique for engaging student interest in reading and helping children understand what they read was through analogies. Thus, over the course of the school year, the observer in her classroom noted reading-related discussion that drew on, among others, movie director Spike Lee's film, "Do the Right Thing," the film "Star Wars," and television wrestling. This teacher also tended to take advantage of the "teachable moment" to impart a little added fact or observation that she thought might intrigue her students.

- Discussion as a device for integrating instruction across subject areas. In another classroom, the teacher frequently engaged his first-grade students in extended discussion related to stories in their literary basal reader. As they reviewed a folktale called "Bringing the Rain to Kapiti Plain," in which a mythical archer ends a drought by shooting a hole in the clouds, the teacher asked the children how they thought clouds were formed. All answers were accepted and written on the board, including these: "A cloud melted." "God's crying." "The water jumped from the earth up to the clouds." This discussion eventually turned into a science lesson on the water cycle, culminating in an experiment involving boiling water, a tray of ice, and condensed steam "raining" down on the heads of the delighted children.

In interpreting what we observed, we did not attempt to attach any specific time limits to the term "extended discussion." Some meaningful interactions between teacher and students were very brief. For instance, in a first-grade class where all the children were bilingual, the teacher prepared the students for a picturebook about autumn by asking what they knew about this season of the year. When it became clear that their background knowledge was limited (leaves fall off the trees, birds fly to Mexico), she moved directly into sharing with them the beautifully illustrated pages in a picturebook, talking about each page in depth. This teacher realized that there was little point in pursuing the originally intended discussion in the absence of information. At the end of the session, the students were able to generate a list of 18 words related to autumn. Later, each dictated an autumn story to a fifth-grade "buddy."

When the activity is well managed, the give-and-take of discussion can teach students (and their teachers) many things. For example, in addition to developing their own powers of analysis, reasoning, and interpretation, students learn to entertain and evaluate the ideas of others. Discussion also gives teachers insights about the experiences and perspectives that students bring to a reading assignment or that color their understandings about material read. However, as any skilled group facilitator knows, there are techniques that enhance the value of group interactions for all participants, as well as behaviors that inhibit a genuine interchange of ideas.

In the hands of a teacher who is not terribly comfortable with relatively unstructured give-and-take between instructor and student, a discussion segment of a lesson can backfire. For example:

- A discussion that went beyond the teacher's comfort zone. One teacher in our sample was trying very hard to follow the approach described in the teacher's manual of her new literature-based reading series. One activity called for her to read some phrases and allow the class to discuss the images evoked by these words: girl looking out the window; cat drear ing; Christmas tree. One child said, "I saw some homeless people sitting on a mattress and the snow was falling down and keeping them warm." For him, the words elicited the winter season and something from his own experience--seemingly an appropriate response to an open-ended type of activity. The teacher, however, chastised the student for not listening well and admonished him to "form a picture based on what I say; do not add anything." This response, of course, squelched both the individual child and the spontaneity of the overall interaction.

In this case, the teacher treated the responses to an interpretive activity as if she had asked a literal question--the approach to establishing whether students understand with which she was most familiar. Without some type of training or opportunity to observe other approaches, she would be unlikely to allow discussion to unfold in the way envisioned by the authors of the textbook.

A Typology of Reading Classrooms

The preceding analysis has demonstrated various ways in which the six strategies for maximizing understanding are related to one another. Although teachers combine them differently, they are often clustered so that students in some classrooms are exposed to instruction featuring several of the strategies at once, while others are taught with little or no use of these approaches.

To explore more effectively the cumulative effect of these strategies, we created an index combining them and divided classrooms into three groups based on their index values: those placing little or no emphasis on strategies aimed at maximizing understanding, those with moderate emphasis, and those with high emphasis. The variables and the data sources used to create this typology were rank ordered from low to high, divided into three groups, and assigned a value of 1, 2, or 3. The values for individual variables were summed for each classroom and divided into the final three groupings that represent our typology. Across each year of data collection, approximately one-third of the classrooms fell into each of the three categories.

It is important to bear in mind that the reading typology does not represent an evaluation of the overall instructional effectiveness of any individual classroom or teacher. Rather, it is designed to allow us to test the hypothesis that alternative instructional strategies may be more effective in helping economically disadvantaged children become good readers. Within the group of classrooms with a low emphasis on strategies such as integrating reading and writing, focusing on deeper meaning, and discussing what is read, there are many apparently effective teachers using traditional reading instruction strategies with positive results for children. Similarly, there are a few apparently ineffective classrooms within each grouping that the typology creates. It is entirely possible for a teacher to attempt new strategies but implement them poorly, as the following example illustrates:

- Missed opportunities in implementing a new strategy for reading instruction. Ms. Ferguson, primary grade teacher, was in her second year of using a literary reader. On one morning when the observer visited, her students completed reading a story in the basal. The teacher then broke the class into six groups, each of which was assigned a question related to the story. After 10 minutes of small group discussion about the answer they would offer, each group reported back. Table 2, reporting on setting and characters, asserted that it was noontime when the story took place--an inferential response since the text did not directly state a time. Rather than probe the group to see how the children arrived at that conclusion, the teacher accepted the answer and moved on, thus missing an opportunity to (1) learn something about the reasoning skills employed by Table 2 and (2) demonstrate the reasoning process to the whole class. After spending several days in this classroom over the school year, the observer noted that the teacher "consistently implements potentially enriching activities, only to have them not realize their potential because the objectives are not vigorously considered or pursued."

In the reading typology, this classroom fell in the category of a moderate emphasis on alternative strategies.

The grade-level analyses presented in Chapter VI indicated that there are some inherent differences in instructional emphasis as children move through the grades, acquiring and solidifying their reading skills. One concern about the validity of the typology that we have created might be that it is biased toward one end of the grade span covered by the study. For example, whether they have adopted new materials or alternative instructional strategies or not, primary grade teachers generally do spend more instructional time on teaching discrete reading skills than do teachers in the middle grades. Does this fact artificially push them into the low- or moderate-emphasis clusters of the typology? Table 29 indicates that this is not the case; the typology accommodates the inescapable differences between first grade and sixth grade well.

Table 29

GRADE-LEVEL DISTRIBUTION OF READING CLASSROOMS
BY EMPHASIS ON ALTERNATIVE INSTRUCTIONAL STRATEGIES

Grade Level	Number	Low Emphasis	Moderate Emphasis	High Emphasis
Grades 1-2	49	17 (35%)	21 (43%)	11 (22%)
Grades 3-4	47	13 (28%)	22 (47%)	12 (26%)
Grades 5-6	38[a]	13 (34%)	17 (45%)	8 (21%)

a - In two districts where elementary schools ended with fifth grade, sixth-grade classrooms were not included in the study sample.

The clusters of classrooms created by the typology might also systematically differ according to other kinds of variables. Our typology is created from a set of variables that focus on comprehension-oriented instructional strategies, but there are other instructional variables that may help explain variance among the three types of classrooms and ultimately affect student outcomes. Emphasis on reading mechanics, grouping practices, and the use of basal readers as opposed to other types of materials are three key descriptors in any classroom where reading is taught. Table 30 shows how the reading classroom types differ on these factors.

Table 30

SELECTED INSTRUCTIONAL CHARACTERISTICS
OF THREE TYPES OF READING CLASSROOMS

Instructional Characteristics	Level of Emphasis on Comprehension: Low	Moderate	High
Year 1 (grades 1, 3, 5)	[n = 22]	[n = 27]	[n = 10]
• Instructional emphasis on reading mechanics: Index from 0 (= no attention paid across the year to discrete skills) to 5 (= all discrete skills taught every day)	1.1 (1.1)[a]	1.4 (1.0)[a]	2.0 (1.1)[a]
• Percentage of classes that regularly group students for reading--			
Homogeneously, by ability	72 (40)	59 (45)	44 (46)
Heterogeneously to mix groups	10 (29)	17 (32)	36 (44)
• Reliance on basal reading series: Scale from 1 (= exclusive reliance) to 4 (= no use of basal)	2.0 (.8)	2.3 (.9)	2.2 (.4)
• Total time spent on reading instruction: Average minutes per day	43 (13)	48 (21)	59 (25)
Year 2 (grades 2, 4, 6)	[n = 21]	[n = 28]	[n = 12]
• Instructional emphasis on reading mechanics: Index from 0 (= no attention paid across the year to discrete skills) to 5 (= all discrete skills taught every day)	1.6 (1.0)	1.7 (1.0)	2.0 (1.[illegible]
• Percentage of classes that regularly group students for reading--			
Homogeneously, by ability	54 (36)	22 (30)	14 (24)
Heterogeneously to mix groups	27 (33)	38 (31)	50 (31)
• Reliance on basal reading series: Scale from 1 (= exclusive reliance) to 4 (= no use of basal)	1.9 (.6)	2.5 (.8)	2.9 (.7)

a - Standard deviations appear in parentheses.

Data from both years make it very clear that there is less grouping by ability and more formation of heterogeneous reading groups in classrooms where the emphasis is on alternative instructional strategies. Further, the overall proportions of classrooms of all types using homogeneous grouping as a way of organizing reading instruction declined dramatically across the 2-year period of data collection, while use of other types of grouping arrangements increased across all types.

The table also offers clear evidence that teaching with emphasis on comprehension does not mean forsaking skill teaching: in fact, classrooms with the greatest emphasis on meaning and understanding were also those that did the most skill teaching as well.

How the Types of Reading Classrooms Are Distributed Among Students, Teachers, and School Settings

As in the case of mathematics, we explored the associations between the three types of reading classrooms and the characteristics of students, teachers, and school or district settings. In essence, we are attempting to answer the question: under what circumstances do alternative approaches to reading instruction appear in schools that serve the children of poverty? The answers are important, not only to interpreting the outcomes of instruction (see the next chapter), but also for assessing the applicability of these approaches to the wide variety of conditions in which the children of poverty learn to read. If, for example, a high emphasis on understanding occurs only in classrooms with bright and relatively affluent children, we are left wondering about the usefulness of this sort of instruction for poorer, low-achieving classroom groups.

Table 31 shows that, on average, students in all three types of classrooms began the school year at relatively comparable levels of achievement. There does not appear to be a particular initial bias indicating, for example, that children in classrooms where reading comprehension would be emphasized started with an edge on their peers in the other types of

Table 31

BACKGROUND CHARACTERISTICS OF STUDENTS
ENROLLED IN THREE TYPES OF READING CLASSROOMS

Student Characteristics	Level of Emphasis on Comprehension: Low	Moderate	High
Year 1 (grades 1, 3, 5)	[n = 22]	[n = 29]	[n = 15]
• Fall pretest score: Average NCEs,[a] CTBS/4 Reading Comprehension	47 (18)[b]	37 (19)[b]	43 (28)[b]
• Poverty level: Percentage of students eligible for free or reduced-price lunch	64 (25)	70 (30)	49 (34)
Year 2 (grades 2, 4, 6)	[n = 18]	[n = 32]	[n = 16]
• Fall pretest score: Average NCEs,[a] CTBS/4 Reading Comprehension	40 (10)	45 (9)	43 (11)
• Poverty level: Percentage of students eligible for free or reduced-price lunch	60 (19)	61 (25)	64 (30)

a - Normal Curve Equivalents (see discussion of outcome measures in Chapter VIII).

b - Standard deviations appear in parentheses.

classrooms. Thus, if the outcome analyses show that these students made greater gains, we can have some confidence that this is not entirely or mainly the result of previous achievement levels. However, the table does indicate that in our Year 1 sample (grades 1, 3, and 5), students in classrooms with a high emphasis on alternative reading instruction strategies were somewhat less poor, on average, than students in the other two types of classrooms, which may have some comparative bearing on outcomes. The same was not true of the second year, when the average poverty level of students across the three types of classrooms was virtually identical.

Teacher background characteristics might also affect both the extent to which teachers are willing to undertake the new ways of teaching represented by a high emphasis on strategies to enhance reading comprehension and student outcomes. Table 32 shows the variation among teachers in the three types of reading classrooms on three indicators of teachers' backgrounds--an index of their initial and ongoing professional development and two attitudinal scales.

Table 32 suggests that teachers in classrooms with a high emphasis on alternative strategies for teaching reading may be somewhat better prepared to teach reading by virtue of their preprofessional and ongoing professional development activities. Their expectations of students and satisfaction with teaching, too, are marginally higher, although the differences are slight. In short, as we would expect, although the students they teach are fairly comparable, the individuals who choose to adopt alternative approaches to reading instruction are not necessarily the same as those who prefer to continue teaching in traditional ways.

The association of classroom types with particular school and district settings is much stronger than with characteristics of students or teachers. As we found with mathematics, certain districts were especially likely to have classrooms experimenting with comprehension strategies while others were not, as can be seen in Table 33. Once again considering the ratio of classrooms placing a high versus low emphasis on comprehension-oriented strategies, District 5 and District 6 exemplify extremes, with ratios that are the reverse of each other (0:23 and 9:1, respectively). As in the case of mathematics, these differences are traceable, in part, to district policies. District 5, for example, prides itself on its "basic skills," which would place little emphasis, in either curricular guidelines or its accountability system, on comprehension-oriented instructional practices. District 6, in contrast, was in the midst of adopting a new language arts program that featured, among other things, a great deal of attention to the kinds of strategies on which our classroom typology rests.

Table 32

BACKGROUND CHARACTERISTICS OF TEACHERS
IN THREE TYPES OF READING CLASSROOMS

Student Characteristics	Level of Emphasis on Comprehension		
	Low	Moderate	High
Year 1 (grades 1, 3, 5)	[n = 23]	[n = 29]	[n = 15]
• Richness of background in language arts: Index scaled from 1 (= least) to 6[a]	2.4 (1.2)[b]	2.6 (1.1)[b]	3.0 (1.3)[b]
• Expectations for student success: Scale value from 1 (= most students won't be able to succeed) to 4 (= all can succeed at grade level)[c]	3.1 (.8)	3.0 (.7)	3.4 (.9)
• Satisfaction with teaching: Scale value from 1 (= least) to 4[c]	2.8 (.6)	2.7 (.8)	3.1 (.6)
Year 2 (grades 2, 4, 6)	[n = 18]	[n = 29]	[n = 16]
• Richness of background in language arts: Index scaled from 1 (= least) to 6[a]	4.1 (1.2)	4.4 (1.4)	4.4 (1.0)
• Expectations for student success: Scale value from 1 (= most students won't be able to succeed) to 4 (= all can succeed at grade level)[c]	3.0 (.7)	3.2 (.5)	3.2 (.8)
• Satisfaction with teaching: Scale value from 1 (= least) to 4[c]	3.2 (.7)	3.5 (.5)	3.2 (1.0)

a - Index summing up to six categories of professional development activity relevant to language arts based on observer ratings (in Year 1) and teacher self-report (in Year 2).

b - Standard deviations appear in parentheses.

c - In Year 1, based on observer ratings; in Year 2, based on teacher self-report.

Table 33

PATTERNS OF READING INSTRUCTION BY DISTRICT
(Both Years of Data Collection)

District/State (n of classrooms)	Number of Classrooms Having Each Degree of Emphasis on Comprehension Strategies: Low	Moderate	High
State 1 (n = 63)	(n = 17)	(n = 29)	(n = 17)
District 1 (rural) (n = 22)	2	10	10
District 2 (urban) (n = 18)	5	10	3
District 3 (urban) (n = 23)	10	9	4
State 2 (n = 25)	(n = 3)	(n = 17)	(n = 5)
District 4 (urban) (n = 25)	3	17	5
State 3 (n = 48)	(n = 24)	(n = 15)	(n = 9)
District 5 (suburban) (n = 32)	23	9	0
District 6 (rural) (n = 16)	1	6	9

The role of the district in promoting or inhibiting the presence of comprehension-oriented reading instruction was not static across the 2 years we collected data. In Year 1, several of the districts had recently embarked on ambitious attempts to revamp their language arts programs, although, as explained earlier in this section, the edicts from the district offices were accompanied by varying degrees of support. By Year 2, two of the districts had taken further steps to promote language arts instruction featuring a number of the strategies we have been studying.

There is not an obvious association between the state setting and the presence of alternative approaches to reading instruction, as was the case in mathematics. With reading, the percentage of study classrooms falling in the "high" category, for example, varies little across states. The profound differences across districts appear to cancel each other out in arriving at state averages. Nonetheless, there was qualitative evidence from observational visits that a state interested in integrated language arts was among the factors driving the wave of mandated changes we witnessed in this aspect of the curriculum.

Within districts, schools sometimes clearly played a role in fostering certain approaches to reading instruction that was independent of the district's influence. The three schools in District 3 illustrate the point. Below, in Table 34, we list the percentage of sample classrooms across both years that were categorized as "high" emphasis on comprehension-oriented strategies and "low" emphasis. The three schools varied considerably, despite clear pressure from the district to adopt an integrated language arts approach favoring instruction aimed at the strategies we have been discussing. Although with such small numbers the pattern can be attributed partly to the individual teachers' predispositions, there are also clear differences across schools in the kind of language arts programs promoted and supported by school principals and others at the school (see Chapter XV for further discussion of this issue). One principal, in particular, insisted that her school retain a "basic skills" orientation to reading, no matter what the district said, and she prevailed in this policy.

Table 34

HOW TYPES OF READING CLASSROOMS WERE DISTRIBUTED ACROSS THE SCHOOLS IN ONE DISTRICT

School (n of classrooms)	Percentage of classrooms across both years of the study classified as placing the following degree of emphasis on comprehension-oriented strategies: Low	Moderate	High
School 5 (n = 10)	50	10	40
School 6 (n = 4)	50	50	0
School 7 (n = 9)	33	67	0

VIII WHAT CHILDREN LEARN FROM DIFFERENT APPROACHES TO READING INSTRUCTION

The preceding chapters described what was taught in reading classrooms and how it was taught, not what children learned. To assess student learning, we collected data of several different kinds during the first and second years of the study regarding students' proficiency in reading and reading-related skills. These data enable us to test several propositions regarding the relationship between curriculum, instruction, and reading outcomes among classrooms and schools serving the children of poverty:

(1) The more classrooms emphasize instructional strategies that maximize understanding, the more likely students are to perform well on measures of reading comprehension, once other factors are taken into account.

(2) Students in classrooms emphasizing reading comprehension strategies acquire a grasp of "basic" reading skills (e.g., decoding, word-letter identification) that is at least as good as that of students in classrooms oriented primarily toward discrete reading skills.

(3) Lower-achieving students benefit as much or more from instruction that concentrates on reading comprehension strategies as their higher-achieving counterparts.

We would expect these effects to be apparent in the short term--that is, at the end of a school year--and also to persist over the summer months.

As stated, the first proposition may appear obvious from both an intuitive and a logical point of view. In effect, it asserts that the more teachers orient instruction toward comprehension, the more likely students are to comprehend what they read. Some may wonder what the focus of the assertion is, given the fact that nearly all reading classrooms in our sample, and indeed in most elementary schools, encourage students to make sense of what they are reading at some level.

The key difference among classrooms, however, is one of emphasis and focus. Our fieldwork and much of the recent reading literature suggest that students in the kinds of schools we studied will learn to read better when teachers deemphasize the teaching of discrete reading skills out of context and at the same time emphasize strategies that help students make sense of text (for example, through questioning that gets at deeper meaning, by directly teaching students comprehension strategies, by giving students ways to talk about the personal meaning of what they are reading). Doing so flies in the face of established traditions of reading instruction in settings populated by children with apparent deficiencies in their exposure to, and ability to use, Standard English. In such settings, conventional wisdom asserts that a heavy emphasis--in the extreme case, a sole focus--on step-by-step instruction in discrete basic reading skills is the best way to lead children to reading.

We examine the propositions stated on the previous page by analyzing the relative contribution to reading outcomes of instructional approaches that employ, in varying degrees, the strategies for maximizing understanding discussed in the last chapter. As in the analysis of mathematics outcomes, we assess the association of these strategies with reading comprehension and mastery of reading-related skills. We do so for the student sample as a whole and for low-achieving children as contrasted with high-achieving children. Our analyses control initially for key student variables that are likely to influence outcomes; subsequently, we control for other possible influences on outcomes--instructional time, emphasis on discrete skills, and various characteristics of teachers.

Outcomes of Reading Instruction

We focused analysis on two types of reading outcome:

- Reading comprehension. We used the Comprehensive Test of Basic Skills (CTBS)/Version 4 Reading Comprehension subtest as a measure of students' ability to read with understanding.

- Mastery of reading mechanics skills. This was measured only for first through third grades, using the "Word Attack" and "Word-letter Identification" subscores of the Woodcock Language Proficiency Battery, an individualized measure thought to be especially useful with young students.*

The testing procedures and details of each test are explained in Volume 2 of this report. Examples of the reading comprehension items are displayed in Figure 2.

As with mathematics, we examined short-term (fall-to-spring) outcomes--those attributable to the school year itself--and, for those students remaining in the sample during the second year, longer-term (fall-to-fall and spring-to-spring) outcomes, which reflect not only what is learned during the school year but also what is retained, gained, or lost during the summer months. In analyzing outcomes, we looked at the same indicator used in analyzing mathematics outcomes: the absolute level of students' scores at various time points in Normal Curve Equivalents (NCEs), controlling for students' pretest NCE score.

This outcome measurement procedure has significant limitations. Chief among them, the test of reading comprehension does not pose for children the task of reading "authentic" material--for example, a whole book, story, letter, memo, article, or whatever--and attempting to make sense of it, using all the means at their disposal. Although this complaint can be raised about many testing procedures, it is especially pertinent in the case of reading. Although experts generally agree that tests such as the CTBS capture some aspects of comprehension, there is a widespread feeling in the reading assessment community that these kinds of measures miss important aspects of comprehension. Nonetheless, the measure does indicate whether or not children can extract meaning from several forms of written text, and to that

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* Because of resource limitations, the test could not be given to all students; consequently, a subset of six students representing the range of abilities in each classroom took the test, and their scores were aggregated to form a classroom measure. In addition, the Woodcock was administered only in the spring of each data collection year (fall pretest scores on the CTBS Reading Comprehension subtest were used as covariates for analyses).

Figure 2

EXAMPLES OF READING COMPREHENSION TEST ITEMS (CTBS/4)

First Grade

Mike and Chris walked over a hill of sand.
They were looking for the best place to eat lunch.
"This sand is red-hot. My feet are on fire!" said Mike.
"Let's stop."
The boys saw a big, flat rock near the sea.
Chris said, "Here is a good place."
The boys sat down and put their toes in the water.
Then they opened the box Mom had given them.

16 Where do you think Mike and Chris ate lunch?

- O on a box
- O on a rock
- O on a table

17 Who found a good place for lunch?

- O Mom
- O Mike
- O Chris

18 What did Mike mean when he said the sand was red-hot?

- O The sand was on fire.
- O The sand was a red color.
- O The sand was too hot to walk on.

19 What happened last in the story?

- O The boys opened the box.
- O The boys sat on the sand.
- O The boys put their toes in the water.

20 What is this story mostly about?

- O finding a box
- O playing in the sand
- O having lunch by the sea

Third Grade

Read the story. Then do Numbers 6 through 10.

If you could have only three colors in your paint box, which would you choose? If your answer is red, blue, and yellow, you made a good choice. These three are called primary colors. You can use them to make a great many other colors.

Suppose you are planning to paint a basket of fruit. In your paint box you have red for cherries, yellow for bananas, and blue for plums. But suppose you want to paint other kinds of fruit, too. If you mix red and yellow, you will have orange for oranges. When you mix blue with red, you will have purple for grapes. Blue mixed with yellow will make green. You can use that for leaves and for green apples, too. Mix all three primary colors together, and you will have brown for the basket.

You don't need to stop there. You can go on mixing the primary colors and paint a garden, a clown, a rainbow, or anything you want!

6 Which of these is true about this story?

- O It tells facts about fruit.
- O It tells facts about colors.
- O It tells how to draw a picture.
- O It tells a colorful fairy tale.

7 According to the story, what colors should you use to paint the basket?

- O purple, blue, and red
- O red, blue, and yellow
- O green, blue, and yellow
- O red, yellow, and orange

8 The best title for this story is

- O "Many from One"
- O "Painting Fruit"
- O "Purple to Green"
- O "The Primary Colors"

9 Why is it important to have red, yellow, and blue in your paint box rather than three other colors?

- O They will make many other colors.
- O They are brighter than other colors.
- O They are the only three you can have.
- O They will be useful for painting gardens.

10 Which of these could you paint if you had only red and yellow in your paint box?

- O oranges and purple grapes
- O bananas and green apples
- O cherries and purple grapes
- O oranges and bananas

Figure 2 (Continued)

EXAMPLES OF READING COMPREHENSION TEST ITEMS

Third Grade

For Numbers 17 through 20, choose the best answer to the question.

17 Millie was reading a story. The words she read were "and everyone in the land shouted hooray!" Millie was probably reading the

- O end of the story
- O beginning of the story
- O part that tells about the setting
- O part that tells about the problem

18 Ned is reading a story called "Sally and the Amazing Homework Machine."

Which of these sentences would most likely be at the very beginning of the story?

- O The teacher was more puzzled each day.
- O Sally's homework papers were better and better.
- O Once a lonely computer was left in the corner of a room.
- O "Hello, my name is Dr. Homework AX-13. May I help you?" the screen replied.

19 Which of these sentences would most likely be the ending of a made-up story?

- O And so they remembered the little elf for the rest of their days.
- O Once there lived an old man and his granddaughter Ruth.
- O Soon everyone gathered around and stared in surprise.
- O Rick saw a tiny elephant, no bigger than the length of his hand.

20 Jenny decided that she would write her own story. Each of these sentences is from the story she wrote.

Which sentence is probably the last one in the story?

- O The owl set out on a journey to find Max, the great magician.
- O Max's magic worked, and the owl slept for three days and three nights.
- O Max looked in his book of magic spells and found a good one for owls.
- O Once an owl opened its eyes so wide that they became stuck, and it could no longer sleep.

Sixth Grade

Here is a passage containing information about specially trained dogs. Read the passage. Then do Numbers 10 through 14.

It is seven a.m. and the alarm has just gone off. Charlie, a two-year-old spaniel, jumps on Maria's bed and silently nudges her until she begins to grumble and almost opens her eyes. This morning it looks as if Maria is going to be stubborn. After a few more tries, Charlie decides it is time to get help. He runs to the next room where Maria's father is still asleep. He barks loudly until her father wakes up and follows him to Maria's room.

Charlie's job is to make sure that Maria gets up in time for school. Without Charlie, she would not know that her alarm had gone off, because Maria cannot hear. Her dog is an example of a group of hearing-ear dogs who, like the better-known guide dogs for the visually impaired, are specially trained to help their owners in their everyday lives.

After being carefully selected, hearing-ear dogs are placed at one of thirteen nonprofit training centers in the United States. Here they undergo training and are matched with owners. A new owner will remain with the dog at the center for about one month so that owner and dog can be trained together.

The concept of hearing-ear dogs for the hearing impaired is relatively new, but the program is growing. In many states laws have been passed to give these dogs the same privileges as other guide dogs, such as being allowed in restaurants. The dogs are making a great difference in the lives of their owners, giving them new freedom and pleasure.

10 A new owner of a hearing-ear dog probably would be taught how to

- F train the dog to bark louder during emergencies
- G tell one breed of hearing-ear dog from another
- H interpret the dog's actions and give commands
- J distinguish a friendly bark from a warning growl

11 Which of these is the most likely reason that Charlie was chosen to assist Maria?

- A He can run very fast
- B He can see well in the dark
- C He is frisky and likes to play
- D He has excellent hearing and learns easily.

12 Which of these privileges would Charlie probably be given that ordinary dogs would be denied?

- F an extra portion of food
- G a free run without a leash
- H permission to sleep on the furniture
- J permission to attend school with his owner

13 Which of these is Charlie probably not trained to do?

- A nudge Maria when a driver honks to get her attention
- B howl by Maria's ear if the smoke detector goes off
- C behave in a special way when Maria's telephone or doorbell rings
- D block Maria from the street if a siren indicates an approaching ambulance

14 Which of these is the best title for the passage?

- F "A New Alarm System"
- G "A New Kind of Helping Dog"
- H "How to Care for Spaniels"
- J "How to Train Hearing-Ear Dogs"

extent it serves our purpose in helping to distinguish more and less effective instructional approaches. In addition, certain items on these tests attempt to capture other dimensions of comprehension than those assessed by conventional short-passage items (see items 17-20 on the third-grade test).

As in the case of mathematics, analyses of reading outcomes were performed at the classroom and student level (by attaching to each student's record the corresponding variables for the student's teacher or instructional approach). The latter mode of analysis provides a reasonable approximation of effects on students, although it is limited by the assumption that all students are independently--and equally--affected by instructional variables. (See discussion of analysis issues in Volume 2.)

Effects on Reading Comprehension

The preceding chapter identified six strategies used in sample classrooms to enhance students' comprehension skills: maximizing the opportunity to read, integrating reading with writing, teaching comprehension strategies, focusing on deeper meaning, deemphasizing isolated discrete skills instruction, and providing opportunities to discuss reading. Teachers in the sample classrooms used the strategies in varying combinations, although overall there was a tendency for teachers using one strategy to be simultaneously using others. It was on this basis that we created types of classrooms using the index described earlier. Collectively, these strategies--and the classroom types that exhibit varying levels of their use--define in operational terms what we mean by "the attempt to maximize understanding."

To determine whether these strategies influenced students' ability to comprehend what they read, we performed multiple regression analyses that parallel what we did in analyzing mathematics outcomes in Chapter V. Dummy variables representing the degree to which these strategies were present in the classroom were used to predict reading comprehension outcomes in equations that included students' pretest scores and poverty level as control variables.

Short-Term Results (Fall to Spring)--As summarized in Table 35, there is clear evidence that placing emphasis on comprehension-oriented strategies boosts students' ability to comprehend what they read. In comparison with students whose teachers use these strategies relatively little or not at all, students with moderate or high exposure to comprehension-oriented instruction perform between 1 and 6 NCEs higher at the end of the school year, once initial differences in student achievement and poverty level are taken into account; in all but one instance, these differences are statistically different from zero at the .05 level. (As in Chapter V, the table presents only the coefficients for variables indicating the type of approach to reading instruction, once student pretest and poverty level have been controlled; the full regression results appear in the Regression Tables in Volume 2.)

Although generally supporting the hypothesis that alternative approaches to reading are beneficial, the table presents mixed results regarding the value of high versus moderate exposure to comprehension-oriented instruction. In Year 1, high exposure is associated with an outcome difference that is significantly different from zero; in Year 2, the outcome is not clearly different from zero (and appears to be smaller, although we conducted no statistical tests to confirm this). This may reflect various factors, among them the possibility that teachers in Year 2 attempting to use comprehension-oriented strategies extensively did so with less skill than their colleagues in Year 1. It is also possible that there are powerful combinations of alternative and conventional practices that influence students' proficiency at reading more than does instruction in which alternative practices predominated. Our findings do not make it easy to resolve this matter, since the reading typology created in Chapter VII does not include a dimension reflecting the nature of conventional reading instruction (we attempted to construct such a typology, but could find no consistent and clean way to do it).

Given the fact that reading instruction differs considerably across grade levels, we ran separate regression equations for upper and lower elementary grades, as shown in Table 36, to check for possible differences in

Table 35

ASSOCIATION BETWEEN APPROACH TO READING INSTRUCTION AND READING COMPREHENSION, OVER THE SHORT TERM (FALL TO SPRING)

	Difference in scores (NCEs) on the CTBS/4 Reading Comprehension Test at the end of the school year, controlling for initial differences in achievement and poverty level.	
Approach to Reading Instruction[a]	Year 1: Grades 1, 3, 5 (n = 1,068)	Year 2: Grades 2, 4, 6 (n = 1,123)
High emphasis on comprehension-oriented strategies	5.6*[b]	1.4[b]
Moderate emphasis on comprehension-oriented strategies	3.9*	4.4*

* Statistically different from zero at $p < .05$.

Table reads: "By comparison with their counterparts in classrooms exposed to instruction with little emphasis on comprehension-oriented strategies, students in classrooms with a high emphasis on these strategies perform 5.6 NCEs better in the spring of Year 1, after initial differences in achievement and poverty level have been taken into account. This result is statistically different from zero at the .05 level...."

a - Approach to reading instruction is represented by dummy variables indicating students' presence in classrooms with a moderate or high emphasis on comprehension-oriented strategies, compared with students in classrooms in which there is little emphasis on these strategies.

b - Figures in the table are unstandardized B-weights for dummy variables indicating each type of reading instruction. Regression equations include students' pretest score, poverty level, and dummy variables indicating grade level (see Regression Tables in Volume 2).

Table 36

ASSOCIATION BETWEEN APPROACH TO READING INSTRUCTION AND READING COMPREHENSION, FOR LOWER AND UPPER ELEMENTARY CHILDREN, OVER THE SHORT TERM (FALL TO SPRING)

Approach to Reading Instruction[a]	Difference in scores (NCEs) on the CTBS/4 Reading Comprehension Test at the end of the school year, controlling for initial differences in achievement and poverty level. Year 1		Year 2	
	Grade 1 (n = 372)	Grades 3, 5 (n = 695)	Grade 2 (n = 342)	Grades 4, 6 (n = 725)
High emphasis on comprehension-oriented strategies	10.4*	4.4*	3.8 (*)	0.6
Moderate emphasis on comprehension-oriented strategies	9.2*	1.6	6.2*	3.2*

* Statistically different from zero at $p < .05$.

(*) Statistically different from zero at $p < .10$.

Table reads: "By comparison with their counterparts in classrooms exposed to instruction with little emphasis on comprehension-oriented strategies, first-grade students in classrooms with a high emphasis on these strategies perform 10.4 NCEs higher in the spring of Year 1, while third and fifth graders perform 4.4 NCEs higher, after initial differences in achievement and poverty level have been taken into account. These results are statistically different from zero at the .05 level...."

a - Approach to reading instruction is represented by dummy variables indicating students' presence in classrooms with a moderate or high emphasis on comprehension-oriented strategies, compared with students in classrooms in which there is little emphasis on these strategies.

b - Figures in the table are unstandardized B-weights for dummy variables indicating each type of reading instruction. Regression equations include students' pretest score, poverty level, and dummy variables indicating grade level (see Regression Tables in Volume 2).

effect. The results replicate the pattern already discussed in nearly all respects: regardless of grade level, comprehension-oriented instruction was associated with higher reading scores, once student pretest score and poverty level had been controlled. (These associations seem especially high for children in the lower elementary grades in both years, although we did not formally test for the significance of differences across grades.) There is one exception to the pattern, which helps to pinpoint the source of the anomaly discussed above: in Year 2, upper elementary students (grades 4 and 6) exposed to instruction heavily emphasizing alternative practices performed approximately the same as their counterparts in classrooms with little or no attention to these practices.

Longer-Term (12-Month) Results (Fall to Fall, Spring to Spring)--The evidence summarized in Table 37 is mixed regarding the effects of comprehension-oriented instruction across a 12-month period of time, at least as far as we can tell from the data at hand. Twelve months after the fall pretest in Year 1, for example, the difference between the average performance levels of students exposed to conventional and alternative practices is negligible. The following spring, on the other hand, students in classrooms placing high or moderate emphasis on comprehension strategies perform noticeably higher than their counterparts receiving skills-oriented reading instruction--3.3 and 4.1 NCEs, respectively, and with differences that are significantly different from zero at $p < .10$ (or very close to that)--once differences in reading ability, poverty level, and participation in a year-round school are controlled.* In neither year were students who were exposed to alternative practices worse off than those receiving skills-based instruction.

The same caveats apply to 12-month results in reading as to those in mathematics. As before, the findings are complicated by the possible effects of sample attrition between years--more than 50 percent of the students

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* Because two of the schools offered instruction year-round--that is, without a substantial summer break--we controlled for this factor in all analyses involving 12-month periods of time.

Table 37

ASSOCIATION BETWEEN APPROACH TO READING INSTRUCTION AND READING COMPREHENSION, OVER THE LONGER TERM (FALL TO FALL, SPRING TO SPRING)

Approach to Reading Instruction[a]	Difference in scores (NCEs) on the CTBS/4 Reading Comprehension Test after 12 months, controlling for initial differences in achievement, poverty level, and participation in a year-round school. Fall 1 - Fall 2 Grades 1, 3, 5 (n = 477)	Spring 1 - Spring 2 Grades 2, 4, 6 (n = 415)
High emphasis on comprehension-oriented strategies	-0.5[b]	3.3[b]
Moderate emphasis on comprehension-oriented strategies	0.5	4.1 (*)

(*) Statistically different from zero at $p < .10$.

Table reads: "By comparison with their counterparts in classrooms exposed to instruction with little emphasis on comprehension-oriented strategies, students in classrooms with a high emphasis on these strategies perform 0.5 NCEs lower after 12 months ending in fall of Year 2 and 3.3 NCEs higher after 12 months ending in spring of Year 2, once initial differences in achievement, poverty level, and participation in a year-round school have been taken into account. These results are not statistically different from zero at the .05 or .10 level...."

a - Approach to reading instruction is represented by dummy variables indicating students' presence in classrooms with a moderate or high emphasis on comprehension-oriented strategies, compared with students in classrooms in which there is little emphasis on these strategies.

b - Figures in the table are unstandardized B-weights for dummy variables indicating each type of reading instruction. Regression equations include students' pretest score, poverty level, and dummy variables indicating participation in a year-round school and grade level (see Regression Tables in Volume 2).

tested in Year 1 were not part of the Year 2 cohort, and this attrition was not evenly distributed across school settings or across different socioeconomic levels among the student population.

Effects on Students' Grasp of Basic Skills

Unfortunately, there are substantial limitations on our data for investigating questions of effect on mastery of basic skills. Only children in the lower elementary grades were given a test (the Woodcock Language Proficiency Battery) that assessed two basic skills in reading (word attack and word-letter identification). As explained before, the test was administered to a subset of six students from each class, chosen to represent the range of reading proficiencies in the room at the beginning of the year. With such small numbers, missing cases can easily skew the results considerably, and the limited sample sizes--both of classrooms and students within them--severely constrain the number of variables that can be meaningfully considered.

Data from the lower elementary grades provide partial answers to the question whether comprehension-oriented instruction fosters growth in basic reading skills. The results of analyses for first graders (in Year 1) and second graders (in Year 2), summarized in Table 38, indicate a mixed pattern of effects. With regard to word-letter identification skills, students in classrooms with high exposure to comprehension-oriented instruction ended up the school year performing lower on the Woodcock than their counterparts receiving instruction that emphasized basic skills, once initial differences in achievement and poverty level were taken into account; these results, however, were not significantly different from zero at the .05 level. With children who were only moderately exposed to alternative practices, the results more closely resembled those for children exposed to conventional practices. Whereas the same pattern occurred for word attack skills in the first grade, the opposite took place in second grade: there, children exposed to alternative reading instruction performed higher at the end of the year (with differences that approach significance). On balance, it is

Table 38

ASSOCIATION BETWEEN APPROACH TO READING INSTRUCTION AND READING MECHANICS SKILLS, FOR LOWER ELEMENTARY STUDENTS, OVER THE SHORT TERM (FALL TO SPRING)

	Difference in scores (NCEs) on the Woodcock Language Proficiency Battery at the end of the school year, controlling for initial differences in achievement and poverty level.			
	Year 1: Grade 1		Year 2: Grade 2	
Approach to Reading Instruction[a]	Word-letter Identification (n = 135)[b]	Word Attack (n = 135)[b]	Word-letter Identification (n = 137)[b]	Word Attack (n = 137)[b]
High emphasis on comprehension-oriented strategies	-3.7[c]	-6.8[c]	-0.8[c]	5.7[c]
Moderate emphasis on comprehension-oriented strategies	1.4	-1.9	-3.1	2.6

Table reads: "By comparison with their counterparts in classrooms exposed to instruction with little emphasis on comprehension-oriented strategies, students in classrooms with a high emphasis on these strategies perform 3.7 NCEs lower in the spring of Year 1, after initial differences in achievement and poverty level have been taken into account. This result is not statistically different from zero at the .05 level...."

a - Approach to reading instruction is represented by dummy variables indicating students' presence in classrooms with a moderate or high emphasis on comprehension-oriented strategies, compared with students in classrooms in which there is little emphasis on these strategies.

b - The individualized Woodcock was administered to a subset (n = 6) of students in each classroom, chosen to reflect the range of achievement levels.

c - Figures in the table are unstandardized B-weights for dummy variables indicating each type of reading instruction. Regression equations include students' pretest score and poverty level (see Regression Tables in Volume 2).

difficult to draw a clear conclusion from these results. The safest statement is that instruction aimed at maximizing comprehension does not consistently enhance nor clearly impede students' mastery of reading mechanics skills.

To explore the pattern one step further, we tried to determine whether other features of reading instruction might explain the outcomes. We were particularly interested in the degree of attention teachers paid to reading mechanics; as pointed out earlier in this chapter and in Chapter VII, teachers providing alternative forms of reading instruction were also likely to spend considerable time teaching reading mechanics. Logically, the amount of attention paid to reading mechanics per se might better predict outcome scores on tests of these skills. The results confirm this contention for first graders. When a variable indicating the degree of emphasis on reading mechanics skills is introduced into the regression equation predicting first-grade outcome scores, it is significantly and positively associated with measures of both word attack and word-letter identification skills (see Regression Tables in Volume 2). The same is not true, however, for second graders: for them, the amount of exposure to instruction in reading mechanics makes little apparent difference in the outcome scores.

Once again, in light of the shortcomings in our database, these analyses should be taken as suggestive rather than conclusive. From this study, there is much we still do not know, and have no way of knowing, about the learning of basic reading skills and the kinds of instruction that will best bring about mastery of these skills. We can more confidently address questions concerning the way these skills are applied in the actual act of reading and comprehending text, based on the results summarized earlier in the chapter.

Differential Effects on High- and Low-Achieving Students

So far, we have examined influences on outcomes for the total pool of tested students or for all students within a grade level, with relatively little regard for differences among them in overall level of ability or demonstrated achievement. To be sure, initial achievement level has been used as a covariate in analyses so that posttest scores could be interpreted in terms of students' initial skill at the beginning of the year. However, we have not yet addressed the question: are the approaches to reading instruction under consideration equally appropriate and effective for low- and high-achieving children? Conceivably, the differences we have reported between students exposed to alternative and conventional reading instruction reflect exceptional performance by high-achieving students compensating for small or negligible gains by their less proficient peers.

It is doubly important to pursue this question, given the extensive research indicating that low-achieving children tend to be treated differently than other students in classrooms and schools. Faced with a range of abilities and proficiencies, school systems, schools, and individual classroom teachers make assignments and adjust curricula to accommodate the various levels of proficiency within the student population. Instruction for the lowest-achieving children often rests on the assumption that they need the greatest amount of discrete skills instruction and correspondingly less teaching aimed at comprehension.

We pursued this possibility in the same way used in analyses of mathematics outcomes, by dividing the total student pool into three groups: those in the top, middle, and bottom thirds of the overall achievement distribution at the time of the pretest. We then conducted parallel analyses of the students falling into each third to see whether the instructional strategies we were examining worked the same for each third.

The results of the analysis, summarized in Table 39, do not indicate consistent differences between the highest and lowest thirds of the student population with respect to the effect of comprehension-oriented instruction on reading outcomes. High- and low-achieving students in classrooms stressing comprehension-oriented instruction outperformed their counterparts in classrooms receiving conventional reading instruction. In Year 1, these effects are clearest (that is, yielding coefficients that are significantly different from zero at the .05 level) for high-achieving students in

Table 39

ASSOCIATION BETWEEN APPROACH TO READING INSTRUCTION AND READING COMPREHENSION, FOR HIGH- AND LOW-PERFORMING STUDENTS, OVER THE SHORT TERM (FALL TO SPRING)

Approach to Reading Instruction[b]	Difference in scores (NCEs) on the CTBS/4 Reading Comprehension Test at the end of the school year, for students in the highest and lowest thirds of the achievement distribution, controlling for initial differences in achievement and poverty level. Year 1: Grades 1, 3, 5 High (n = 331)	Year 1: Grades 1, 3, 5 Low (n = 401)	Year 2: Grades 2, 4, 6 High (n = 397)	Year 2: Grades 2, 4, 6 Low (n = 368)
High emphasis on comprehension-oriented strategies	7.3*	3.5	1.4	1.7
Moderate emphasis on comprehension-oriented strategies	1.8	4.6*	6.4*	2.6

* Statistically different from zero at $p < .05$.

Table reads: "By comparison with their counterparts in classrooms exposed to instruction with little emphasis on comprehension-oriented strategies, students in the highest third of the achievement distribution who are exposed to instruction with a high emphasis on these strategies perform 7.3 NCEs higher in the spring of Year 1, after initial differences in achievement and poverty level have been taken into account. This result is statistically different from zero at the .05 level...."

a - Approach to reading instruction is represented by dummy variables indicating students' presence in classrooms with a moderate or high emphasis on comprehension-oriented strategies, compared with students in classrooms in which there is little emphasis on these strategies.

b - Figures in the table are unstandardized B-weights for dummy variables indicating each type of reading instruction. Regression equations include students' pretest score, poverty level, and dummy variables indicating grade level (see Regression Tables in Volume 2).

classrooms placing greatest emphasis on comprehension-oriented instruction and for low-achieving students in classrooms providing moderate exposure to this sort of instruction. During the following year, high- and low-achieving students appear to do about as well in the classrooms that depart the most from conventional practices; in classrooms with moderate exposure to comprehension-oriented instruction, high-achieving students benefit more obviously than low-achieving ones. (Note, however, that we have not formally tested the significance of the difference between regression coefficients for high- and low-achieving students; rather, we have only demonstrated how confidently we can assert that these coefficients are different from zero.)

In summary, it appears that both high- and low-achieving students benefit from instruction that departs from conventional skills-based instruction. It is harder to determine from our findings whether extensive or more moderate exposure to alternative forms of reading instruction is optimal for low-achieving children.

Other Factors That Might Influence Reading Outcomes

Strategies that maximize reading for understanding are not the only factors that can influence reading comprehension scores. As in the analyses of mathematics outcomes, we considered other variables in addition to the characteristics of students (initial achievement and poverty level, which were included in all analyses as covariates): (1) instructional time, (2) emphasis on reading mechanics skills, (3) teachers' general proficiency at managing instruction, (4) the richness of the teachers' background in the subject area and relevant pedagogy, (5) the teachers' expectations for students' success in language arts, and (6) the teachers' satisfaction with teaching. As in Chapter V, our reasons for including these variables in regression equations were twofold: first, to ascertain whether these factors reduced or eliminated the apparent association between alternative practices and outcomes and, second, to determine whether these variables were clearly linked to outcomes independent of any influences attributable to the overall instructional approach.

Regarding the first issue, we found a similar pattern to what was described for mathematics. Introducing these other variables into regression equations did little to alter the size or significance of differences between the outcomes of students exposed to conventional and alternative instructional practices, as summarized in Table 40. Thus, even when variations in instructional time, emphasis on reading mechanics, or characteristics of the teacher are taken into account, the positive relationship between alternative instruction and reading comprehension scores still holds.

Regarding the independent influence of these factors on students' ability to comprehend what they read, some variables emerge from analyses with clear associations to outcomes, as described below.

<u>Other Features of Reading Instruction</u>

Besides the global measure of approach to reading used in previous analyses, we included in regressions a measure of the number of minutes allocated to reading instruction and an index of the overall emphasis placed on reading mechanics (measured by summing the frequency with which different kinds of reading mechanics were the focus of instruction--see description of measures in Volume 2). Both of these measures were significantly and positively linked to outcomes (see Regression Tables in Volume 2). In other words, spending more time on reading instruction and directly teaching reading mechanics both contributed to students' learning to comprehend what they read, independent of the teacher's use of comprehension-oriented strategies.

<u>Characteristics of Reading Teachers</u>

Characteristics of teachers that have often distinguished higher-performing from lower-performing classrooms show no consistent or statistically significant differences between the outcomes of students exposed to alternative and conventional practices. (There is one exception to this finding: in Year 2, the richness of teachers' background in language arts was significantly and positively linked to reading comprehension scores--see

Table 40

ASSOCIATION BETWEEN APPROACH TO READING INSTRUCTION AND READING COMPREHENSION, CONTROLLING FOR OTHER INSTRUCTIONAL AND TEACHER VARIABLES, OVER THE SHORT TERM (FALL TO SPRING)

	Difference in scores (NCEs) on the CTBS/4 Reading Comprehension Test at the end of the school year, for students in classrooms with high emphasis on comprehension-oriented strategies, compared with students who have little exposure to these strategies.	
	Year 1: Grades 1, 3, 5	Year 2: Grades 2, 4, 6
When controlling for students' fall pretest and poverty level and for:		
Time for instruction (minutes/day of reading)	4.8*	--
Emphasis on discrete skills	4.1*	1.6
Teachers' proficiency at managing instruction	5.8*	1.1
Richness of teachers' backgrounds in subject area, expectations for student success, and satisfaction with teaching	5.5*	1.2

* Statistically different from zero at $p < .05$.

Table reads: "By comparison with their counterparts in classrooms in which comprehension-oriented strategies are used little or not at all, students extensively exposed to these strategies perform 4.8 NCEs higher in the spring of Year 1, once initial differences in achievement, poverty level, and the amount of time spent on reading instruction are taken into account. This result is statistically different from zero at the .05 level...."

a - Unstandardized B-weights for dummy variables indicating students' exposure to instruction emphasizing comprehension-oriented strategies, compared with students receiving instruction with little or no emphasis on these strategies. Coefficients for all variables are in Regression Tables in Volume 2.

Regression Tables in Volume 2.) In all likelihood, the limited range of variation on many of these variables partly explains this finding, as discussed in Chapter V regarding the similar pattern in analyses of mathematics teachers. After all, we selected schools and classrooms in which most teachers were likely to be well qualified to teach language arts, have high expectations for students, and be relatively satisfied with teaching as a career. Thus, in our sample of classrooms, these factors do not appear to play a clear role in distinguishing higher- and lower-performing classrooms, even though they may contribute to student achievement throughout the sample.

Interpreting the Results of Reading Outcomes Analysis

What can we conclude about the effects of different approaches to reading instruction on the student population that is the focus of this study? First, the attempt to maximize understanding appears to pay off in terms of students' ability to understand what they read. Overall, exposure to comprehension-oriented instruction in moderate or great degree appears to enhance student learning to comprehend what they read over the short term, that is, by the end of the school year in which they encounter such instruction. Other features of instruction may contribute as well--among them, the amount of time spent on reading instruction and the emphasis placed on reading mechanics.

Longer-term effects--that is, across a 12-month period of time, including the summer months--are not as consistent, but in one out of two instances (Spring 1 to Spring 2), students who remained in the study sample across 2 years appear to show the positive effects of comprehension-oriented instruction. In the other instance (Fall 1 to Fall 2), there is no evidence that these students continue to perform better than their counterparts exposed to conventional practices. This finding does not negate the value of what was learned during the school year, but it does suggest that exposure to alternative practices in a single year without summer follow-up or continued exposure in the following school year may not be enough to make a big difference in students' learning to read.

Second, our understanding of the effects of these strategies on students' mastery of reading mechanics skills is incomplete, in that we have no data for analyzing this relationship for the upper elementary grades and our data at the lower elementary level are less than ideal. However, as far as we are able to detect, the clearest influence on demonstrated mastery of basic skills in the lower elementary grades is instruction emphasizing these skills. Concentrating on strategies aimed at understanding may help somewhat (e.g., with word attack skills), but more often the evidence suggests that these strategies neither help nor seriously impede the mastery of reading mechanics skills.

Third, there is no clear and consistent evidence that comprehension-oriented instruction works less well for low-achieving students than for their more proficient peers: both appear to benefit by exposure to comprehension-oriented instruction, sometimes more when this instruction is present in moderate degree, sometimes more when it is highly emphasized.

There are important qualifications to the reading outcome story we have told. The deficiencies in the assessment procedures discussed earlier leave some uncertainties about differences across years and about the effects on mastery of basic skills among upper elementary students (and indeed about effects on basic skills learning for all).

Furthermore, we do not have complete information on reading across the curriculum. We concentrated data collection on instruction in which teachers had as a primary purpose the improvement of reading skills. Especially in the upper grades, where reading becomes a central medium of learning in all subject areas--and hence is practiced and learned in such contexts--we do not know the extent or nature of the other forms of reading practice available to students. Nonetheless, because in most classrooms these subjects are taught by the same teacher and because language arts accounts for the bulk of instructional time during the day, we are likely to have captured the most important elements of the school experience related to reading.

With these qualifications in mind, the data available in this study still make possible several important conclusions regarding the teaching of reading in the types of school settings we have been studying. The study suggests that in these kinds of settings improving reading comprehension is not solely or mainly a problem of improving reading mechanics skills. Instead, there is reasonable evidence that strategies which emphasize understanding have an important role in fostering children's ability to comprehend what they read, which is, after all, the ultimate goal of reading instruction for the children of poverty. The teaching of basic skills still appears to play an important role in enhancing reading comprehension independent of a focus on comprehension, but not as the predominant focus or purpose of reading instruction.

PART THREE:

WRITING INSTRUCTION

We conducted the same kinds of analyses for writing as for mathematics and reading. The results of these analyses are summarized in this part, following an organization similar to the preceding two parts.

Chapter IX presents a profile of writing instruction across the grades in the sample classrooms. Overall, the classrooms in the study sample conform to some nationwide trends--for example, regarding the generally low priority given to writing in the curriculum--while departing from others, as evidenced by the surprising extent of "extended" text writing tasks (contrasted with "restricted" text such as fill-in-the-blank or other short-answer exercises). On average, however, the approach to teaching writing in sample classrooms bears many marks of conventional practice in the language arts: a heavy emphasis on discrete language mechanics skills (spelling, punctuation, grammar, etc.), reliance on writing assignments as individual seatwork, a general lack of attention to revising or editing, and so forth.

The following chapter (X) describes strategies teachers employ to enhance their students' competence at writing. One strategy--providing numerous opportunities for writing composed extended text--affords a convenient way to group classrooms, from those that offer little or no extended text writing, thus conforming more to the conventional practices, to those that depart moderately or extensively from conventional practice by offering increasing degrees of such writing. Correlated with this grouping is a series of other instructional strategies, among them teaching the process of writing, changing the social context for writing, and integrating writing with other subjects. The chapter describes each strategy and shows what instruction in each type of classroom looks like.

Outcome analyses presented in Chapter XI confirm a pattern revealed in analyzing mathematics and reading instruction in Parts One and Two: students in classrooms with the most opportunities for extended text writing (and hence the most exposure to related instructional strategies) are better able to compose written text, both at the end of the school year and across 12-month periods of time. Furthermore, instruction oriented toward extended text writing improves students' learning of correct writing mechanics at least as much as conventional practices.

IX WRITING CURRICULUM AND INSTRUCTION IN GRADES ONE THROUGH SIX

As with mathematics and reading, we placed our study of the writing curriculum and instruction within the greater context of national concerns and trends. In the past, the teaching of writing at the elementary school level has received little attention or emphasis; however, during the past decade a movement has begun to expand the role of writing instruction in the elementary school language arts curriculum. Both the National Council of Teachers of English (NCTE) and the National Assessment of Educational Progress (NAEP) are prominent forces in this movement. For example, the results of the NAEP for 1984 (Applebee, Langer, & Mullis, 1986) show that writing instruction had not been given a position of major importance in the school curriculum at the fourth- or eighth-grade level:

- Most students, majority and minority alike, were unable to write adequately except in response to the simplest of tasks.
- Few students understood or considered strategies of planning or revising when approaching a writing task.
- A large proportion of the students reported that when they do revise their writing, they focus on mechanics rather than the substance of their text.
- Students reported that their teachers were more likely to mark mistakes than to show an interest in what they write or to make suggestions for the next writing task.
- Twenty-two percent of the fourth graders and 12 percent of the eighth graders reported doing no writing during a 6-week period.

Taking heed of such findings, the NCTE has advocated not only placing greater importance on writing instruction but also integrating reading and writing. In its 1986 publication, *Guidelines for the Preparation of Teachers of English Language Arts*, the NCTE argued that teachers should be given an understanding of the relationship between the different facets of language and the competence to integrate reading and writing in their teaching. Other national activities have contributed momentum to the movement. For example, the National Writing Project, an outgrowth of the Bay Area Writing Project, has served as a model for teachers working together to improve curriculum and instruction--in this case, writing. The federal government's establishment of the Center for the Study of Writing demonstrates the national importance given to writing instruction.

The deficiencies that have prompted national concern over writing instruction are no less applicable in schools that serve the children of poverty than elsewhere. In such schools, writing is typically considered less important than reading, or too difficult for children who lack "basic" language skills, or both. As a consequence, in the early grades especially, writing tends to be given less time and attention.

In our sample of classrooms, wide variation exists in the approaches to writing curriculum and instruction. This variation enables us to examine a number of questions about the factors that distinguish classrooms from one another, the forces that drive teachers to adopt one approach or another, and the relative efficacy of approaches to enhancing the writing proficiency of children.

When considering what is available to children from low-income families, our investigation takes on special importance in at least three ways. First, whether one believes that writing is primarily a vehicle for self-understanding or a tool for learning, the opportunities provided in the classroom are crucial to the development of students' writing competence; these students are unlikely to develop this competence elsewhere.

Second, there is considerable debate over the extent to which instruction should focus on the "component skills" of writing (punctuation, spelling, grammar) for children who have typically not learned all aspects of the rules for Standard English syntax and grammar. The conventional wisdom argues that classroom writing instruction needs to emphasize these skills. In fact, by the time they reach school, these children have already acquired a consistent set of syntactical rules, but often for a dialect or language that is different from Standard English (Farr & Daniels, 1986). In this study, we address this issue by looking at the role of component skills instruction in the writing opportunities provided to students and seeing whether an emphasis on skills instruction is related to students' writing competence. Even teachers who approach the teaching of writing in ways other than emphasizing component skills may experience the conflict between encouraging fluency and teaching for correctness. This study attempts to depict ways in which teachers of writing resolve this conflict when working with at-risk students.

Third, research on the writing process has shown that the writer's background knowledge is crucial to the writing process. Thus, it would seem that writing tasks promoting the meaningful use of language will draw on students' cultural and linguistic backgrounds. But in schools serving large numbers of children from low-income families, students' backgrounds and experiences are not always used as the basis of in-school writing. It is important to understand how teachers can make better use of their students' experiential resources.

In this chapter, we provide an overview of the writing instruction in the sample classrooms--what is taught in writing, who teaches writing, and how writing is taught. As in the comparable chapters on reading and math, we present aggregate pictures of instruction broken down by grade. The data presented in the chapter are taken from the logs that the teachers completed each day and the coding forms that the observers completed after each of their visits.

The reader will note that we have presented the data for Year 1 and Year 2 on separate tables. The data were collected in slightly different ways each year; thus, the absolute value of some of these variables may appear to be systematically higher or lower when comparing the two years. Because of this fact, it is more useful to look for similar central tendencies and across-grade patterns within each year's data.

What Is Taught in Writing Across the Year

Descriptive data regarding the degree of extended text writing, the attention to the writing process, the genres and audiences for student writing, and the types of language mechanics skills taught reveal an overall pattern that confirms some aspects of the national tendencies described above, while departing from them in others. With regard to extended text writing, for example, there is more of this, on average, than national figures indicate is typical of this kind of school. Tables 41a and 41b show that, for classrooms in the sample, the mean percentage of all writing tasks (other than journal writing) that require extended writing increases as the children go up in the grades. These figures indicate that the majority of writing tasks assigned to first-grade children do not involve extended writing but rather involve "restricted" writing (e.g., worksheets or fill-in-the-blanks, or copying). However, because the first-grade children are typically given a larger number of writing assignments, they actually may do more tasks requiring extended writing than do fifth-grade children. For fifth-grade students, the reverse is true: they have fewer writing assignments, but a higher proportion of them involve extended writing. This difference may be a result of the emphasis on basic skills (and the necessary worksheets) that is present in the curriculum of many first grades even though many first-grade teachers are attempting to incorporate extended writing into their language arts curriculum.

As the numbers in Tables 41a and 41b show, certain stages of the writing process receive more attention than others. Across both years, more time is devoted to prewriting and drafting text than to revising and editing, a finding that is consistent with NAEP results. The table also indicates that time spent on the different stages of the writing process varies as a function of grade. In the first and second grades, for example, prewriting receives greater emphasis than in the fifth and sixth grades. Teachers of younger children seem to believe that they need to devote more time to preparing their students for the writing task. These numbers are consistent with the qualitative data, which documented many first-grade teachers spending a significant amount of time in prewriting activities and discussions. First-grade teachers frequently devoted an entire language arts lesson to a prewriting activity, such as reading a book or talking about a particular holiday or upcoming event.

- Prewriting in Ms. Abernathy's first grade. One first-grade teacher devoted almost 2 hours to preparing her students to write a letter before their trip to a National League baseball game. Ms. Abernathy first led a discussion about the team in general and specific team members, then asked the children to draw a picture of a baseball game, then told the children that one of the star players had attended their school. Only after all these activities did she ask the children to write a letter to the player. These letters were delivered to him before the game that the children attended. On the day of the game, he waved to the area of the stadium where the children were seated, holding the letters in his hand! Activities such as this prepared the children for the writing task and gave authenticity to their writing.

Across all grade levels, significantly fewer instructional days were devoted to the revising and editing stages. These two seemed to be difficult for teachers to implement in their classrooms. Although teachers assigned a large number of extended writing tasks, students were given little opportunity to edit and revise their original text.

The teacher is the most frequently designated audience for children's writing--whether or not the teacher acts in an evaluative capacity. The pattern is replicated in the second year.

Across all grades, students engaged in "personal writing" (journals, letters) more frequently than other genres. Essays and analytic writing tasks were the least common, but they increased in frequency at higher grade levels. Over 35 percent of all fifth-grade writing assignments, for example, involve essays or other informative kinds of writing. Personal writing is equally prevalent across grades; it appears that teachers in the higher grades maintained the same degree of personal writing as in the lower grades, while increasing the amount of informative or analytic writing. This pattern conforms to widely held views on the developmental readiness of children for the latter forms of writing, views that were generally shared by sample teachers.*

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*Not all writing scholars subscribe to this developmental view (see Calkins, 1980).

Table 41a

WHAT IS TAUGHT IN WRITING ACROSS THE SCHOOL YEAR, BY GRADE (YEAR 1)

Characteristics of Writing Curriculum	Grade 1 (n = 19)	Grade 3 (n = 24)	Grade 5 (n = 20)
Focus on extended text writing:			
• Average number of extended text tasks during observed 2-week periods	5 (3)	4 (3)	3 (2)
• Of all writing tasks during observation period, average percentage that involved extended text	43 (26)	49 (30)	57 (31)
Focus on writing processes: Of all instructional days, average percentage in which each was a focus of instruction--			
• Prewriting	36 (30)[a]	26 (22)[a]	20 (18)[a]
• Drafting text	34 (33)	29 (27)	49 (43)
• Revising	8 (15)	8 (8)	11 (9)
• Editing	9 (13)	9 (8)	10 (6)
Genre: Of all instructional days, percentage on which writing tasks involved--			
• Essay (persuasive or analytic writing)	3 (9)	2 (2)	12 (12)
• Other informative writing	12 (14)	15 (15)	23 (18)
• Imaginative writing	18 (20)	19 (15)	24 (16)
• Personal writing	31 (27)	20 (21)	38 (33)
Audience for writing: Of all instructional days, percentage on which students wrote for--			
• Teacher as evaluative audience	16 (21)	13 (13)	15 (14)
• Teacher as nonevaluative audience	20 (22)	16 (17)	16 (14)
• Other students	13 (12)	11 (10)	11 (9)
• Outsiders	7 (17)	4 (5)	3 (5)
Types of language mechanics skills: Of all instructional days, average percentage that focused on--			
• Handwriting	40 (32)	46 (31)	23 (29)
• Spelling	43 (34)	69 (23)	66 (66)
• Punctuation/capitalization	31 (31)	25 (23)	10 (28)
• Sentence structure	29 (30)	31 (21)	30 (27)
• Parts of speech	16 (23)	21 (21)	16 (24)

a - Standard deviations appear in parentheses.

Table 41b

WHAT IS TAUGHT IN WRITING ACROSS THE SCHOOL YEAR, BY GRADE (YEAR 2)

Characteristics of Writing Curriculum	Grade 2 (n = 26)	Grade 4 (n = 26)	Grade 6 (n = 17)
Focus on extended text writing: Of all instructional days, percentage on which extended writing assignments involved--			
• Journal writing	40 (35)[a]	44 (34)[a]	36 (29)[a]
• Other kinds of text	47 (22)	48 (20)	55 (14)
Focus on writing processes: Of all instructional days, percentage on which each was a focus of instruction--			
• Prewriting	36 (26)	36 (20)	25 (14)
• Drafting text	47 (22)	50 (27)	40 (18)
• Revising	15 (11)	20 (14)	20 (14)
• Editing	13 (9)	19 (12)	19 (14)
Source of writing assignment: Of all instructional days, percentage on which the source for the writing assignment was--			
• Reading lesson	27 (22)	28 (22)	27 (17)
• Content areas (e.g., science)	23 (20)	22 (21)	23 (17)
• Class or school events	18 (21)	17 (17)	13 (11)
• Students' experiences	36 (30)	37 (23)	30 (18)
• Students' feelings	36 (30)	37 (26)	35 (22)
Audience for writing: Of all instructional days, percentage on which students wrote for--			
• Teacher as evaluative audience	22 (21)	24 (16)	18 (11)
• Teacher as nonevaluative audience	32 (24)	18 (18)	14 (9)
• Other nonevaluative audiences	17 (14)	16 (12)	12 (7)
Types of language mechanics skills: Of all instructional days, percentage that focused on--			
• Handwriting	38 (25)	41 (26)	24 (31)
• Spelling	59 (20)	69 (22)	55 (31)
• Punctuation/capitalization	39 (22)	41 (25)	39 (30)
• Sentence structure	31 (24)	42 (23)	35 (27)
• Parts of speech	24 (21)	38 (23)	29 (26)

a - Standard deviations appear in parentheses.

During the second year, data indicating the sources of writing topics were obtained from the teacher logs. Here we found great consistency across the grades: students' experiences or feelings were the most frequent source, followed by the reading lesson and other content areas. Thus, it appears that writing is integrated to some degree with reading and other content areas; however, the students' personal experiences and feelings are still the major source of writing topics. This emphasis on students' personal experiences and feelings may reflect the high frequency of journal writing that we observed in these classrooms. For the most part, teachers allowed students to write on a topic of their choice for their journal assignments.

Instruction in language mechanics--spelling, punctuation, grammar, etc.--was a common feature of sample classrooms, with more time devoted to spelling than any other kind of skill. We found that the long-standing practice of a new spelling list distributed on Monday and a spelling test given on Friday morning was still followed in many of the classrooms in our study. A few first- and second-grade teachers followed a practice currently referred to as "inventive spelling," an approach that allows students to spell words phonetically (the quantitative data shown in Table 41 do not distinguish between inventive and the traditional approach to teaching spelling).

The emphasis on various language mechanics skills varies somewhat across grade levels. Handwriting, for example, is given the greatest emphasis at the third-grade level--the grade when most students are expected to show competence in cursive writing. Emphasis on parts of speech is the one skill that is fairly consistent across grade levels: most language arts curricula present parts of speech in increasing levels of complexity, starting with simple nouns in the first grade and progressing to adverbs, participles, and prepositions in the intermediate grades. Thus, it appears that even though the complexity of the subject varies, teachers at different grade levels in our sample tended to devote the same amount of time to the topic. Although there is considerable debate among writing scholars on the value of teaching grammar (Hillocks, 1986), the teachers we studied seemed generally convinced of its value.

Emphasis on punctuation decreases as the children go up in the grades. First-grade teachers emphasized punctuation over 30 percent of the instructional days, compared with fifth-grade teachers, who taught punctuation about 20 percent of the time. A similar pattern is shown for emphasis on sentence structure. Spelling appears to be given great emphasis across all grade levels, especially at the third- and fifth-grade levels. The smaller mean at the first-grade level is consistent with the quantitative data that revealed that several first-grade teachers gave greater emphasis to fluency than to correctness.

Overall, teachers in our sample paid some attention to current thinking about teaching writing; however, traditional practices were still present: as noted above, great emphasis was still given to the formal teaching of spelling. The amount of time devoted to prewriting activities tended to decrease for older students, and across all grade levels, teachers devoted more time to prewriting and drafting than to revising and editing. Across all grade levels, the teacher was the most frequent audience for writing assignments. The data on genre are interesting, however, for they indicate that across grade levels, teachers maintain the same level of emphasis on personal writing while increasing the amount of essay and report writing. Thus, it appears that teachers view personal writing as having value in its own right and not simply as a precursor to more formal kinds of writing.

Who Teaches Writing

In collecting data about the characteristics of instructional staff, we made no distinctions between reading and writing teachers, but instead solicited information about "language arts teachers." In virtually every instance there was no difference between teachers of reading and writing. The information that appears in Chapter VI regarding reading teachers thus describes the nature and type of instructional staff in writing classes, the extent of their expertise and experience, and their attitudes about teaching and students.

The Organization and Format of Writing Instruction

Data about grouping, learning activities, and teacher directiveness, summarized in Tables 42a and 42b, help to capture some basic features of the way writing was taught.

Unlike reading, in which homogeneous ability grouping has a long tradition, no particular grouping was favored among sample classrooms, although at two grade levels (third and sixth), heterogeneous grouping of students was especially popular. If anything, there is a slight trend toward heterogeneous grouping as the grades increase, perhaps mirroring the pattern in reading.

Clearly, students spent a lot of time during writing instruction doing written work of one kind or another. Although data on students' learning activities during writing instruction are available only from Year 1, the data nonetheless afford a view across grades of the way students spend their time in class. Students spent the greatest amount of time working on their own writing, followed by completing written workbook exercises. The practice of having students help each other with their writing, either in peer response groups or collaborative writing, was not an approach that we observed frequently in these classrooms. Teachers reported that such activities were too difficult to plan and to carry out smoothly. The data in Table 42 reflect this concern. With the exception of third-grade classes (for reasons that are unclear), students worked on their own writing approximately half of all days on which writing was taught. Across all grades, a third of all days were devoted in whole or in part to written exercises in workbooks, and additional time was spent on a small percentage of days copying written material or taking dictation. Other kinds of activities, such as prewriting and oral exercises, were not as common, although across all grades these activities took place on average of one day (or more) per week.

When looking at the data about the kinds of activities students engage in during writing instruction, few across-grade differences appear (however, as with much of the data, there are large within-grade differences). The activity "generate idea· for writing" also shows a slight decline across grades, which is consistent with data presented in Table 41 concerning a declining emphasis on prewriting activities ("generating ideas" is typically a prewriting activity).

Across grade levels, teachers were consistent in the degree to which they encouraged or permitted their students to direct their own learning. The data in the table suggest what we frequently observed in visits to classrooms: teachers tended to be relatively directive in setting up classroom writing tasks, although they allowed students latitude in determining how the tasks should be carried out. In comparison with reading and mathematics, teachers gave students somewhat greater freedom, on average, to direct their learning during writing instruction.

The table indicates several things about homework patterns: first, that the frequency of writing-related homework was generally low--lower than for reading and mathematics, in fact--and, second, that students were much more likely to get homework related to language mechanics than to writing text itself. In addition, there are some differences across grades. Homework assignments requiring text writing were more likely in fifth- and sixth-grade classrooms than in first- and second-grade classrooms. This is interesting in light of the finding that first- and sixth-grade students tended to have a higher percentage of extended writing tasks than did fifth-grade students. It may be that, on average, fifth-grade teachers assign more out-of-class extended writing tasks than in-class writing tasks.

Table 42a

ORGANIZATION OF WRITING INSTRUCTION
AND ASSOCIATED LEARNING ACTIVITIES, BY GRADE (YEAR 1)

Instructional Strategies	Grade 1 (n = 19)	Grade 3 (n = 24)	Grade 5 (n = 20)
Grouping: Percentage of classes that regularly group students for writing--			
Homogeneously by ability	33 (52)[a]	20 (42)[a]	10 (32)[a]
Heterogeneously to mix ability levels	33 (52)	60 (52)	35 (47)
What students do in class: Of all instructional days, the average percentage in which students--			
Generate ideas for writing	30 (27)	19 (16)	20 (17)
Work on their own writing	53 (32)	38 (25)	54 (23)
Do written exercises in workbook	36 (27)	36 (21)	35 (29)
Copy notes, letters; take dictation	18 (22)	13 (17)	6 (8)
Give feedback to other children about their writing	15 (18)	8 (9)	15 (15)
Do oral exercises or drill (e.g., to practice self-expression skills)	30 (27)	24 (21)	26 (28)
Teacher/student-directedness: Degree to which students are encouraged or required to direct their own learning, on a scale from 1 (= completely teacher-directed) to 5 (= completely student-directed)	1.7 (.6)	1.7 (1.0)	2.9 (.6)
Homework: Of all instructional days, average percentage on which homework was assigned or pending related to--			
Writing (composed) text	10 (13)	10 (14)	22 (17)
Language mechanics	10 (17)	24 (19)	24 (23)

a - Standard deviations appear in parentheses.

Table 42b

ORGANIZATION OF WRITING INSTRUCTION
AND ASSOCIATED LEARNING ACTIVITIES, BY GRADE (YEAR 2)

Instructional Strategies	Grade 2 (n = 26)	Grade 4 (n = 26)	Grade 6 (n = 17)
Grouping: Percentage of classes that regularly group students for writing--			
Homogeneously by ability	33 (45)[a]	36 (50)[a]	18 (34)[a]
Heterogeneously to mix ability levels	36 (48)	26 (44)	52 (45)
Teacher/student-directedness: Degree to which students are encouraged or required to direct their own learning, on a scale from 1 (= completely teacher-directed) to 5 (= completely student-directed)	2.3 (1.1)	2.1 (.7)	2.7 (.8)
Homework: Of all instructional days, average percentage on which homework was assigned or pending related to--			
Writing (composed) text	26 (24)	37 (28)	40 (16)
Language mechanics	45 (29)	59 (23)	41 (25)

a - Standard deviations appear in parentheses.

X ALTERNATIVE APPROACHES TO WRITING INSTRUCTION

The preceding chapter made it clear that among the study classrooms a fair amount of writing was going on and, on average, much of it involved the composing of "extended" or elaborated text. But the descriptive averages obscure enormous variation an... ...rs in their approach to writing instruction--for example, in the various kinds of writing tasks they created, their attention to writing processes, or their approaches to discrete skills and the "correctness" of written products.

In this chapter we turn to these matters by concentrating on teachers' use of instructional strategies intended to maximize meaningful communication. The strategies are similar to those discussed in Chapter VII regarding reading. The two facets of literacy instruction are related and can be integrated in instruction (this is one of the key strategies in both areas). There are, nonetheless, differences in the instructional strategies for reading and writing that relate to the unique nature of each subject area.

We first describe and illustrate six strategies that we observed in action and for which there is support in the literature on writing instruction. From these, we create a typology of classrooms that distinguishes those in which the strategies are used extensively from those in which they are less frequently employed. Finally, as in the case of mathematics and reading, we examine how the different types of classrooms are distributed among students, teachers, and school settings.

Strategies Intended to Maximize Meaningful Written Communication

In parallel with the analyses of mathematics and reading (see Chapters IV and VII), we identified a series of strategies that collectively emphasize meaningful written communication. Each strategy reflects a key underlying dimension of writing instruction and serves as a useful tool for distinguishing differences among the classrooms we are studying. Our analysis concentrates on six strategies that, based on the research literature and our own fieldwork, appear to have an important role in the teaching of writing to the children of poverty:

(1) maximizing opportunities for students to write extended text;

(2) integrating writing with other areas of the curriculum;

(3) deemphasizing mastery of discrete language mechanics skills or mechanical correctness as the primary aims of writing instruction;

(4) teaching the processes of writing;

(5) connecting writing to children's backgrounds or base of experience;

(6) changing the social context of the writing task.

Although independent of one another in one sense, the five strategies are interrelated in many ways, as subsequent analyses will show. But first, we discuss each strategy and the dimensions that underlie it.

Maximizing Opportunities for Extended Text Writing

The first strategy rests on a simple premise that parallels the assumption underlying teachers' attempts to maximize students' opportunity to read text: given more chances to compose text requiring some complex thought, students are more likely to become proficient writers.

To classify the complexity of the writing tasks assigned in the study classrooms, we use three categories of text: (a) noncomposed, (b) composed-restricted, and (c) composed-extended. The three differ from each other chiefly in terms of the complexity of written expression demanded of the child. Noncomposed text refers to writing requiring no thought about the process of composing. Activities such as copying text, writing dictated text, and single-word exercises are classified as noncomposed text. Composed-restricted text requires the student to compose a short piece of writing that has a well-defined length, such as assignments requiring the writer to compose a phrase or sentence containing one of the week's spelling words. Composed-extended text requires the writer to compose text that does not have a well-defined or predetermined length (although the teacher may require a certain number of words, sentences, or pages) and that elicits an elaborated thought in written form. Book reports, journal writing, a story, a letter, or a poem would all be classified as composed-extended text.

Classes in the sample vary greatly on this dimension. In some classrooms, even though a significant amount of time is devoted to writing, very little of this time is used to write extended text. In these classes, students write answers on exercise sheets, spelling words, or sentences dictated by the teacher. Classrooms on the other end of the continuum provide many opportunities for students to write extended text. In one classroom, for example, extended writing is an important part of all instruction. Writing occurs throughout the day--during reading, social studies, and science. Students write in their journals for 20 minutes every day and write book reports of the books they read during silent reading.

When complex writing tasks are assigned on a regular basis, students do write a large amount of extended text. Like all children, this population of students stand to gain a great deal from such classroom writing experiences.

Integrating Writing with Other Areas of the Curriculum

A second strategy promotes writing as a useful communicative tool by integrating writing into the instruction of other subject areas, such as reading, social studies, science, and mathematics. Across the sample, there are many classrooms where writing and reading are integrated--students write about what they read and read what they write. In a few classrooms, writing is an important part of the social studies and science instruction, but we have virtually no cases in which writing is used during mathematics instruction. In some classrooms, writing may be taught as a unique subject and no extended composing occurs in the subject areas. Thus, a variety of configurations exist in the degree to which writing is integrated across the curriculum.

Integration of writing is related to the previous strategy (maximizing the amount of extended text writing) in one sense. When writing becomes a part of more than one subject area (e.g., science or social studies), the frequency of writing is likely to increase.

In some classrooms, reading and writing are completely integrated, with little distinction made between these two elements of literacy. In one of these classrooms, students write summaries of all the trade book stories they read. In addition, the teacher would select themes from the stories they read, such as justice, villains, or certain emotions, and have the students write on these themes. The students then read these themes to each other.

This strategy is especially important for students from low-income backgrounds because of its focus on meaningful communication in Standard English. Writing that is included in the instruction of other subject areas conveys to the student the various uses of writing and its importance in a literate society. When writing is integrated across the curriculum, it is presented not as an isolated skill but as a vehicle for learning, persuading, reporting, and presenting points of view. For the most part, writing instruction unrelated to specific content areas is usually for self-expression or description. Although these are important aspects of writing, students' awareness of the full range of uses for writing may be expanded as opportunities for using writing occur throughout the curriculum. This issue also applies to children who are not from low-income backgrounds. However, for this study, it is crucial that we understand the kinds of opportunities given to at-risk students that facilitate their appreciation of the meaningful use of language because they are so often taught writing as a set of discrete language skills.

Deemphasizing Discrete Language Mechanics Skills and Mechanical Correctness as the Primary Aims of Writing Instruction

This strategy alters the degree of emphasis placed on discrete language skills (punctuation, sentence structure, spelling, etc.) and the mechanical correctness of written text. Both in our conception and across the sample classrooms, teachers can be sorted into those who (1) place minimum emphasis on correctness and devote little time to teaching language mechanics skills; (2) emphasize correctness and language mechanics skills, but as they are encountered in students' written text; and (3) concentrate on teaching these skills out of context of the students' writing.

Like its counterpart in the preceding chapter on reading, this strategy reflects one of the major concerns of this study: the relative importance of discrete skills taught in isolation from the activity (writing) to which the skills apply. Counter to research suggesting that students tend not to benefit from such instruction (Hillocks, 1986), many educators seem to assume that students from low-income backgrounds will develop greater writing competence if they are taught the mechanical skills of writing first and if their writing opportunities are designed to make sure that these skills are correctly applied. This discrepancy between empirical evidence and conventional wisdom is probably one of the most enduring conflicts in the field of literacy. The findings reviewed in the next chapter may help to resolve this conflict.

In sample classrooms where a high degree of emphasis is placed on correctness and language mechanics skills, students tend to have little opportunity to write extended text. In one third-grade classroom, for example, the teacher believed that the language arts textbook was too difficult for her students. Thus, the textbook (with extended writing assignments) was not used and no extended writing was assigned. The teacher believed that her students needed training in language mechanics, and writing assignments consisted of grammar exercises and spelling for about 20 minutes each day. By contrast, in another third-grade classroom, the teacher placed little emphasis on these skills, and students wrote extended text for at least 30 minutes each day.

Teaching the Processes of Writing

A fourth strategy aims at giving students better communicative tools by teaching the different phases of the writing process--prewriting, drafting, editing, and revising--and by helping students to see writing as a multiphase process.

Prewriting--activities to prepare students for actual writing of text--is of special interest in this study. Judging from the sample classrooms, this phase of writing seems to offer numerous ways for teachers to draw on students' backgrounds and experiences. Some teachers in the sample did so, and thereby ensured that students had a source of knowledge that was useful for certain assignments. Other teachers who devoted considerable time to prewriting used it as an opportunity to provide students with new information or experiences that they were unlikely to encounter outside of schools and that the students could then use in their writing assignments. Although both types of prewriting have important and different roles to play in preparing students for writing, the former acknowledges that students come to school with useful and valued experiences, while the latter presumes that students lack knowledge necessary for writing. Exclusive use of the latter may unintentionally communicate a lack of value or recognition for their background. Our investigation was designed to explore the most effective balance of approaches to prewriting, in addition to the overall value of prewriting in enhancing the writing competence of this segment of the student population.

The quantity and quality of students' opportunities for revisions are also important to consider. In one fifth-grade classroom, for example, students worked with partners and gave each other suggestions for revising a particular piece of writing. By mid-year, this activity was an established routine in the classroom, and students knew that for all extended writing assignments, their partners would help them with their assignments before they were given to the teacher. In another classroom (of second graders), the teacher taught her students to "edit" their writing by circling words they thought they misspelled and then asking the teacher to help with corrections. These kinds of routines differ greatly from classrooms where students turned in their writing assignments for evaluation by the teacher with little or no opportunity for revisions.

Connecting Writing to Students' Backgrounds

As noted in discussing prewriting above, writing instruction can offer students the chance to connect their base of experience to the academic learning they are asked to do in school. For the children of poverty, these connections are often not obvious to the children (or teachers), nor easily made, because of the differences between the children's and the teachers' backgrounds. But as a matter of instructional strategy, teachers can foster these connections in a variety of ways.

Across both years of the study, many teachers sought in varying degrees to allow or encourage children to draw on what they knew from their lives outside of school as a source of material for writing assignments, as a basis for interpreting what others had written, or as a kind of "expertise" that could help students reflect on the meaning of what they and others wrote. In doing so, writing teachers were simply capitalizing on what is a natural impulse for children, who use what is familiar in making sense out of the world. But the key factor was the degree to which teachers communicated to students that their home lives--however different and even unpleasant at times these lives might be--were a respected, welcome, and valuable part of classroom discourse, both written and otherwise. Not all teachers felt comfortable sending this message to students, either through ignorance of the world the children come from, disrespect for it, or fear that drawing on children's backgrounds might open up a Pandora's box of discomforting experiences that the teacher wouldn't be able to "manage" in the classroom.

Because this strategy goes beyond writing per se and, in a sense, has relevance for all that takes place in the academic instruction of the children of poverty, we explore the topic at greater length in Chapter XIII. A number of examples used in that chapter illustrate how the strategy can be applied to writing and other areas of the curriculum.

Changing the Social Context of the Writing Task

A final strategy involves the attempt to construct a social context for writing that motivates and encourages communication with others. The relationships between writers and peers, the teacher, or other audiences are crucial elements of this social context. Accordingly, we paid attention to these dimensions of the social context--peer interaction during writing, the degree of student direction in instruction, and the degree to which students write for audiences other than the teacher as evaluator--in an effort to understand how the social environment might facilitate or inhibit students' writing.

One scholarly view (Dyson, 1983) argues that children write for each other and that interactions among them during the writing task are crucial to the development of literacy. As a consequence, we not only observed whether children were encouraged or permitted to talk to one another during their writing, but what they talked about. For example, did they read their writing to each other? Did they communicate ideas and help each other elaborate on their ideas? Did they ask each other technical kinds of questions? In general, we hoped to understand how much, and how, children worked together on their writing tasks.

Related to the social environment created for the children is the degree of control maintained by the teacher over the writing task. Approaches to writing instruction that depart from conventional practices encourage more choice by the student and a greater degree of student direction in doing writing assignments. Traditional classrooms, in which instruction is highly teacher-controlled, allow little room for students to choose or shape their writing tasks, as in cases in which the writing task requires students to follow a pattern when writing a sentence. For example, after reading the story "Just Like Daddy," one first-grade teacher instructed the students to write a sentence using the following pattern, "I ____________ just like __________." This kind of task contrasts with those that allow more room for students to determine the content and even the form of expression, as in another first-grade classroom in which the teacher devoted considerable time to a prewriting activity that stimulated students' thinking about what they see in the spring, followed by an activity in which students drew a picture of spring and then wrote about their picture. Between these two extremes lies a range of environments that surrounds the students' efforts with varying degrees of "scaffolding"--support by the teacher that structures and simplifies or guides the writing.

The audience for students' written work may also have a key role in encouraging writing as meaningful communication. We define audience as the person(s) to whom the product of a writing task is addressed, either explicitly (as in a letter, memo, or other form of targeted writing) or implicitly. The concept of audience is of concern because so much of the writing that occurs in school has the same audience--the teacher, who also serves as evaluator. Writing text for an audience that will also serve as an evaluator can add to children's anxiety about writing and impede the development of their writing competence, especially among students who are not particularly secure about their ability to write. Alternative approaches to writing instruction encourage writing for a variety of audiences, none of which acts in an evaluative capacity.

Several examples from sample classrooms display social environments that appear to encourage more meaningful communication:

- In one first-grade classroom, students write daily in their journals and are allowed to talk to each other during their writing time. During our observations, we saw students reading their journal entries to their peers, who, in turn, frequently asked some questions related to the content of the entries. These interactions gave the first-grade students opportunities to read their entries aloud and to add to what they had written. Journal time was considered a social time, with all students sharing their ideas.

- In a fifth-grade classroom, the teacher allowed the class to select the writing topic from a list provided by the teacher. During this selection process, students were allowed to call out their preferences and reasons. These discussion periods seemed to increase the students' interest in the topics and to get them thinking about what they would write.

- In a sixth-grade classroom, the teacher planned a brainstorming session before each new writing task. Students could present ideas for possible writing topics. All ideas were accepted, and the students could select from the topics presented or identify one of their own.

This dimension is especially important when looking at the writing opportunities provided the student population on which this study focuses.

As in the teaching of language mechanics, conventional wisdom argues that such students need a high degree of "structure"--that is, clear rules about the task, a structure for carrying out the assignment, and clearly specified criteria for evaluation. When teachers structure their writing lessons in accordance with this view, they tend to create a social environment for writing that precludes student-student interaction and student choice, and deprives students of some responsibility for communication. This kind of environment may work against the acquisition of writing competence within this segment of the student population.

Differences in Strategies Across Grades

The six strategies just discussed can be summarized in quantitative terms, as shown in Tables 43a and 43b. As the breakout by grade within the table reveals, there are few major differences across grades within our sample. However, there are some exceptions. Younger students, for example, were more likely than their counterparts in higher grades to be allowed to interact with each other during writing lessons. Older students in the sample wrote longer, on average, although they typically had fewer tasks involving extended writing (these assignments were generally more substantial than what first graders were asked to do). Otherwise, the measures indicate that varied approaches to writing curriculum and instruction are reasonably well distributed across grades.

Types of Writing Classrooms

The first of the six strategies--maximizing opportunities for extended text writing tasks--provides a convenient way of classifying classrooms. As our subsequent discussion will demonstrate, other dimensions of writing instruction cluster in such a way that each type of classroom exhibits a characteristic combination of the remaining strategies. Thus, for example, we found that in those classrooms where students have relatively frequent opportunities to compose extended text, teachers also tend to integrate writing into the curriculum, place a high degree of emphasis on the writing process, and place less emphasis on correctness relative to meaningful written communication.

Depending on the frequency of opportunities for writing extended text, we placed sample classrooms into one of three groups:

- <u>"Extensive-opportunity" classrooms</u>. This group of classrooms consistently offered at least two different kinds of opportunities for students to write extended text on almost a daily basis--typically, journal writing and some sort of writing related either to classroom experiences, out-of-school experiences, or the content of the academic curriculum. At any time during the year, students were working on some sort of formal writing in addition to having almost daily opportunities for journal writing.

- <u>"Moderate-opportunity" classrooms</u>. In classrooms offering a moderate degree of opportunity, students wrote some kind of extended text regularly (e.g., two or three times a week or more). In most such classrooms, the opportunity took the form of daily journal writing. In addition, on special occasions (e.g., holidays or community events), the students might write extended text related to that event, but such assignments were not consistently included in the daily schedule.

- <u>"Low-opportunity" classrooms</u>. In this group of classrooms, extended text writing was infrequent or nonexistent. The teachers in some of these classrooms began the year with some sort of journal writing (often used as a classroom management device); however, for the most part, journal writing was dropped from the daily schedule as the year progressed. Other than that, perhaps one or two opportunities were given across the year for writing extended text. Most of the "writing" in such classrooms consisted of worksheets or exercises that involved limited composing at best.

We created the typology by first analyzing qualitative classroom reports to identify salient differences in the way teachers approached writing instruction. The opportunities for extended text writing were readily apparent at this stage as the feature of instruction that most clearly distinguished classrooms from one another. Because we had no single direct measure of this concept for Year 1, we created an index from four variables (that appear in Table 44), then divided classrooms that fell in the high, low, or middle range of the index (see Volume 2 for details on the construction of this index). A similar index was created for Year 2, but it included log items that elicited more directly the frequency of several kinds of

Table 43a
STRATEGIES THAT MAXIMIZE MEANINGFUL WRITTEN COMMUNICATION, BY GRADE (YEAR 1)

Instructional Strategies	Grade 1 (n = 19)	Grade 3 (n = 24)	Grade 5 (n = 20)
Maximizing the amount of extended text writing			
• Average minutes/day students actually write	20 (10)[a]	21 (16)[a]	26 (25)[a]
• Average number of extended text tasks during 2-week observation periods	5 (3)	4 (3)	3 (2)
• Of all writing tasks during observation periods, average percentage that involved extended text	45 (26)	49 (30)	56 (31)
Integrating writing with reading and other subjects: Of all instructional days, average percentage on which writing instruction was integrated with--			
Reading	42 (26)	35 (29)	39 (28)
Other subjects	34 (28)	20 (19)	30 (29)
Deemphasizing discrete skills and correctness			
• Emphasis on correct mechanics: Scale from 1 (= greater emphasis on correct mechanics) to 3 (= greater emphasis on meaningful communication)	2.0 (.7)	2.2 (.6)	2.0 (.6)
• Embeddedness of language mechanics instruction: Scale from 1 (= skills taught primarily out of context) to 3 (= skills taught primarily in context)	1.7 (.7)	1.6 (.5)	1.7 (.6)
Teaching about writing processes: Scale from 1 (= little prewriting or revision) to 3 (= extensive prewriting, frequent revision)	2.0 (.6)	2.2 (.7)	2.1 (.7)
Connecting writing to students' backgrounds: Of all observed days, percentage on which writing was explicitly linked to children's backgrounds	79 (31)	48 (42)	62 (38)
Changing the social context of writing: Of all observed lessons, average percentage on which student-student interaction was permitted or encouraged during writing instruction	69 (37)	48 (37)	49 (42)

a - Standard deviations appear in parentheses.

Table 43b
STRATEGIES THAT MAXIMIZE MEANINGFUL WRITTEN COMMUNICATION, BY GRADE (YEAR 2)

Instructional Strategies	Grade 2 (n = 19)	Grade 4 (n = 24)	Grade 6 (n = 20)
Integrating writing with reading and other subjects: Of all instructional days, average percentage on which writing instruction was integrated with--			
Reading	59 (34)	53 (25)	47 (23)
Other subjects	58 (42)	54 (35)	63 (45)
Deemphasizing discrete skills and correctness			
• Emphasis on correct mechanics: Scale from 1 (= greater emphasis on correct mechanics) to 3 (= greater emphasis on meaningful communication)	2.3 (.6)	2.1 (.6)	2.4 (.5)
• Embeddedness of language mechanics instruction: Scale from 1 (= skills taught primarily out of context) to 3 (= skills taught primarily in context)	1.8 (.7)	1.8 (.5)	2.0 (.6)
Teaching about writing processes: Scale from 1 (= little prewriting, virtually no revision) to 3 (= extensive prewriting, frequent revision)	1.9 (.7)	2.1 (.8)	2.0 (.7)
Connecting writing to students' backgrounds: Of all observed days, percentage on which writing was explicitly linked to children's backgrounds	70 (38)	79 (37)	71 (36)
Changing the social context of writing: Of all observed lessons, average percentage on which student-student interaction was permitted or encouraged during writing instruction	77 (31)	53 (38)	64 (36)

a - Standard deviations appear in parentheses.

Table 44

THE EXTENT OF OPPORTUNITIES FOR EXTENDED TEXT WRITING

Features of Writing Instruction	Characteristics of classrooms in which the opportunities for extended text writing were-- Low	Moderate	Extensive
Year 1	[n = 21]	[n = 25]	[n = 18]
• Average minutes/day students actually wrote text	14 (8)[a]	18 (13)[a]	31 (25)[a]
• Of all instructional days, percentage on which students drafted text	15 (19)	38 (27)	60 (25)
• Average number of extended writing tasks during observation periods	2 (1)	4 (3)	6 (3)
• Proportion of writing tasks during observation periods that involved extended text writing	.24 (.14)	.49 (.26)	.75 (.22)
Year 2	[n = 19]	[n = 30]	[n = 20]
• Average minutes/day students actually wrote text	11 (12)	22 (13)	36 (22)
• Of all instructional days, percentage on which students drafted text	27 (12)	45 (12)	67 (25)
• Of all instructional days, percentage on which students composed extended text involving--			
Journal writing	12 (14)	33 (22)	80 (18)
Other writing tasks	31 (10)	51 (14)	68 (14)

a - Standard deviations appear in parentheses.

extended writing. The differences among the classroom types on the variables composing the typology index, shown in Table 44, are substantial--for example, the values for the extensive-opportunity group on all variables are more than twice the values for the low-opportunity groups.

To be sure that the typology was not skewed toward a particular grade level, we checked the distribution of classrooms across grades and found it to be relatively even. Across both years of data collection, for example, 18 classrooms from the first three elementary grades were classified as offering extensive opportunities for extended text writing, while 21 classrooms in grades 4, 5, and 6 did so.

As suggested by Tables 45a and 45b, the types of classroom differ on many, although not all, of the strategies discussed above. Generally speaking, the differences are substantial, and, with one exception in Year 1, they demonstrate a relationship between the opportunities for extended text writing and the use of these instructional strategies. However, the indicators used in the table do not capture all the features of curriculum and instruction considered or reported in the analysis we describe below, which relies heavily on qualitative case reports.

The principal differences between the groups, as revealed by the data in the table, are as follows:

- In the extensive-opportunity group of classrooms, writing was integrated with reading more frequently than in the other two types of writing classroom.

- Although the variable indicating attention given to the writing process during Year 1 showed <u>less</u> teaching of writing processes in the extensive-opportunity classrooms, the reverse was true in Year 2. (We observed some low-opportunity classrooms in which teachers follow some sort of writing process paradigm, but the way in which it was followed did not carry over to writing itself.)

- Teachers in the extensive-opportunity classrooms tended to place greater emphasis on meaningful communication than on correct mechanics and to embed the teaching of language mechanics in the actual writing task.

- Especially in the second year, teachers in extensive-opportunity classrooms were much more likely to connect instruction to students' backgrounds than in other classrooms.

Table 45a

HOW STRATEGIES THAT MAXIMIZE MEANINGFUL WRITTEN COMMUNICATION ARE RELATED TO OPPORTUNITIES FOR EXTENDED TEXT WRITING (YEAR 1)

Instructional Strategies	Opportunities for Extended Text Writing: Low (n = 21)	Moderate (n = 25)	Extensive (n = 18)
Integrating writing with reading and other subjects: Of all instructional days, average percentage on which writing instruction was integrated with reading	23 (25)[a]	44 (25)[a]	50 (25)[a]
Deemphasizing discrete skills and mechanical correctness			
• Emphasis on correct mechanics: Scale from 1 (= greater emphasis on correct mechanics) to 3 (= greater emphasis on meaningful communication)	1.9 (.7)	2.1 (.6)	2.2 (.6)
• Embeddedness of language mechanics instruction: Scale from 1 (= skills taught primarily out of context) to 3 (= skills taught primarily in context)	1.5 (.6)	1.7 (.6)	1.9 (.7)
Teaching about writing processes: Scale from 1 (= little prewriting, virtually no revision) to 3 (= extensive prewriting, frequent revision)	2.2 (.8)	2.3 (.6)	1.6 (.8)
Connecting writing to students' backgrounds: Of all observed days, percentage on which writing was connected to children's backgrounds	60 (43)	64 (36)	69 (39)
Changing the social context of writing: Of all observed lessons, average percentage on which student-student interaction was permitted or encouraged during writing instruction	51 (37)	59 (36)	60 (45)

a - Standard deviations appear in parentheses.

Table 45b

HOW STRATEGIES THAT MAXIMIZE MEANINGFUL WRITTEN COMMUNICATION ARE RELATED TO OPPORTUNITIES FOR EXTENDED TEXT WRITING (YEAR 2)

	Opportunities for Extended Text Writing		
Instructional Strategies	Low (n = 19)	Moderate (n = 26)	Extensive (n = 19)
Integrating writing with reading and other subjects: Of all instructional days, average percentage on which writing instruction was integrated with reading	33 (39)[a]	58 (38)[a]	77 (31)[a]
Deemphasizing discrete skills and mechanical correctness			
• Emphasis on correct mechanics: Scale from 1 (= greater emphasis on correct mechanics) to 3 (= greater emphasis on meaningful communication)	2.0 (.4)	2.2 (.7)	2.3 (.5)
• Embeddedness of language mechanics instruction: Scale from 1 (= skills taught primarily out of context) to 3 (= skills taught primarily in context)	1.6 (.4)	1.9 (.4)	2.2 (.6)
Teaching about writing processes: Scale from 1 (= little prewriting, virtually no revision) to 3 (= extensive prewriting, frequent revision)	1.7 (.8)	2.3 (.5)	2.3 (.8)
Connecting writing to students' backgrounds: Of all observed days, percentage on which writing was connected to children's backgrounds	51 (38)	82 (35)	94 (15)
Changing the social context of writing: Of all observed lessons, average percentage on which student-student interaction was permitted or encouraged during writing instruction	36 (39)	54 (32)	77 (31)

a - Standard deviations appear in parentheses.

- In the low-opportunity classrooms, student-student interaction during writing instruction was much less evident.

We describe below the characteristics of the three types of classrooms, first by analyzing the extensive-opportunity classrooms along with several extended examples, and then by contrasting this type of classroom with the other two types.

Classrooms with a Large Amount of Extended Writing

Brief portraits of high-opportunity classrooms at the first-, third-, fourth-, fifth-, and sixth-grade levels illustrate the ethos, range of practices, and student response in classrooms that include large amounts of extended text writing in their academic program. The first example comes from an inner-city school serving a largely African-American and Hispanic population, with most of these students coming from poor families.

- Writing in Ms. Carrera's first grade. A visit to this first-grade classroom at any time during the year reveals the importance given to written text. The walls of the classroom are filled with word lists, poems, the class daily newspaper, and stories. All these charts are hand printed by Ms. Carrera; most have been dictated by the students to her. Posters displayed around the room during the Christmas season serve as examples of the use of children's text in this room. Two weeks before Christmas, posters (of about 20 words each) are seen, one listing Christmas words, another "s" words, and a third different kinds of forest animals. The "s" words reflect the phonetic sound the students are currently working on. The forest animal list represents the theme of the stories the students are currently reading. The themes of these lists change across the year (during the World Series, a list of baseball words is displayed); however, the number of posters displayed remains fairly constant across the year. Beside each word is a pictorial representation, drawn by Ms. Carrera. The students have dictated the text to her, and she has written the students' words and drawn pictures so that they can later identify the words.

  In addition to these dictated word lists, there is a daily newspaper. Each morning, the students dictate to Ms. Carrera five or six sentences that comprise that day's newspaper. This newspaper is posted throughout the day and taken home by a different student each day. Also displayed around the room are stories, often dictated by the students, and poems written by various authors. Approximately 90 minutes of each morning is devoted to students' dictating different kinds of text to the teacher and to reading these lists and stories.

Journal writing time occurs for about 30 minutes each morning after recess. In the early weeks of the school year, the students draw story pictures and label these pictures, using words from the lists displayed around the room. Later in the school year, the students write three- or four-sentence stories. They take turns reading their stories to Ms. Carrera, who types the stories onto a computer file and then prints the student's story. The sentences are cut into strips, and each sentence is pasted on a page of a construction paper book. The students then illustrate each page of their book. At the end of journal writing time, a special chair is brought to the front of the room, and students take turns sitting in the chair and reading their stories from their books.

In addition to the daily dictation of text and journal writing, students write several stories across the school year. These stories are related to a current theme integrated across the curriculum. The children write their stories only after several days have been devoted to reading and discussing the theme, and the stories are posted around the room.

A third-grade classroom in a different kind of inner-city setting approaches the task of teaching writing somewhat differently, although there are common threads with the preceding case.

- <u>Writing in Ms. Jones' third grade</u>. The students in this class (a) learn how to do research and write research reports that will be used in reading lessons, (b) write in their journals several times a week, (c) maintain "reading response" journals in which they write about each story assigned for reading, and (d) write creative pieces frequently. Writing instruction in this classroom is thoroughly integrated with the reading curriculum. For example, after reading about planets, Ms. Jones has the students write a creative story about life on a specific planet of their choice and produce research reports about the solar system on a printing press.

  Writing assignments are given only after much time has been devoted to the topic of the assignment. For example, in writing about life on a particular planet, students read extensively about the solar system, visit a local science museum, and discuss imaginary trips to each planet.

  In addition to the writing assignments related to reading, students write for 10 to 15 minutes each day in their journals on a topic that Ms. Jones assigns. These topics range from analysis of a character from their reading curriculum to writing about their favorite number, their feelings, or more imaginative topics such as "If I had only one eye," "What if we all looked alike," and "What if we lived our lives backwards."

  Ms. Jones devotes about 20 minutes a day to component skills instruction. Early in the school year, she conducts grammar lessons out of context; later in the year, however, she uses written text to teach grammar--for example, in one lesson, a poem by Edna St. Vincent Millay was used as an occasion for teaching adjectives, following which, students wrote about where they would like to travel.

A visit to a fourth-grade classroom serving inner-city children representing several different ethnic groups (Asian, African-American, Pacific Islanders, and Hispanic) reveals a teacher who integrates her writing instruction across the curriculum.

- Writing in Ms. McMillan's fourth grade. In this classroom, language arts is scheduled for approximately an hour and a half each morning. During that time, reading, writing, and other language arts are integrated. Although students have an opportunity to write every day, the number of extended writing assignments each week varies from two to about five. Writing assignments are always related to the students' experiences. For example, after a field trip to the museum, students wrote a report about their trip. As part of their science, students reported on their observations of the seeds they had planted. These reports were included in their Plant Notebook. Later in the year, students wrote several writing samples for their Me Book, such as "Me When I'm Fifteen." At the end of the year, each student's writing samples were compiled into an individual book. Students had pen pals in a nearby city with whom they corresponded throughout the year, usually about once a month. For another assignment, students were asked to interview their parents about how they got their names. Thus, all writing assignments were related to something in which the students were involved or had great interest.

  Ms. McMillan gives her students much guidance before they begin their writing. Usually class discussions about the topic and some of the vocabulary set the scene for the students. She usually helps the students think about how they might begin their writings and the construction of paragraphs.

  During all writing assignments, the students are allowed to interact with their teacher and with each other. For example, before beginning the writing assignments about the field trip to the museum, Ms. McMillan asked the students what they should do if they did not know how to spell a word. "Sound it out or ask a friend. When all else fails, circle it," was the reply. For this particular assignment, after some students had written text, Ms. McMillan asked them to read it to her. One student had used the word "stuff" in the text. She asked what the girl meant by stuff; the student started naming some specific items that she had seen. Ms. McMillan suggested that she add all of those items to her writing. When another student read her paper, Ms. McMillan responded, "Great. How did you feel during the whole day?" She suggested that the student describe her feelings in the paper. These examples seem typical of the kind of interaction Ms. McMillan had with her students during their writing assignments. She had students reading each other's papers beginning in the early weeks of the fall, and prewriting activities were a standard part of instruction since that time also. She did not, however, put emphasis on editing and revising until February.

The students were accustomed to writing about what they read. For example, after the class had read "The Garden," Ms. McMillan linked the writing to the theme of the story in the following way. She had the students recall the story by asking questions such as "Who can tell me the main characters?" "What happens when the frog comes along?" She focused the students on how the frog cared for the seeds he planted by prompting them to recall all of the gardening tasks. Students then set about planting their own seeds. Before they planted and watered their seeds, she told them to touch the soil, to think about where she might have gotten it, to smell it, and to look at it. This led right into a prewriting activity in which the students generated descriptive words for the soil as she wrote the words on a large piece of paper.

The fourth example, at the fifth-grade level, once again from an inner-city school, depicts an approach that combines elements of the preceding three, although with differences related to the later developmental stage of the students.

- <u>Ms. Wong's approach to fifth-grade writing</u>. Students in this classroom have various opportunities to write, because writing is integrated across the curriculum. For example, before taking their field trips, the students write about their expectations, and afterwards they write thank-you letters to their host and write reports on what they learned. A variety of genres are assigned during the year, including several creative writing topics and personal and business letter exercises. Students write in journals for 10 minutes a day. These journals are not collected or graded, for students are expected to write mainly about their feelings on any topic of their choice.

  Correctness and component skills receive relatively little attention in this classroom. Ms. Wong does not emphasize mechanical correctness in the beginning of the school year. Instead, she focuses on the substance of the students' writing and the characteristics of the elements of the genre in which they are writing. She tends to correct only student writing that will be mailed to someone outside the classroom community. Such student work is corrected mainly for mechanical errors, not substance.

  Ms. Wong is concerned mainly with giving students a sense that they can affect others through communication. This objective seems to give the students a sense of purpose in writing rather than having the feeling that they are performing an empty exercise.

The fifth example comes from a sixth-grade classroom within a school that emphasizes a discrete-skills approach to literacy instruction. This teacher follows an integrated approach to language arts.

- Writing in Ms. Dodd's sixth grade. Ms. Dodd's approach to any reading lesson is always with the understanding that the reading will be the basis for a writing task. For example, the students had read a story about robots that contained a discussion of the advantages and disadvantages of robots. The students then wrote about their views of robots. Ms. Dodd collected the papers and read them over without assigning a grade. The papers were returned to the students, and group discussions about the topic followed. After the group discussions, students rewrote their papers.

  Ms. Dodd follows a schedule of writing referred to as "Writers' Workshop." This schedule involves a series of writing activities that occur within 1-month cycles. During the first section, the students may write on any topic of their choosing. After this initial writing, the "conference section" occurs, when the teacher meets individually with the students in the classroom about their writing and students have an opportunity to revise their text. During the next section, students read their text to a small group of other students. Other students may offer comments on the text, and some revision may occur. In the last section, students have the opportunity to prepare their text for publication. They have the choice of hand writing the text or typing it into a computer.

As these examples suggest, classrooms with large amounts of extended text writing resemble each other in various ways, despite differences in setting and the nature of the students they serve. We discuss below how extensive-opportunity classrooms appear as a group with respect to the four strategies.

In all the extensive-opportunity classes, writing is integrated with the reading curriculum. Teachers find various ways of relating what students write to what they read. For example, one fifth-grade teacher systematically assigned her students to write chapter summaries on what they had read that day. She also assigned essays related to the themes of their reading stories--themes such as justice and villainy. In one third-grade classroom, after reading a story about imagination, the teacher assigned a writing task asking the students to write about a problem in their lives that was solved by using their imagination.

First-grade teachers showed the greatest variation in their approach to integrating reading and writing. Some of the first-grade teachers began the school year by having students draw pictures of the stories that they read, and as the year progressed the students began to write about what they had drawn, often of their own volition. One adventurous first-grade teacher, who was experimenting with the concept of inventive spelling for the first time, began the year by asking her students to write about something that they remembered from reading the story "Corduroy the Bear." One student in the class wrote "Corduroy had a bntn bot he ctin fiod ti." (Translated, "Corduroy had a button but he couldn't find it.") Another first-grade teacher, who did not use a reading textbook, read stories to her students and had them dictate stories to her. These stories were read by the class and by individuals. The printed stories were displayed around the room and, if they chose, students could use these stories as a source for their own writing.

The teachers in the extensive-opportunity group make the connection between reading and writing throughout the language arts lesson. While stories are being read, themes, meaning, and language are discussed. The reading time is rich, and ideas are presented and exchanged. Thus, writing is a natural accompaniment to reading and class discussions. Breaking down the traditional barriers between reading and writing seems to facilitate students' enthusiasm for the writing task.

Several, but not all, of the extensive-opportunity group of classes integrated writing with social studies and science. This integration usually took the form of reports and letters. For current events, students wrote letters to persons such as the principal, baseball players on a local team, and officials at the local public broadcasting station. These kinds of assignments were frequent and related to events in the children's lives. For example, a letter to a famous baseball player preceded attendance at the team's next home game. One exceptional fifth-grade teacher attempted to facilitate the development of her students' metacognitive skills by systematically giving her students science problems and requiring them to write their thoughts as they went through the process of solving the problem.

With regard to their emphasis on component skills and correctness, teachers in classrooms with a high degree of extended text writing tended to place the least emphasis on discrete skills in writing mechanics. Nonetheless, all teachers in the high group devoted some time to teaching these skills, typically within the context of the students' writing. For example, one fifth-grade teacher taught her students correct usage of quotation marks as part of a story-writing assignment that contained dialogue. Other teachers in the high group used examples from students' writing to discuss certain grammatical concepts.

The issue of correctness is more complicated. Although nearly all the upper elementary teachers in the extensive-opportunity group were concerned about the correctness of their students' writing, they dealt with this issue in different ways. Some of the teachers used peer editing sessions, thus removing the teacher from the role of evaluating correctness. Other teachers noted needed corrections on the students' papers and gave them an opportunity to revise their work before they submitted the final draft. The primary concern of these teachers was to establish an environment conducive to students' generation of text, and the teachers did not want to hinder students' fluency by overemphasizing the mechanical correctness of the text.

The attention given to the writing process varied within the extensive-opportunity group. Different patterns appeared for prewriting versus revising and editing:

- Prewriting. All of the extensive-opportunity group classes devoted substantial time to prewriting activities. Because writing in these classrooms was so often integrated with reading, much of the prewriting involved reading and discussion. On other occasions, the teachers used school-based experiences such as a field trip or a walk around the school to develop material for the students' writing. Prewriting sometimes took the entire lesson for a given day, or even several days. During this time, the teachers attempted to build structures for their students that would facilitate their writing of extended text. The teachers view prewriting as a significant part of instruction demanding careful and systematic planning.

- Revising and editing. Fewer than half of the classrooms in the extensive-opportunity group devoted much time to revising and editing, and in two of these classes, peer response groups were used (although apparently not with any kind of formal response sheets).

For the most part, these response groups did one of two things: editing the writing for mechanics or identifying areas where the writer might provide further description or more information. Other teachers in the extensive-opportunity group ignored the revising and editing phase, believing that this was not important or necessary.

Overall, the extensive-opportunity classes devoted considerable time and effort to prewriting and drafting text, but other phases of the writing process were not given equal attention.

Regarding the social context of the writing task in extensive-opportunity classrooms, it was rare to find students talking among themselves and working together in high-group classes. Most exchanges of ideas were led by the teacher and occurred before the actual composing began. In some of the upper elementary classes, student-student interaction took place as part of peer editing of students' writing as students helped each other in their final editing (usually mechanics).

Journal writing was an exception to the pattern just described, especially in first-grade classrooms. In one first-grade class, for example, the teacher allowed her students in the beginning of the year to talk during journal writing; at the same time, she was concerned about the fact that some of her students were copying each other's writing. As the year progressed, however, the teacher began to view these exchanges as simply one source of ideas. In another first-grade classroom, children were allowed to write at their tables or on the floor. Each day during journal time, a group of students were gathered on the rug, talking about their writing. For the most part, journal writing in these first-grade classes is a buzzing, happy time, with children writing, talking about their writing, and sharing crayons as they illustrate their writing.

At the same time that they typically restricted students' interaction with one another, teachers in the extensive-opportunity group did much to structure the writing tasks, so that students proceeded from a highly structured activity early in the year to a less structured one later on. For example, two first-grade classrooms approached writing as follows:

- Progression of writing assignments across the year in Ms. Jansen's classroom. The assignments moved from drawing pictures about what had been read to writing short words that students sounded out phonetically as labels for pictures. By early November, the students were filling blanks in sentences. From late in November through January, they were completing sentences with their own ideas, writing their own sentences, and writing letters within a prescribed format. In February, they began writing stories and poems in a prescribed format and moved into writing completely on their own. In early March, they began writing poetry because the teacher believed the students had a good handle on rhyme and were ready to use more sophisticated language.

- The use of structured writing prompts in Ms. Brammer's first grade. In this classroom, the teacher structured the writing task with the use of prompts. The complexity of the writing required in students' responses to these prompts increased as the year progressed. In the fall, for example, students responded to the following prompt: *"If I had a pet penguin, I would name it ______. It would eat ______. It would live in ______. Having a pet penguin would be neat because _____."* Toward the end of the year, a prompt read: *"One ______, my best friend and I __________."* Children were expected to copy the prompt and complete it by filling in blanks and adding three or four sentences to the end of the prompt.

In classrooms characterized by large amounts of extended writing, students wrote to various audiences--themselves, their teachers, and outsiders. As a group, these classrooms were more likely than others to write with themselves as a primary audience (because they did a great deal of journal writing) and to individuals or groups outside the classroom (because they did a great deal of letter writing). Letters were typically about local topical events or issues, and were for the most part actually sent to the person or group in question.

Classrooms with Less Extended Writing

The remaining classrooms in our sample were classified as offering either moderate or few opportunities for extended text writing. The pattern of curriculum and instruction in these classrooms differs in various ways from the extensive-opportunity group, as the following examples and analysis demonstrate. Our discussion combines the "moderate-opportunity" group of classrooms and those with little or no extended text writing because the differences between these two are not major and are generally a matter of degree.

Descriptions of several low-opportunity group classrooms highlight the differences.

- Writing in Ms. Polacek's first grade. Writing mechanics are the centerpiece of Ms. Polacek's writing curriculum. Her objectives for the year are to help her students write a simple sentence, recognize a sentence, know punctuation and mechanics, and spell common words. Writing instruction occurs about once a week, including work on spelling, based on a list provided in the basal reading series. During this time, students usually complete worksheets focusing on some sort of writing mechanics skill. Occasionally, students write in journals by copying sentences like the following from the chalkboard: *"Today is Monday, December 4, 1989. It is a sunny day. It is a beautiful day."* The students illustrate their writing after they finish copying it. Later in the year, Ms. Polacek encourages the students to add their own sentences after they have copied the sentences written on the chalkboard.

  Most of the writing done in this classroom is related to spelling assignments. Students have to write sentences with their spelling words, and the teacher corrects these sentences for spelling, punctuation, capitalization, and neatness.

  Ms. Polacek places great emphasis on correctness, so much so that when students are given the freedom to express themselves through writing, they are greatly concerned about their spelling. Because they have not been taught to spell phonetically and very few word lists are displayed around the room, they depend on the adults in the room for the correct spelling. Thus, it is common to see much movement and waiting in lines during the infrequent writing activities.

Other classrooms in this group set up similar routines aimed at building language skills, which provide few opportunities for writing text, as the following third-grade case illustrates:

- Writing in Ms. Delacruz's third grade. In this classroom, writing occurs occasionally, but only when there is a disruption in the normal schedule of lessons, such as when the art teacher is ill or an assembly is canceled (we learned of one such assignment during our visits). In such instances, students are asked to write a paragraph that completes a sentence such as this: *"If I were a gift, I would be ______________________________."*

  Instead of written text, instruction focuses on spelling and grammar. Each morning, 10 to 15 minutes is devoted to spelling and a similar period of time to grammar. Spelling assignments follow a weekly pattern: on Monday the words are presented and students copy them; on Tuesday students complete a workbook exercise using the words; on Wednesday they take a pretest; on Thursday they complete another workbook exercise; and on Friday the students are given a posttest.

Grammar lessons follow a similar format, but with a little more oral participation by the class. In both spelling and grammar, students' exercises are monitored and corrected periodically (however, we never saw any papers being returned to students).

In part because of the emphasis on spelling words or using grammatical forms correctly, it does not seem easy (nor is it Ms. Delacruz's intention) to integrate writing with reading. Virtually all written work in her class involves restricted writing with relatively little room for composing or elaborating thoughts.

Classrooms with a moderate or small amount of extended text writing thus look fairly different from the extensive-opportunity group described previously. We review below the key differences on the strategies we have been using for analysis.

Typically, classrooms in the moderate- and low-opportunity groups integrate writing with other subject areas less than the extensive-opportunity group, or not at all. In part, this reflects the fact that because less extended writing is done, there is less to integrate. But also, teachers assign writing tasks that are not designed to connect with the learning taking place in reading, social studies, or other areas of students' work. Thus, in journal writing, students either select their topic or the teacher assigns a topic unrelated to other subject areas. In addition, broad generic topics such as "Write what you do when you get bored" are common among these classrooms.

To be sure, some classrooms give students opportunities for writing extended text that can relate to other subject areas. For example, students are sometimes asked to write in the same genre as what they are reading--a poem, a letter, a story, or whatever. One third-grade teacher in this group gave her students the following instruction for writing. "Think of a name for your story. Think of something your character has done. It might be a trip you went on or a real story like 'The Lost Key.' Think of a story. It might be a strange or funny story." In a rare writing assignment, another third-grade teacher in the low group assigned the following writing task: "Write about one of your favorite stories; it doesn't matter which one, as long as we've read it." These instructions reveal a lack of "scaffolding"--

that is, a framework for writing activity that helps students move from reading to writing. In all these examples, the writing is simply a "tag-on" to the reading, not an integral part of a unified activity. As a result, very little integration with other subject areas occurs. The lack of scaffolding, of preparing the students for the writing task so that it naturally flows from class discussion or other learning activities, is a salient difference between the high and medium groups of classes.

Teachers in the moderate- and low-opportunity groups focused heavily on discrete language mechanics and correctness. They tended to have a view of writing development as the acquisition of discrete skills that would later be applied to extended text. Relative to other teachers, they were more likely to focus on correctness because they believed that students need to acquire the rules of writing before they can write any meaningful text.

Accordingly, language arts lessons in these classrooms are often devoted to exercises from a textbook--mainly requiring seatwork. The teacher might talk briefly about the concept to be covered, such as past tense and present tense, and then students are asked to complete the exercises from the book. In such instances, the time used for teaching mechanics takes away from the time that could be used for writing extended text. By contrast, teachers in extensive-opportunity classrooms are too busy with extended text writing to devote a great deal of time to teaching discrete skills out of context.

Regarding the attention they gave to the writing process, on the whole, teachers in the moderate- and low-opportunity classrooms paid somewhat less attention to writing as a process than did teachers in the high group. The exceptions were typically within the medium group, such as one teacher who had her room decorated with posters describing the various phases of the writing process and examples of each. Unlike extensive-opportunity group classrooms, however, these teachers did not invest large amounts of time in prewriting, preferring to spend equal time on all aspects of the process.

The key difference across the sample probably has less to do with <u>whether</u> teachers taught about the writing process and more to do with <u>how</u>

they taught it. Along with the shift in emphasis away from prewriting, these teachers also used prewriting time differently. Rather than bringing students' cultural background or out-of-school experiences into the prewriting activity, as many teachers in the extensive-opportunity group did, teachers in the medium group tended to use the activity as a way to provide the students with new information. The reason may have been that teachers preferred all students to have a common experience for a given writing assignment or that they were fearful of the kinds of experiences their students might report.

How Types of Writing Classrooms Are Distributed Among Students, Teachers, and School Settings

The types of writing classrooms are distributed fairly evenly among different groups of students and teachers, as can be seen in Table 46. As was the case with mathematics and reading, the three types of classrooms have comparable percentages of children from low-income backgrounds, serve students whose initial achievement level is virtually the same, and are staffed by teachers who hold similar expectations for student success.

The only difference that is consistent across years is that teachers in the extensive-opportunity classrooms have somewhat stronger backgrounds in language arts than their colleagues in low-opportunity classrooms. This is not a surprising finding, and it squares with what we saw in practice. The instructional strategies we have been discussing are not part of the repertoire picked up in preservice programs of years past. For the most part, teachers have acquired these instructional ideas through colleagues, in-service workshops, reading in journals, and a lot of trial and error over the past decade. Those who are most comfortable with these strategies and have used them most in their teaching--in other words, the extensive-opportunity teachers--are likely to be ones with the greatest exposure to these ideas through professional development experiences.

Table 46

CHARACTERISTICS OF STUDENTS AND TEACHERS IN THE DIFFERENT TYPES OF WRITING CLASSROOMS

	Characteristics of classrooms in which opportunities for extended text writing were-- Low	Moderate	Extensive
Year 1	[n = 21]	[n = 25]	[n = 18]
Student characteristics			
• Average percentage on the Free or Reduced-Price Lunch program	62 (28)[a]	72 (31)[a]	56 (31)[a]
• Fall scores on CTBS/Reading Comprehension (in NCEs)	44 (9)	46 (8)	46 (10)
Teacher variables[b]			
• Richness of teacher's background in language arts	2.2 (1.6)	2.7 (1.1)	2.7 (1.1)
• Expectations for student success in language arts	2.7 (.7)	3.1 (.7)	2.7 (1.0)
• Teacher's satisfaction with teaching	3.1 (.6)	3.2 (.5)	3.0 (.9)
Year 2	[n = 19]	[n = 26]	[n = 19]
Student characteristics			
• Average percentage on the Free or Reduced-Price Lunch program	60 (24)	62 (26)	62 (25)
• Fall scores on CTBS/Reading Comprehension (in NCEs)	44 (6)	45 (8)	45 (8)
Teacher variables[b]			
• Richness of teacher's background in language arts	3.7 (1.3)	4.1 (1.5)	4.9 (.9)
• Expectations for student success in language arts	4.2 (.6)	4.4 (.5)	4.1 (.5)
• Teacher's satisfaction with teaching	3.3 (.9)	3.5 (.5)	2.8 (.9)

a - Standard deviations appear in parentheses.

b - Teacher variables in Year 1 were derived from observer ratings, in Year 2 from teachers' responses to a questionnaire.

With regard to the association between classroom types and school settings, strong links are apparent to both the district and state contexts, as can be seen in Table 47. Consider, for example, the only state (State 1) with a mandated annual writing assessment that requires students to write actual text: nearly half of all classrooms studied across both years of the study were classified as offering extensive opportunities for extended writing, in comparison with a small percentage (15 percent or fewer) of the classrooms from the other two states, in which there is no statewide writing test of any kind.

As in the other subject areas, particular districts have a characteristic "profile" with respect to the distribution of classroom writing types. Districts 1 and 3, for example, make writing a high priority--not surprisingly, only a quarter of the classrooms we studied in these districts offered students little or no chance to do extended text writing. More than two-thirds of the classrooms we studied in District 5, on the other hand, fell into this category, reflecting the virtual absence of attention to writing in district-mandated language arts curricula. Still other districts, such as District 4, were characterized by having the majority of classrooms offer moderate exposure to extended text writing, in response to a clear priority for improvement in reading, yet coupled with a growing focus on writing as an important facet of language arts.

Individual school sites also appear to play a role in encouraging or discouraging writing instruction of certain types, although the effects seem more subtle than the powerful impact of district and state factors. For example, in School 1, one of the schools with the highest proportion of extensive-opportunity classrooms, the principal chairs the District Writing Curriculum Committee and strongly encourages extended text writing; her teachers respond accordingly.

The relationships between types of classrooms and characteristics of students, teachers, and settings will be explored in greater depth in Chapter XV. For the moment, it is important to know that the outcomes of writing instruction discussed in Chapter XI may reflect the influence of these factors in various ways.

Table 47

PATTERNS OF WRITING INSTRUCTION BY DISTRICT
(Both Years)

District/State (n of classrooms)	Number of classrooms in which opportunities for extended text writing were-- Low	Moderate	Extensive
State 1 (n = 63)	(n = 11)	(n = 24)	(n = 28)
District 1 (rural) (n = 22)	4	7	11
District 2 (urban) (n = 18)	4	7	7
District 3 (urban) (n = 23)	3	10	10
State 2 (n = 25)	(n = 9)	(n = 12)	(n = 4)
District 4 (urban) (n = 25)	9	12	4
State 3 (n = 45)	(n = 20)	(n = 18)	(n = 7)
District 5 (suburban) (n = 31)	19	9	3
District 6 (rural) (n = 14)	1	9	4

XI WHAT CHILDREN LEARN FROM DIFFERENT APPROACHES TO WRITING INSTRUCTION

The nature of the different approaches to writing instruction described in the preceding chapter suggests several propositions regarding how children who experience these approaches perform in assessments of writing competence. We investigated these propositions by collecting writing samples from children at the end of each year of data collection. As in the case of mathematics and reading, analyses addressed the association of the different approaches with outcome scores, the relationship of these approaches to the mastery of basic skills, and the possibility of differential effects for higher- and lower-achieving children. The following three hypotheses emerged from past research and our own fieldwork:

(1) The more classrooms focus on composed extended writing and associated instructional strategies (e.g., integrating writing with reading, teaching writing process skills, connecting writing to children's backgrounds), the more likely students are to demonstrate proficiency in written communication, all other factors being equal.

(2) Students in classrooms emphasizing composed extended writing will acquire a grasp of "basic" writing mechanics (e.g., handwriting, spelling, punctuation, grammar) that is at least as good as that of students in classrooms oriented primarily toward these skills, taught out of context.

(3) Approaches to writing instruction that emphasize composed extended writing are likely to work as well for lower-achieving children as for higher-achieving ones.

These propositions assert relationships that are often assumed to be otherwise in the kinds of schools we have been studying. Interpreted one way, the first proposition states that the more students write, the better they will write. But there is more to it than the number of pages students compose. A "focus on composed extended writing" implies that a certain kind of writing is the goal of instruction--composed elaborated text, in which students must form coherent thoughts in prose--and also that students are explicitly taught how to do this, through the means described in the preceding chapter. Yet, obvious as it may sound, the proposition has not always been assumed to apply to classrooms filled with low-income children, many of whom use Standard English less extensively out of school than more affluent children. In such circumstances, the conventional wisdom holds that students need a much heavier dose of the "basics" of writing mechanics, before they are judged capable of mastering the art of written communication. And the students who perform least well on achievement tests are often assumed to be those most in need of these skills.

Both the recent writing literature and our fieldwork suggest that this assumption may be flawed. To determine whether our observations and those of the literature were valid, we compared writing samples produced by students in the three types of writing classrooms described in the preceding chapter, initially controlling for key student characteristics that are likely to be associated with outcomes. We then examined the effects of different approaches on the mechanical correctness of students' writing; next, we considered the possibility of differential relationships between outcomes and approaches for students who were at the low and high ends of the achievement continuum. Finally, we considered how outcomes were related to other factors, in particular, the emphasis placed on language mechanics, the teachers' general proficiency at managing instruction, and several background characteristics of teachers.

Outcomes of Writing Instruction

We used actual writing samples as the source of indicators of instructional outcomes. Two kinds of outcome measures were derived from the samples:

- Competence in written composition, as judged by a panel of raters who assessed writing samples holistically. This measure focused on the quality of written expression without attention to the mechanical correctness of writing, which was captured by a second measure.
- Mechanical correctness of students' writing, judged holistically as part of the same rating process.

Because of limitations in resources and the difficulties in assessing the writing of young children, writing samples were used with grades 3 through 6 only. The procedure is explained in detail in Volume 2 of this report. Examples of the results of this process appear in Figure 3.

As with mathematics and reading, we examined both short-term (fall-to-spring) outcomes--those attributable to the school year itself--and, for those students remaining in the sample during the second year, longer-term (fall-to-fall, spring-to-spring) outcomes, which reflect not only what is learned during the school year but also what is retained, gained, or lost during the summer months. In analyzing outcomes, we had no norm group profile against which to create a measure corresponding to NCEs, as in reading and mathematics. In addition, the holistic rating process generated scores on a single scale regardless of grade. Accordingly, we created a score for each student that showed how far above or below the mean for each grade the student performed.

Although it is generally accepted that writing samples provide the most direct way to assess writing competence, there are shortcomings to the procedure that have been much debated in the writing assessment literature. For example, the brief (approximately 20-minute) time for writing to the prompt gives students a chance to create only a first, rough draft, not time to edit or revise in ways that they may well have been taught. Nonetheless, the writing samples employed for this study offer, at least, a reasonable approximation of the writing proficiency of the students.

As with mathematics and reading outcomes, analyses of writing outcomes were performed at the classroom and student levels (by attaching to each student's record the corresponding variables for the student's teacher or instructional approach). As was the case with reading and mathematics, we used student-level analysis to approximate the relationship between instruction and individual student performance, while acknowledging that not all students are independently--and equally--affected by instructional variables as assumed by the analytic procedure. (See discussion of analysis issues in Volume 2.)

Figure 3

STUDENT WRITING SAMPLES

A Fourth Grader's Response to a Prompt Eliciting Explanatory Writing

Read the following carefully. Take a minute to think about what you want to write and then begin writing. You will have 20 minutes to complete this assignment.

Think of someone who is very important to you. You like and respect this person very much. Explain WHY this person is so important to you.

My teacher is important to
me because I wouldn't to
no nothing about forth Grade
if it wouldn't be her.
and she's a nice teacher
I wish She's my 5 Grade
teacher if I past to the 5=
Grade She's the Best teacher
I ever have

Scores on a holistic scale from 1 (lowest) to 6:

(A) Writing Competence: First Rater–3; Second Rater–2

(B) Writing Mechanics: First Rater–2; Second Rater–3

Figure 3 (Continued)

STUDENT WRITING SAMPLES

A Sixth Grader's Response to a Prompt Eliciting Descriptive Writing

Read the following carefully. Take a minute to think about what you want to write and then begin writing. You will have 20 minutes to complete this assignment.

Think about something you like to do. Pick one activity. This activity can be something you like to do at school, or it can be something you like to do outside of school. Describe this activity so that someone reading your description will understand why you enjoy this activity so much.

While at home, I love to play hot potato with my friends. Its a very fun game if you know how to throw fast. Sometimes, Ill cheat and just smack the ball back instead of throwing it. I always beat my friends when we play the game. All of my friends are shorter than me so I get the ball whenever they throw. Sometimes I even throw the ball over their heads so they will have to run and get it.

My brothers can beat me in this game. I am always the one to get burned up when they play with me. They are taller than I am. They are like red-wood trees to me. If I catch the ball good they'll cheat and say I'm out. I can't do anything about it because they'll beat me up. When I play with them, I can't quit and they can't get out. I guess thats why I like playing Hot potato so much.

Scores on a holistic scale from 1 (lowest) to 6:

(A) Writing Competence: First Rater–5; Second Rater–6

(B) Writing Mechanics: First Rater–5; Second Rater–5

Effects on Students' Competence at Written Composition

A first set of analyses investigated the associations between writing competence and the extent of emphasis on extended text writing, controlling for student characteristics, as in analyses of reading and mathematics. We summarized these results, first pertaining to the school year (fall to spring) and second across 12-month periods of time.

Short-Term Results (Fall to Spring)--The three types of writing classroom described in the preceding chapter exhibit different patterns of outcomes, as displayed in Table 48. At a glance, the figures suggest that classrooms which focus instruction on extended text writing tend to end up with higher measures of writing competence by the end of the school year. The effect is largest (and statistically different from zero) for classrooms in which teachers place a high emphasis on extended text writing and, hence, on the various instructional strategies that are associated with this approach to writing instruction. The pattern is replicated across years, which gives us added confidence in the results.

The differences shown in Table 48 can be thought of as the incremental increase in writing competence scores that would be expected for students exposed to greater amounts of extended text writing by comparison with students in classrooms in which little or no extended text writing was done. As in analyses of mathematics and reading, these differences are estimated by adjusting for student characteristics (initial achievement level and poverty level). Thus, in Year 1, for example, students in classrooms placing high emphasis on extended text writing are estimated to perform 2.7 of a z-score unit (x 10) higher than students exposed to little or no extended text writing, once initial achievement and poverty level have been taken into account.

Longer-Term Results (Fall to Fall, Spring to Spring)--Viewed in longer-term perspective, there is evidence that these effects persist over a 12-month period, as shown in Table 49, although there is not complete consistency when one compares Fall 1 - Fall 2 findings with Spring 1 - Spring 2

Table 48

ASSOCIATION BETWEEN APPROACH TO WRITING INSTRUCTION AND COMPETENCE AT WRITTEN COMPOSITION, OVER THE SHORT TERM (FALL TO SPRING)

Approach to Writing Instruction[b]	Difference in scores (in z-score units x 10)[a] on the writing assessment at the end of the school year, controlling for initial differences in achievement and poverty level.	
	Year 1: Grades 3, 5 (n = 704)	Year 2: Grades 4, 6 (n = 717)
Extensive opportunities for extended text writing	2.7*c	2.9*c
Moderate opportunities for extended text writing	1.2	1.6(*)

* Statistically different from zero at $p < .05$.

(*) Statistically different from zero at $p < .10$.

Table reads: "By comparison with their counterparts in classrooms with little or no extended text writing, students in classrooms with extensive opportunities perform 2.7 z-score units (x 10) higher in the spring of Year 1, after initial differences in achievement and poverty level have been taken into account. This result is statistically different from zero at the .05 level...."

a - Raw holistic rating scores on the writing assessment were converted to within-grade z-scores (see explanation in Volume 2).

b - Approach to writing instruction is represented by dummy variables indicating students' presence in classrooms with moderate or extensive opportunities for extended text writing, compared with students in classrooms in which there is little or no extended text writing.

c - Figures in the table are unstandardized B-weights for dummy variables indicating each type of writing instruction. Regression equations include students' pretest score, poverty level, and a dummy variable indicating grade level (see Regression Tables in Volume 2).

Table 49

ASSOCIATION BETWEEN APPROACH TO WRITING INSTRUCTION AND COMPETENCE AT WRITTEN COMPOSITION, OVER THE LONGER TERM (FALL TO FALL, SPRING TO SPRING)

Approach to Writing Instruction[b]	Difference in scores (in z-score units x 10)[a] on the writing assessment after 12 months, controlling for initial differences in achievement, poverty level, and participation in a year-round school.	
	Fall 1 - Fall 2: Grades 3, 5 (n = 276)	Spring 1 - Spring 2: Grades 4, 6 (n = 252)
Extensive opportunities for extended text writing	1.6[c]	5.1*[c]
Moderate opportunities for extended text writing	3.7*	0.9

* Statistically different from zero at $p < .05$.

Table reads: "By comparison with their counterparts in classrooms with little or no extended text writing, students in classrooms with extensive opportunities perform 1.6 z-score units (x 10) higher 12 months after the Fall 1 pretest, once initial differences in achievement, poverty level, and participation in a year-round school have been taken into account. This result is statistically different from zero at the .05 level...."

a - Raw holistic rating scores on the writing assessment were converted to within-grade z-scores (see explanation in Volume 2).

b - Approach to writing instruction is represented by dummy variables indicating students' presence in classrooms with moderate or extensive opportunities for extended text writing, compared with students in classrooms in which there is little or no extended text writing.

c - Figures in the table are unstandardized B-weights for dummy variables indicating each type of writing instruction. Regression equations include students' pretest score, poverty level, and a dummy variable indicating grade level (see Regression Tables in Volume 2).

results. In the first year, for example, students exposed to a moderate amount of extended text writing appear to do better over the longer term than those exposed to a high degree of this approach to writing instruction. We caution that, as in the case of mathematics and reading, these results may reflect some attrition biases due to the large numbers of students who dropped out of the study sample from one testing point to the corresponding time 12 months later. There are also differences in measurement error that may have influenced these results (measurement in Year 2, for example, was more precise than in the preceding year).

Effects on Students' Grasp of Language Mechanics

Some educators worry that emphasizing meaningful written communication may diminish the attention to basic language mechanics skills, so much so that students fail to master spelling, handwriting, paragraphing, and so on. We checked out this possibility by performing analyses parallel to those just reported, but with the mechanical correctness of writing samples as the outcome score. Unlike the analysis of reading mechanics, our outcome here reflects the use of language mechanics in actual written text, as opposed to demonstrated mastery out of context.

The results, displayed in Table 50, suggest that students extensively exposed to extended text writing do at least as well on the mechanics of writing as their peers in classrooms with little or no extended text writing. In both years, students exposed to extensive or moderate opportunities for writing extended text received holistic ratings of the mechanical correctness of their writing samples that appear slightly higher than students in classrooms where little or no such writing was done; however, none of these differences are statistically different from zero at the .05 level.

To pursue the matter further, we performed another analysis, as we had done in the case of reading, to determine whether the result could be attributed to the teachers' emphasis on language mechanics skills taught out of context. After all, all teachers in the sample spent at least some time on

Table 50

ASSOCIATION BETWEEN APPROACH TO WRITING INSTRUCTION AND MECHANICAL CORRECTNESS OF WRITING, OVER THE SHORT TERM (FALL TO SPRING)

Approach to Writing Instruction[b]	Difference in scores (z-score units x 10)[a] on the writing assessment at the end of the school year, controlling for initial differences in achievement and poverty level. Year 1: Grades 3, 5 (n = 704)	Year 2: Grades 4, 6 (n = 717)
• Extensive opportunities for extended text writing	0.8[c]	1.1[c]
• Moderate opportunities for extended text writing	0.2	0.5

Table reads: "By comparison with their counterparts in classrooms with little or no extended text writing, students in classrooms with extensive opportunities perform 0.8 z-score units (x 10) higher in the spring of Year 1, after initial differences in achievement and poverty level have been taken into account. This result is not statistically different from zero at the .05 level...."

a - Raw holistic rating scores on the writing assessment were converted to within-grade z-scores (see explanation in Volume 2).

b - Approach to writing instruction is represented by dummy variables indicating students' presence in classrooms with moderate or extensive opportunities for extended text writing, compared with students in classrooms in which there is little or no extended text writing.

c - Figures in the table are unstandardized B-weights for dummy variables indicating each type of writing instruction. Regression equations include students' pretest score, poverty level, and a dummy variable indicating grade level (see Regression Tables in Volume 2).

handwriting, spelling, punctuation, sentence structure, and other language mechanics skills; some might argue that the degree of instruction aimed directly at these skills can better account for the variation in student scores on correct mechanics. The results of this analysis (not shown in the table) suggest that no such relationship exists. When we included in regression runs a variable indicating the amount of attention to discrete language mechanics skills, the relationship between degree of extended text writing and outcomes remained virtually unchanged (see Regression Tables in Volume 2). What is more, the emphasis on language mechanics skills bore little relationship to the mechanical correctness outcome scores.

Our findings may suggest some differences between reading and writing with regard to the role played by instruction aimed at mechanical skills. At first glance, our analyses seem to suggest that teaching writing skills out of context may be less helpful in influencing students' grasp of these skills than is the case in reading. However, we note that our measures were not exactly parallel, and the differences in our measurement may account for the discrepancy in findings. In reading, we measured students' ability to use word attack and letter-word identification skills out of context, and we did so for lower elementary children only. In writing, we measured students' use of language mechanics in context--that is, an actual writing sample--and we did so for upper elementary students only (grades 3-6). Our data set is simply too constrained to enable this issue to be adequately resolved.

Differential Effects on High- and Low-Achieving Students

As with reading and mathematics, we checked to see whether the relationships above worked equally well for different segments of the overall achievement distribution. This analysis yielded a mixed pattern, with some apparent contradiction across years, as displayed in Table 51. In Year 2, for example, the top and bottom thirds of the student achievement distribution differed: the lowest-achieving students in classrooms offering moderate or extensive opportunities for extended text writing performed significantly better than comparable students in classrooms with little or no writing of

Table 51

ASSOCIATION BETWEEN APPROACH TO WRITING INSTRUCTION AND COMPETENCE AT WRITTEN COMPOSITION, FOR HIGH- AND LOW-PERFORMING STUDENTS, OVER THE SHORT TERM (FALL TO SPRING)

Approach to Writing Instruction[b]	Difference in scores (z-scores x 10)[a] on the writing assessment at the end of the school year, for students in the highest and lowest thirds of the achievement distribution, controlling for initial differences in achievement and poverty level.			
	Year 1: Grades 3, 5		Year 2: Grades 4, 6	
	High (n = 227)	Low (n = 229)	High (n = 254)	Low (n = 233)
• Extensive opportunities for extended text writing	4.3*[c]	0.2[c]	0.6[c]	3.0*[c]
• Moderate opportunities for extended text writing	0.6	1.1	0.1	2.7(*)

* Statistically different from zero at $p < .05$.

(*) Statistically different from zero at $p < .10$.

Table reads: "By comparison with their counterparts in classrooms exposed to instruction with little or no extended text writing, students in the highest third of the achievement distribution who are exposed to instruction with extensive opportunities for extended text writing perform 4.2 z-score units (x 10) higher in the spring of Year 1, after initial differences in achievement and poverty level have been taken into account. This result is statistically different from zero at the .05 level...."

a - Raw holistic rating scores on the writing assessment were converted to within-grade z-scores (see explanation in Volume 2).

b - Approach to writing instruction is represented by dummy variables indicating students' presence in classrooms with moderate or extensive opportunities for extended text writing, compared with students in classrooms in which there is little or no extended text writing.

c - Figures in the table are unstandardized B-weights for dummy variables indicating each type of writing instruction. Regression equations include students' pretest score, poverty level, and a dummy variable indicating grade level (see Regression Tables in Volume 2).

this kind, while their high-achieving classmates performed about the same as high-achieving students in classrooms with little or no extended text writing. During the first year, low-achieving students either resembled their high-achieving counterparts (in classrooms offering moderate opportunities for extended text writing) or appeared to benefit somewhat less (in classrooms offering extensive opportunities). We note once again that no formal test of difference between coefficients for high- and low-achieving students was done. Across both years, both groups of students did as well under alternative forms of instruction as children exposed to conventional writing instruction, and often better.

Other Factors That Might Influence Writing Outcomes

Other than the writing approach variables (and student characteristics used as covariates), we considered other factors that might influence writing outcomes, similar to those used in analyses of mathematics and reading: (1) emphasis on language mechanics skills, (2) the teacher's general proficiency at managing instruction, (3) the richness of the teacher's background in language arts, (4) the teacher's expectations for student success in language arts, and (5) the teacher's satisfaction with teaching.

When entered one at a time in regression equations along with writing approach variables and student characteristics, these other factors do little to change the relationship between degree of extended text writing and competence at written composition, as can be seen in Table 52 In other words, the pattern for writing parallels that for mathematics and reading: the approach to writing instruction is consistently and positively linked to students' proficiency at composing text, independent of the amount of attention paid to language mechanics or various characteristics of the teachers.

Some of these variables appear to exert some influence on writing outcomes independent of teaching approach, although the evidence is not always consistent across years. Placing greater emphasis on language mechanics, for example, is significantly and positively associated with competence at

Table 52

ASSOCIATION BETWEEN APPROACH TO WRITING INSTRUCTION AND COMPETENCE AT WRITTEN COMPOSITION, CONTROLLING FOR OTHER INSTRUCTIONAL AND TEACHER VARIABLES, OVER THE SHORT TERM (FALL TO SPRING)

	Difference in scores (z-scores x 10)[a] on the writing assessment at the end of the school year, for students who have extensive opportunities for extended text writing, compared with those who do little or no extended text writing.	
	Year 1: Grades 3, 5	Year 2: Grades 4, 6
When controlling for students' fall pretest and poverty level and for:		
Emphasis on discrete skills	2.2*	2.8*
Teachers' proficiency at managing instruction	3.1*	2.7*
The richness of teachers' backgrounds in subject area, expectations for student success, and satisfaction with teaching	2.5*	3.1*

* Statistically different from zero at $p < .05$.

<u>Table reads</u>: "By comparison with their counterparts in classrooms with little or no extended text writing, students in classrooms with extensive opportunities for extended text writing perform 2.2 z-score units (x 10) higher in the spring of Year 1, after initial differences in achievement, poverty level, and emphasis on discrete skills have been taken into account. This result is statistically different from zero at the .05 level...."

a - Figures in the table are unstandardized B-weights for dummy variables indicating each type of writing instruction. Regression equations include students' pretest score, poverty level, and a dummy variable indicating grade level (see Regression Tables in Volume 2).

written composition in one of the two years (see Regression Tables in Volume 2). This is a curious finding: recall that the emphasis on language mechanics skills directly--as a focus of instruction and often taught out of context--may contribute to students' ability to express themselves in writing, along with opportunities for extended text writing. That is not to say that all approaches to language mechanics teaching are equally effective. From our data, we simply do not know.

In Chapter X, we noted that various instructional strategies (integrating writing with reading, teaching the writing process, etc.) were linked to the amount of extended text writing taking place in the classroom. In addition to being an instructional strategy in its own right, providing numerous opportunities for extended text writing can be thought of as a proxy for the presence of these other strategies. Thus, to an extent, the apparent effects of providing numerous opportunities for extended text writing may be simultaneously a reflection of these various strategies. Further analyses investigated the relationship between each of these strategies and outcomes by using them to predict writing competence scores for both years (see Regression Tables in Volume 2).

The results of these analyses suggest that many of these strategies have a significant association with outcomes, independently of each other (and of student characteristics, which appear in all regression runs as covariates). With two exceptions in each year, the regression coefficients for the six strategies are positive; and in four of the six cases--integrating writing with reading, teaching the writing process, emphasizing meaningful communication over mechanical correctness, and connecting instruction with students' backgrounds--the coefficients are positive and statistically different from zero at the .05 level for at least one year.

As in the case of mathematics, some characteristics of writing teachers also appear to exert influence over writing competence. When included in regressions along with the overall approach to writing instruction and student characteristics, the variable indicating teachers' skill at engaging students in academic tasks (across all subject areas) is positively related to writing competence, and in one of the two years, the regression coefficient is significantly different from zero at the .05 level. Even more obviously, teachers' satisfaction with teaching appears to be strongly and positively linked to writing outcomes in both years. Other characteristics of teachers--subject-area background and expectations for students--are not obviously related to outcome scores, although, as explained in earlier chapters, this is probably a reflection of limited variation on these variables in our sample rather than the fact that subject-area background or expectations for students' success play no role in student learning.

Interpreting the Results of the Writing Outcomes Analysis

Overall, the evidence suggests a conclusion about writing instruction for the children of poverty that parallels what we found for mathematics and reading: strategies aimed at fostering meaningful written communication appear to produce students whose ability to compose written text is superior to that of students in other classroom settings, all other factors being equal. In addition, as in the case of the other two subject areas, these instructional approaches appear to do so with comparable improvement in basic skills, in this case, the students' proficiency at writing mechanically correct text. More consistently than for mathematics or reading, the results appear to persist over 12-month periods of time, although we note that the data to support this conclusion have the same weaknesses as in the other two subject areas.

Our conclusion goes beyond the assertion that given greater opportunities to write, students write better. Such a conclusion can be used to support practices such as providing students a lot of time for relatively unsupervised writing in journals (which many of the classes we studied did). But the classrooms we categorized as emphasizing a high degree of extended writing did much more. In addition to journal writing, teachers in these rooms structured a variety of writing tasks and provided students a great deal of help and feedback with their writing.

These findings and our fieldwork in classrooms suggest that, when given the opportunity to write, the students perceived in writing instruction an important avenue of expression--a chance in the school day to do something enjoyable and, in most cases, personally meaningful. This perception was held by a wide range of students, including children from a variety of backgrounds, those who were already adept at academic work and those who experienced considerable difficulty.

As with analyses of mathematics and reading, there are important qualifications to the writing outcome story we have told. First, the measures we used tell us about students' writing competence as demonstrated in the artificial setting of the writing assessment test. That by itself is not enough to establish that students have mastered effective written communication in a wide variety of settings, even though it is suggestive of more generalized capabilities.

Second, the information we have about students' writing experiences in school is incomplete. We focused data collection on instruction that was intentionally aimed at writing in some way (although not necessarily at the writing of composed extended text). We do not know how much practice in writing students received within other areas of the elementary curriculum, and it is possible that writing social studies or science reports, for example, contributed to students' proficiencies in important ways. Our fieldwork suggests that this kind of writing is not extensive in the schools we studied, but we have no systematic way of checking that assertion across all classrooms.

But overall, the results of these outcome analyses suggest that in school settings serving the children of poverty, a variety of teachers have found success in increasing students' writing competence, both those who start out low achieving and others who start out higher on the achievement spectrum. That is a substantial and noteworthy accomplishment, and is especially important when one considers the tenuous place that writing occupies in the language arts curriculum in many schools serving this student population.

PART FOUR:

CROSS-CUTTING CONSIDERATIONS

In this part, we shift focus from particular subject areas to dimensions of instruction that are not necessarily specific to a subject and the way it is taught. The chapters in this part address, in turn, one of three central challenges confronting teachers who work with the children of poverty: to establish classroom order that supports academic learning, to respond appropriately to diversity in student backgrounds, and to accommodate the wide range of achievement levels in the regular classroom. Regarding each challenge, we analyze the approaches adopted by teachers in the study sample and determine how their approaches are related to instruction aimed at meaning and understanding.

First, in Chapter XII, we examine the nature of the learning environments created by teachers as they attempted to manage academic instruction in their classrooms. Here we identify different kinds of learning environments, ranging from those that can be considered dysfunctional to those that not only establish order but also provide a rich array of learning opportunities. The chapter describes and illustrates each type of environment, and links it to a series of decisions made by teachers about basic management style and the subject matter being taught. Throughout, we argue that academic instruction and classroom management are difficult, if not impossible, to separate. For example, smoothly running classrooms with the widest array of learning strategies and routines were most likely to be teaching for meaning and understanding in each subject area.

Second, in Chapter XIII, we describe how teachers respond to differences in student background. The chapter identifies responses that range from least to most constructive in dealing with the cultural diversity typical of classrooms in which children from low-income backgrounds are concentrated.

Key to the most successful responses is the attempt to recognize and respect these backgrounds, and to connect instruction explicitly to the cultures and life experiences that are familiar to students. Teachers who made these connections were more likely to be focused on meaning and understanding and also more able to engage children in academic learning.

Third, in Chapter XIV, we analyze the ways in which supplemental instruction attempts to accommodate the different achievement levels of students. As the chapter makes clear, supplemental programs are a ubiquitous but highly varied resource in the kinds of schools we studied. Overall, their contribution to instruction aimed at meaning and understanding is uneven; although comprehension of what is read or conceptual understanding of mathematics is sometimes the goal of pullout or in-class supplemental teaching, more often these programs seek to reinforce basic decoding or computation skills. What supplemental programs do best is sort students by their prior achievement and encourage or support the creation of different curricula presumed to be appropriate for each ability level. The evidence summarized in this chapter suggests that supplemental instruction may often be more limiting than its designers intend or realize.

XII MANAGING ACADEMIC LEARNING ENVIRONMENTS

Across the school day, teachers face the task of establishing order in the classroom that supports academic learning. This involves examination of what has traditionally been viewed as "classroom management," as well the intersection of these issues with subject-specific instructional matters. In this section, we focus on this interaction between styles of maintaining an orderly classroom and choices about academic tasks.

For the instructional strategies described in the preceding chapters to be effective, students must be engaged in appropriate academic tasks; they must be actively involved in reading, writing, or mathematics. For this to occur, the classroom--more precisely, the academic learning environment within the room--must be well managed. Although orchestrating the activities and whereabouts of 20 to 35 elementary school children all day long is no small feat in any setting, it is often particularly difficult in classrooms with large numbers of children from low-income families.

Many of the problems that the teachers face in the classrooms we visited are common to all schools: a range of ability levels, students who bring with them problems from outside the classroom, insufficient personnel. These factors tend to be exaggerated in high-poverty schools, and added to these are obstacles that teachers in schools serving more affluent student populations rarely have to confront. Given the demographics and the less-than-ideal working conditions, it is not surprising that a few of the sample classrooms appear "dysfunctional." But despite the adverse conditions, the majority of the teachers in the sample classrooms did amazingly well at creating a constructive academic environment with the odds strongly against them. This chapter will examine the failures and the successes, with a view toward isolating those strategies likely to be effective with this population of children.

The chapter will begin with a discussion of the roots of the problem in all classrooms serving the children of poverty. These are potential problems that faced all the sample teachers to a greater or lesser degree. Second, on the basis of qualitative case reports done for half of the sample in the first year and a third of the sample in the second year, we divide classrooms into categories according to the amount and quality of student engagement in academic tasks across the school day. These groups range from highly effective learning environments to classrooms where management is a serious unsolved problem. Examples will be given for each group, and issues that are central to management style will be described. Third, we look at the characteristics of the students and teachers in each type of learning environment. Fourth, we address particular dimensions of classroom organization and describe how they typically appear in the classrooms of the most and least successful managers. A concluding section examines the interaction between management and the academic learning environment, and summarizes the implications of the management patterns for academic instruction.

<u>The Roots of the Problem in Classrooms Serving the Children of Poverty</u>

Before we examine teachers' attempts to create and maintain order in the classroom, it is important to note at the outset that many of the primary obstacles to an orderly and productive learning environment lie outside the teacher's control. The population of students we are studying and the communities from which they come have a series of attributes that complicate management in any classroom. In poorly managed classrooms, the effects of these factors are manifested in especially obvious ways.

- <u>Mobility</u>. A poor population tends to be a transient one, in both urban and rural environments. Many of our teachers had over a third of the class leave and be replaced during the course of the year. Often new students are incorrectly assigned and then shuffled around to many different classes. The consequences for continuity in the instructional agenda are obvious.

- <u>Nutrition and health</u>. Several teachers mentioned this as a severe problem, particularly in the primary grades. One principal told us that the children's diet was her most pressing concern--several of the children went for days without a meal prepared by an adult. The many children with unstable home situations were visibly exhausted, and many slept during school time. At least two students in fifth-grade classrooms became pregnant during the course of the year.

- Drugs and violence. Many children attending urban schools included in the sample lived in neighborhoods where drug traffic was constant. Some of the older children were apparently involved already, and many of the students were affected by it in various ways: by shootings in their buildings, relatives going to jail, etc.

- Family structure. The majority of the children in our classrooms came from single-parent homes; in other cases, the single guardian was not a parent at all. Teachers found this a particularly difficult problem to overcome. Children usually went home to an empty house and spent most of their out-of-school time unsupervised. Single working parents have a hard time maintaining contact with school personnel.

- Economic constraints. Students often lacked the money to buy basic materials like pencils or notebooks (which were usually in short supply in these schools). Inadequate private and public transportation made it difficult for children to stay for after-school activities and for parents to attend school events.

- Language proficiency. Several of the sample classrooms in one state had children who were monolingual in one of three or four different languages. Even with aides and creative scheduling, such classrooms are challenging.

But the characteristics of the students walking in the school door are only part of the story. Policies, facilities, and the availability of resources in the schools we studied can also make the task of managing a productive learning environment difficult. The joint effects of the following factors conspired against good management in many of the classrooms we have been studying:

- Insufficient resources. Our classrooms almost universally lacked adequate instructional materials. In some cases there weren't enough textbooks to go around; in one district the same "consumable" workbooks had been used by new sets of students for 5 years. Libraries, reference books, and other materials were not always in adequate supply. A great deal of time and energy goes into compensating for inadequate funds, such as the ubiquitous candy bar sales to raise money for essential materials like copier paper.

- High pupil/staff ratios. In the cases where one adult is responsible for more than 30 students, there are usually management problems. Several of our schools received extra personnel through desegregation agreements, so this was not a problem in all of our schools. Many schools had aides to alleviate the problem at least part of the day. Absenteeism among the staff, and the difficulty of obtaining substitutes, created problems even where class sizes were small.

- Physical plant problems. A number of the school buildings we visited were old and in need of repair. More commonly, noise from adjoining rooms (or, in one case, construction) often interfered with teaching.

- External mandates. As will be described in the examples below, teachers had to deal with a number of directives from their states or districts that made life in the classroom more complicated in a number of ways. Many teachers had not received adequate training to implement new curricula; in others, requirements for testing or pacing interfered with the flow of instruction or provoked student resistance.

- Lack of administrative support. Many of the teachers felt that they did not receive enough help in disciplinary matters from the principal. This was the case in all of the "dysfunctional" classrooms we studied. Support was often lacking in other areas as well, including encouragement to experiment with alternative approaches or protection from intrusive external mandates (see Chapter XV).

- A fragmented school day. Many of the students in these classrooms qualified for a number of compensatory education programs or other supplementary services. As is discussed in greater detail in Chapter XIV, they often missed time in the regular classroom and spent extra time in waiting and transitions. In some cases, there was a constant stream of students in and out of the room.

Four Types of Academic Learning Environments

Success in the management of the learning environment is usually readily apparent to an observer: a class is busily engaged in academic tasks, there are few disruptions, and transitions between instructional segments occur smoothly. Teachers are often the first to admit when this is not the case; they are usually painfully aware when their agenda is not being followed.

On the basis of the qualitative data from the classrooms we studied intensively, we first categorized the predominant learning environments within each classroom into three groups. The criterion of interest was the amount and quality of student engagement in academic tasks.

- Dysfunctional learning environments. In certain classrooms, there is a constant struggle to maintain order, and the need to gain control determines much of the interaction in the room.

* Adequate learning environments. In other classrooms, the struggles continue, but the teacher is able to attain a basic level of control. As a result, some academic learning is taking place; at times, more than half the students are engaged in appropriate tasks.

* Orderly learning environments. In this group of classrooms, an effective management system is in place and most students are seriously engaged in academic work.

Classrooms within each of these groups are not identical to each other. In particular, we found that in the well-managed classrooms of the third group--where order is never a pressing issue--combinations of management techniques and instructional strategies created learning environments with a distinctly different "feel" to them. On closer scrutiny, it became apparent that there is something other than the maintenance of order per se that profoundly affects the learning climate. Thus, we were able to further subdivide this group of classrooms as follows:

* Orderly, restrictive learning environments. These occur in smoothly run, highly structured classrooms, where rules and consequences are clear and enforcement is consistent and fair. Usually, these classrooms revolve around a basic system of established, regular routines and a relatively narrow range of instructional strategies. Control is tightly maintained, and there is a certain lack of spontaneity in children's engagement with learning.

* Orderly, enabling learning environments. Routines are much more varied in these classrooms, and learning activities are not as tightly controlled (although the structure is by no means "loose"). Not only are all students seriously engaged most or all of the time, but energy and enthusiasm are evident while children are involved with academic tasks.

We describe each type, with examples, in terms of general classroom atmosphere, management approach, and the way teachers viewed and explained the management pattern in the room. As the discussion makes clear, each type has a characteristic "ethos" that enhances or inhibits academic learning.

Dysfunctional Learning Environments

The study sample includes only a small number of truly "dysfunctional" classrooms. Simply put, they were not pleasant places to be. Because of the need to "keep the lid on," disciplinary matters tended to overwhelm instructional plans. The following example from a rural school is typical of such a room:

- <u>Ms. James' fifth grade</u>. There are more than 30 students of various racial backgrounds in Ms. James' combined fifth-/sixth-grade classroom. All of the students qualify for free lunch. Although occasional bursts of enthusiasm are evident, the class is often filled with an air of tension and frustration. The students seem to like and respect the teacher, but she does not let them get close to her. There seems to be a constant tug of war between her and the students on discipline issues.

  Although Ms. James generally is quite stern with the students, she often allows them to socialize. They are an unusually gregarious group: they take advantage of every opportunity to interact with each other--whispering, calling out, passing notes, moving around--especially during seatwork time. In cyclical fashion, the noise level slowly rises beyond what Ms. James will tolerate. She then angrily warns the class to quiet down, and after a couple of further warnings she signs individuals up for chore duty after school. If the whole class continues to be disruptive, then Ms. James will make everyone "write lines," i.e., fill several sheets of paper with a disciplinary statement or the school's mission statement. Things quiet down for a while, and the cycle begins again.

  Ms. James' students often seem eager to channel their energy into learning activities, and they happily volunteer for group activities that involve reading aloud or writing on the board. However, whenever they have to do anything at their desks, they generally succeed in avoiding the tasks entirely. Unfortunately, long periods of seatwork time usually correspond to the recess sessions that occur right outside the room's windows, as Ms. James tries not to schedule any activities that involve oral communication during this noisy time.

  In mathematics, Ms. James teaches the whole class together. Students are allowed to work on problems in pairs; in theory, a stronger student and a weaker student work together. In practice, the pairs rarely talk about the assignment. During the seatwork time, Ms. James corrects paperwork at her desk and monitors individual behavior. She knows that they need more one-on-one instruction, but she feels that the pacing specified by the district does not allow time for this. About half of the daily math period is devoted to seatwork. Ms. James holds the students accountable by weekly tests and checking off if homework is handed in.

  Reading is also taught in a single group, for fifth and sixth graders together. Although the students are enthusiastic during the times they are allowed to read aloud, they rebel during seatwork time or ignore the teacher during questions about the story.

> These management issues become more pronounced by the end of the year. Especially in math, with little feedback on individual problems, many students have tuned out entirely and no longer make any effort to complete assignments or even to work on the weekly tests.

A number of the issues raised in this example are common ones in poorly managed classrooms. Although seatwork always presents a challenge in maintaining student engagement, it is clearly more of an issue when previous direct instruction has gone way over the heads of some students. In this case, a relatively inexperienced teacher was confronted with a curriculum mandate that required all students to be taught from the same level of material and not be grouped by ability. Having no specific training in this approach, Ms. James was overwhelmed by the more complex management issues it created. This and other dysfunctional classrooms also had the following characteristics.

As in Ms. James' class, the most poorly managed rooms were not constant battle zones. Although there were some nasty incidents, including a few serious fights, there were also occasional moments of laughter and warmth. In fact, study team field staff were surprised to notice that the students often seemed immune to what seemed to be a tense, highly unpleasant situation. The students had developed coping mechanisms, and in many cases managed to enjoy themselves. This energy, however, was not channeled into academic tasks.

Although we were not able to observe in the first 2 weeks of school, it was immediately apparent in many classrooms that important groundwork had been done in establishing order for the year. In the first group of classrooms, however, there was little evidence of this, other than the ubiquitous rules posted at the front of the room. The dysfunctional classrooms had an apparently capricious system of cues for punishment; as in Ms. James' class, it would just be a certain noise level--not always the same one--or some behavior that had gone unnoticed the day before. Under such circumstances, students typically reacted and adapted to perceived personality or mood changes in the teacher more than to established routines.

All the teachers of the dysfunctional classrooms were keenly aware of the problem. Some complained about lack of training or familiarity either with the type of student or the mandated curriculum; all expressed discontent with the administrative support for disciplinary matters. In all cases, the principal was perceived as "too soft" on behavior problems. In fact, in schools where this was the case, even the effective managers echoed this sentiment. Poor managers were also less likely to have a close collegial relationship with other staff members and cited the lack of support from parents in developing students' social skills.

Adequate Learning Environments

The second group of classrooms often began the year with serious problems and managed to improve the situation to the point that many or most students were focused on academics and completing assignments a large proportion of the time. Often, however, order itself became the agenda and enthusiasm was clearly lacking; consequently, disruptions continued to occur. For example:

- Ms. Durgin's approach to managing first grade. This first-grade classroom has 30 students, of mixed race and language background. A very definite routine is in place early in the year and is followed throughout the year without exception. Each day starts out with phonics instruction, followed by worksheets done independently on the "sound of the week." Further direct instruction in reading is followed by additional seatwork. For the most part, students are comfortable in the room because the assignments are always quite manageable for the students. They are eager to do well for the teacher and are virtually guaranteed success.

  Ms. Durgin has few severe disruptions to deal with. The overall atmosphere of the classroom is positive, but not challenging. Students are given simple tasks and are not pushed to be creative or to grasp difficult concepts. When she does need to discipline students, Ms. Durgin is often inconsistent in her approach. She is generally more patient with the students in the morning, when she gently calls students' names to refocus them on task. Usually by the afternoon her patience has worn thin, and she sometimes yells at the students for no greater infractions than had occurred in the morning. In addition, she often talks very loudly into the faces of individual students who do not attend or who are off task. She also occasionally singles students out in front of the classroom when they do not know an answer, which embarrasses them.

> In mathematics, Ms. Durgin struggles with the new concept-oriented curriculum and has trouble explaining difficult issues to the students. After a brief and sometimes confusing explanation, the students work in their workbooks at their own pace. The slower students get farther and farther behind, until by April they are 100 pages behind the faster students (and the lesson of the day doesn't ever apply to the work they are doing). Although Ms. Durgin circulates to help students with their work, there is no formal system for feedback. As the year progresses, more and more students begin to tune out, but few actual disruptions occur.
>
> The situation is similar in reading. In theory, all students are reading the same story--there is no grouping--but in practice students are allowed to move on in their workbooks only when they have completed all tasks for each story. Again, the slower readers are way behind and never doing work related to the story of the day.

This group of classrooms achieved order, but often at the expense of meaningful academic content. The "feel" of these rooms was certainly less hostile and threatening than that of the truly dysfunctional environments. They might be orderly to the extent of being slightly oppressive, with little spontaneity evident, or they might be--depending on the population--quiet and passive. Also in this category were the rarer examples of teachers who had inherited a particularly well-behaved or passive group; discipline was not an issue, but the instruction bored or alienated the students.

Generally, prior groundwork for successful management was much more apparent in the second group of classrooms than in the dysfunctional rooms--if not from the teacher him/herself, then from socialization in previous years. (The observer, and probably the teacher as well, was less likely to fear that something would explode at any moment.) Because management issues were less of a problem, fewer teachers viewed them as barriers. More typically, they described their students as unmotivated and uninterested in learning. Rather than administrative support, they often lamented the lack of support from parents in academic matters.

<u>Orderly, Restrictive Learning Environments</u>

In the third group of classrooms, it was immediately apparent to all observers that students were engaged in the assigned task almost all the time. It was also evident (from a few brief incidents) that achieving this state of affairs was in fact a major accomplishment and took a lot of long, hard work from the teacher. On further examination, however, it was apparent that the "spark" was missing for all or most of the students. Even when assignments were completed and test scores showed that learning had occurred, there was some mild passive resistance evident, as the following example shows.

- Management in Ms. Williams' fifth grade. Ms. Williams is new in her school, and she has between 17 and 20 students in her fifth-grade class. Her class, like the school, is all African-American, and although she has no previous experience with this population, she has worked in a variety of settings with chilaren from low-income backgrounds. The principal places a great deal of emphasis on discipline and improving standardized test scores. From the beginning, Ms. Williams takes firm control of the class, and the level of engagement is very high.

  Ms. Williams is an expert practitioner of the Assertive Discipline System, which is used districtwide. Basically, nothing is done without a cue, a system, or a specified procedure. Most of this constant reinforcement is woven into regular instruction, and disruptions are very rare. Reinforcements come through marbles in the jar (which add up to goodies like videos or popcorn), marks on student desks, or simply the ever-present "Thank you, Curtis, I like the way you're sitting quietly." Ms. Williams smoothly inserts the management into every aspect of instruction--but the system is always running (and the students are clearly aware of it). For example, while weaving among the desks during a math lesson, she almost undetectably places a mark on the permanent tally on the student's desk if she notices appropriate behavior on the way by.

  In general, this results in a very orderly and mostly quiet classroom, which doesn't feel as oppressive as it may sound. Although there is little spontaneity ("Think first, and don't raise your hand to answer until I say 'hands are OK'"), there is also no time wasted during transitions, instructions are clear, and enforcement is very consistent and fair. When disruptions occur (such as when an unmonitored group is doing seatwork), she handles them calmly, never letting herself get drawn into power struggles.

  Academic instruction follows the district-prescribed curriculum closely. Instruction relies exclusively on basals in reading and on texts and worksheets in language arts and math. Academic tasks tend to be fragmented and of short duration, with few visible connections made between one assignment and the other. For example, the 45-minute reading group is often broken up into three or four activities that come from the reading mechanics workbook and the basal reader. A similar organization occurs in math, where, during a 50-minute period, the students may have three sets of review exercises interrupted by a newer skill and a computation game. Students spend approximately half their day completing worksheets or problems printed in the textbook, and this work is monitored carefully and continuously. Ms. Williams records grades for each piece of work every day.

During the teacher-directed portions of instruction, students are eager to contribute. Ms. Williams slows down the pace for students who aren't getting it, and other students don't complain: they are clearly used to this. This is a well-managed, busy classroom, but there is rarely any visible enthusiasm or evidence that students are curious enough to pursue any academic task beyond the minimal requirements. By the end of the year, class and teacher both seem drained from the effort involved in holding it all together.

Not all the classrooms in this group were this meticulously orchestrated. What they have in common is the fact that the instructional agenda was clearly followed: students were involved, academic outcomes were in line with goals and expectations. Although it is not as apparent as in the earlier cases, it was clear that management concerns were still driving some instructional concerns.

Many orderly, restrictive classrooms had a somewhat "looser" feel than the one described above. In many there was a cooperative spirit and more energy. In these cases, discipline still required hard work at times, or some students might have counted themselves out entirely. In short, in classrooms of this sort, management either worked fairly well for all, as above, or well enough for moments of real creativity and bursts of enthusiasm--but not for everyone, and dealing with interruptions was still an important part of the agenda. By comparison with the previous groups, it was clear in these classrooms that a great deal of time and energy had been invested from the beginning of the year to putting a tight management system in place. For most children, the system was running and nonnegotiable. In some cases, it left students out or inhibited spontaneity.

Having solved the major management problems, these teachers were more likely to notice that their instruction lacked a clear direction. They were often aware that many students were going through the motions only, and they welcomed the chance to find out about alternative approaches. However, teachers in this group still thought of parents as a primary cause that students were compliant but unmotivated.

Orderly, Enabling Learning Environments

Teachers' styles in this group of classrooms were varied. Some fit traditional images of strict, no-nonsense teachers; others were more effusive and affectionate. Through a combination of the "right" moves, they all succeeded in making their classrooms highly productive learning environments, where students not only completed assigned tasks but clearly enjoyed coming to school to learn.

- How Ms. Carrera manages her first-grade class. Ms. Carrera's first-grade class in a rural area has 28 children, half Anglo and half Hispanic. In a word, the class "hums." It is a comfortable place where children enjoy being and doing schoolwork; the business of learning is central to everything that is done in the room. Children treat each other and the teacher with respect, as a result of her careful lessons in how to listen to each other, to offer ideas verbally to the class, and to respect what the others say.

  Ms. Carrera's management style is calm and quiet. She is remarkably effective at maintaining order despite the fact that the classroom is one of four clustered together in a semi-open pod arrangement. She uses a combination of quiet reminders, pointing to each seating group (clusters of four desks together), with individual praise for So-and-So, who is sitting nicely now. The result is that students do what she asks the first time she asks, with rare exceptions (which are quickly brought into line), and attention is not drawn to management issues very often.

  The principal remarked that "Ms. Carrera is one of the most organized teachers in the school." Everything has a place and can be found. She has extensive training through a variety of professional development experiences in both language arts and mathematics teaching. The depth of her training is very evident--she has picked up ideas from all of these experiences and has developed a diverse repertoire of activities, many of which she uses on a regular basis. She is an active adapter of curricula for her own purposes. For example, her math program is an eclectic combination of units from DMP, *Math Their Way*, and the textbook that was adopted by the district last year.

  In reading, Ms. Carrera is giving the new mandated basal a "good try," while enhancing it with trade books from the recommended list along with some of her old favorites. She has a very clear sense of what she wants to accomplish and adapts materials flexibly to that end. Students respond to both math and reading with uniform enthusiasm and attention. By May, all the children in the room are reading, many with relative ease, and only a few in halting word-by-word fashion.

With virtually no management issues demanding center stage, the academic focus was obvious in these classrooms. Teacher energies were freed up (largely through their own efforts) to experiment with different instructional methods. Children felt successful, were respectful of each other, and willingly approached the tasks of the day at school. A clear "system" was in place for this group of classrooms from the beginning of the year. Management concerns were seamlessly woven into the fabric of instruction.

None of the teachers in this group of classrooms were resting on their laurels. Indeed, they tended to take more of the responsibility for their students' learning than many of the less effective managers: they were somewhat less likely to blame--as opposed to consider the significance of--other influences (e.g., parents). Many of the expert managers in our sample ascribed their success to the "niceness" of their group this year. Most importantly, they were often the most eager to learn from others and expand their already impressive repertoire of instructional strategies.

Characteristics of Students, Teachers, and School Settings Associated with the Four Types of Learning Environments

What are the students and teachers like in each of the types of classrooms just described? Are the types associated with particular kinds of school and district settings? We now turn to these questions to locate the types of classrooms we have identified within the variety of settings under study. The results of these analyses suggest explanations for the existence of each classroom type, which will be discussed more fully in Chapter XV.

As is demonstrated by Table 53, the student populations served in each type of classroom are not identical, although there is a similar range of students served. To some extent, well-known associations appear--the poorest and lowest-achieving classrooms and those with the highest transiency rates or pupil-staff ratios are less likely, on average, to experience an academic learning environment that is both orderly and academically challenging. Curiously, the percentage of children from low-income backgrounds does not

Table 53

STUDENT, CLASSROOM, AND TEACHER CHARACTERISTICS IN CLASSROOMS WITH DIFFERENT TYPES OF ACADEMIC LEARNING ENVIRONMENTS

	Type of Academic Learning Environment			
	Dysfunctional (n = 6)[a]	Adequate (n = 7)[a]	Orderly, Restrictive (n = 12)[a]	Orderly, Enabling (n = 15)[a]
Student characteristics				
• Poverty level: Percentage receiving free or reduced-price lunch	70 (27)[b]	74 (33)[b]	67 (28)[b]	64 (33)[b]
• Initial achievement level: Fall Pretest, CTBS/4 Reading Comprehension (in NCEs)	36 (7)	41 (7)	45 (13)	45 (10)
Classroom characteristics				
• Class size: Students/class	23 (4)	24 (7)	22 (4)	23 (4)
• Pupil/teacher ratio				
Language arts	20:1 (8)	17:1 (10)	16:1 (7)	14:1 (6)
Mathematics	17:1 (5)	15:1 (9)	14:1 (7)	12:1 (6)
• Mobility rate: Percentage of students leaving by the end of the year	33	28	19	21
Teacher characteristics				
• Richness of teacher's background: Scale from 1 (= lowest) to 6 (= highest)				
Language arts	2.3 (1.7)	2.5 (.9)	2.4 (.8)	3.0 (1.3)
Mathematics	2.3 (1.7)	2.3 (1.6)	2.5 (1.0)	2.6 (1.1)
• Satisfaction with teaching and current situation: Scale from 1 (= least) to 4 (= most)	2.6 (.4)	2.9 (.5)	3.3 (.3)	3.5 (.7)

a - Based on analysis of 40 classrooms studied intensively in Year 1.

b - Standard deviations appear in parentheses.

distinguish among the classrooms of different management types. Classrooms with orderly, enabling learning environments have an average percentage of children of poverty that approaches that for dysfunctional classrooms. It is difficult to ignore the fact that in classrooms in which order is a continuing problem, teachers face a more difficult set of conditions than in more orderly settings.

The profile of teachers associated with each type of classroom instruction, suggested by the data in the table, indicates that there are important differences between those who manage learning environments more and less successfully. As one can see from these figures, teachers who are expert managers tend to have stronger backgrounds in their subject area. This may indicate self-selection of professionally active teachers for innovative ways of doing things or, conversely, that the most successful classroom managers have become more committed to their careers and thus are more likely to seek further involvement in related professional activities. Not surprisingly, the expert managers in classrooms with orderly learning environments also tended to have higher expectations for their students and were more satisfied with teaching as a career and with their own teaching situation. These attitude measures may indicate both realistic estimates of their own capacities to influence student learning and a sense of professional fulfillment.

The types of academic learning environments are not evenly distributed among the district settings we studied, as can be seen from Table 54. In fact, there is a pronounced school and district effect apparent from the patterns that appear in the table--namely, that teachers who manage their classrooms more effectively are clustered in particular districts. This fact should not be given more significance than it deserves; our classroom sample was not a random representation of the districts or the schools under study. Nonetheless, the study sought to include the variety of approaches used in each setting, and the sampling process was likely to identify better-than-average teachers. The associations between types of classrooms and particular settings raise provocative possibilities about the conditions necessary to foster particular approaches to instruction, which we examine in Chapter XV.

Dimensions of Classroom Organization and Management Strategy

The four types of academic learning environments described above differ in both general atmosphere and the amount of learning that is accomplished. By looking more closely at all four types, it is possible to contrast them further on at least the following dimensions of classroom organization and management strategy: (1) ways of dealing with disruptions; (2) consistency of routines; (3) feedback and accountability; (4) motivational strategies; (5) the pacing of academic instruction; (6) the quality and quantity of student-teacher and student-student talk; (7) personalization of instruction; (8) fragmentation or coherence of curriculum; (9) student responsibility for learning; and (10) development of appropriate academic tasks. In approaching most of these various "management" issues, teachers are simultaneously making decisions about orderliness and about subject matter. We discuss these issues in rough order from those that are least implicated with subject-specific decisions to those that are most subject-specific.

Dealing with Disruptions

An important component of classroom management is the ability to handle disciplinary problems appropriately when they occur. Although they tend to happen less often in well-managed classrooms, they are usually also resolved differently.

In the least effectively managed classrooms, punishments for inappropriate behavior were typically arbitrary and unpredictable. Often, the teachers themselves created the major disruptions. It was not uncommon to see a reading group interrupted by a loud admonition from the teacher to someone on the other side of the room. When a lesson is peppered with several of these incidents, it is not surprising that task engagement is intermittent at best.

Another common reaction to behavior problems in classrooms with dysfunctional learning environments was to ignore them entirely until they escalated to an unacceptable level. When this point was reached, all work

Table 54

HOW DIFFERENT TYPES OF ACADEMIC LEARNING ENVIRONMENTS ARE DISTRIBUTED AMONG DISTRICTS[a]

District (n of classrooms)[a]	Percentage of classrooms within each district exhibiting each type of academic learning environment.			
	Dysfunctional (n = 6)	Adequate (n = 7)	Orderly, Restrictive (n = 12)	Orderly, Enabling (n = 15)
State 1				
District 1 (rural) (n = 4)	0[b]	0[b]	25[b]	75[b]
District 2 (urban) (n = 6)	33	33	17	17
District 3 (urban) (n = 8)	25	13	13	50
State 2				
District 4 (urban) (n = 9)	0	22	33	44
State 3				
District 5 (suburban) (n = 9)	22	11	56	11
District 6 (rural) (n = 4)	0	25	25	50

a - Based on analysis of 40 classrooms studied intensively in Year 1.

b - Rows sum to 100 percent, except for rounding error.

generally ceased until order was restored. In the worst cases, the day's agenda was punctuated regularly by intervals of lights-out, heads-down-on-desks, and so forth. The following example is typical of this type of classroom:

- Ms. Landell's approach to classroom disruption: ignoring the escalation of chaos. During the course of a language arts lesson in Ms. Landell's fifth-grade classroom, several students left the room without permission; the class rabbit got loose and jumped around the room, causing the students to twitter and chatter; a pencil flew across the room; one student was stabbed with a pencil and had lead in his hand; several boys were playing with a stencil kit rather than doing the reading lesson; several students were yelling across the room; three boys were popping paper with their pencils; several students were kicking each other; and two boys were giving a dance demonstration in the back. Once or twice, Ms. Landell walked past a girl and didn't appear to notice that she was playing with a radio brought from home. Another time, a student turned her chair to face the back of the room whenever Ms. Landell stood beside her. Once again, Ms. Landell did not acknowledge her behavior. Another student started putting glue all over a basket of crayons and smearing on the desk. In this instance, Ms. Landell did acknowledge what the student was doing and told her to clean up; however, she did not check to see whether the student actually did.

  Behavior of this type occurred throughout the day, until certain offenders were put into "time out." Several of the repeat offenders, however, did not seem to care about the consequences for inappropriate behavior, and they were rarely singled out for punishment.

A third way of dealing with disruptions was through the isolation of the offenders. In extreme cases, this became a permanent situation, and certain students (almost always boys) were relegated to the periphery of the classroom for all activities. In one room, a bookcase separated a potential troublemaker from the rest of the class, and although the teacher claimed that he was given individualized instruction, the site visitor never observed this. More commonly, single students were scattered around the edges of the room with no physical barriers, but they had no deskmates, were left out of groups, and often could not hear the teacher well or see the board.

When disruptions occurred in the more effectively managed classrooms, they almost never were dealt with in an arbitrary fashion--enforcement and punishment were generally more consistent. Some of the expert managers did not treat all children equally, but the variation comes from flexibility based on individual circumstances rather than changes in the teacher's mood. For example, some of the better managers reacted to infractions differently based on their personal knowledge of a student's current home situation. Unlike poor managers, they were much less likely to lose their temper or be sharper with the students at certain times of the day. Achievement of a consistently high level of student engagement almost always meant that the teacher was not an inveterate screamer; disruptions were more often dealt with quietly and privately. Among the expert managers, there were few teachers who raised their voices (although the tone of voice was often quite stern).

In Mr. Pacheco's first-grade class, thoughtful preventive management largely eliminated the need for radical corrective measures:

- Preventive approach to disruptions in Mr. Pacheco's first-grade classroom. The discipline strategies Mr. Pacheco used early in the year did not change. When the class as a whole became noisy, he often reinforced positive behavior of students by complimenting students or tables of students for their attention, behavior, or posture. He had students talk to other students to get their attention, and he also "counted eyes." He had a saying that if the students' eyes were with him, their minds were with him. "We're forgetting about eyes...I need to see eyes." "We're all listening together, thinking together, learning together."

  For the first half of the year, Mr. Pacheco also kept a list on the side board of students who had been warned twice. He called it a "think list." He often reminded the students that when their name was added, they needed to think harder. For every check they got by their name they had to spend 5 minutes at a recess "meeting" with Mr. Pacheco. Later in the year, he just called students' names and did not use a list. The students learned that the consequences were the same.

  The students responded immediately to Mr. Pacheco's discipline strategies. During one observation, the class was sitting on the rug discussing the solar system and astronauts when Mr. Pacheco told a student that he had to leave. With no discussion or comment, the student stood up and walked to the tables and sat down. He was later asked to rejoin the group. The class was never disrupted to discipline one or several students. These occasions were woven into the fabric of the lesson so smoothly that they could easily slip by unnoticed.

The second two strategies described above--ignoring behavior and isolation of troublemakers--were also used occasionally by the most effective managers, but in different ways. Good managers are excellent judges of when to intervene and when to overlook small infractions, mindful of the fact that an intervention is itself an interruption that might have further negative consequences for instruction. In some cases, this means overlooking small incidents in the interest of keeping the flow going.

In even the most smoothly run classrooms, it may be necessary occasionally to pull a student or two away from the rest of the group to keep everyone from becoming distracted. In the hands of expert managers, however, this device was used sparingly and for relatively short periods. Putting a student into "time out" to keep him or her from dominating the class interaction was never allowed to become a de facto tracking mechanism.

Consistency of Routines

Many teachers talk about the need for structure in classrooms with students from low-income homes. This typically translates into the establishment of consistent routines throughout the day and year, so that little time is lost while making transitions and performance expectations are clear. In dysfunctional classrooms, routines do exist, but they are generally dull and repetitive (30 minutes of seatwork drill immediately following every math lesson), or they are not created with clear expectations about behavior during each segment. Routines alone, without predictable consequences or challenge, become numbing for students, and they soon learn that going through the motions is sufficient. Also, even in the adequately managed classrooms where structures are clearer, the routinization of academic tasks without allowances for student differences (except with the occasional help of an aide) almost guarantees that engagement will be low for part of the class.

In the more successfully managed classrooms, there is very little "dead time" when any group of students is waiting for directions about what to do next, and this fact alone clearly increases the amount of time focused on academics. The expertly managed classrooms, although structures and schedules are clearly in place, don't suffer from the "overmanaged" feel of some of the orderly, restrictive classrooms. The freedom that comes from having shaped a responsive and respectful group creates flexibility to change routines when new approaches seem called for.

Feedback and Accountability

Questions of feedback and accountability are closely related to the issue of predictable consequences and apply equally to both management and instructional concerns. This is perhaps the area where the learning environments of dysfunctional classrooms differ most sharply from those of effectively managed classrooms. Indeed, in examining the characteristics of the classrooms within each of the four groups, a rather clear continuum of monitoring activity emerged. This ranges from almost no--or extremely capricious--attention to what students are doing, to occasional feedback for behavior and achievement, to careful record keeping with grades or points, to regular use of formal and informal assessment to inform further teaching practice. Simply put, the best managers are outstanding monitors, and the poorest managers are inattentive to, or unaware of, student progress.

In dysfunctional classrooms, monitoring and feedback are sporadic at best, and consequences are often random. It is important to note that although a clear, consistent management system will maintain order, constructive engagement in academic tasks generally results only when feedback is prompt and useful for those tasks. In poorly managed classrooms, both disruptions and incomplete assignments may often go unnoticed. In the third-grade classroom described below, the students' attention was minimal:

- Sporadic monitoring in Ms. Jones' third-grade classroom. Ms. Jones' classroom is best described as mildly chaotic and tense. Monitoring strategies are sporadic at best: sometimes she uses a point system for good behavior, along with checks and names on the board for bad, but there seems to be no pattern as to when this system is in operation.

  The noise and level of inattention rise at various times throughout the day, until the entire class is reprimanded (loudly) or one child is singled out for her wrath. During instructional activities, her monitoring is extremely inconsistent. For example, when she asks, "Is book a noun or a pronoun?" and half the class yells out each answer, she will say "Right" and move on to the next prompt. When five students are at the board doing math problems, she pays attention to only one--sometimes not even noticing whether the others have copied the problem incorrectly.

In reading, accountability for workbook tasks is so haphazard that completing assignments is generally understood to be voluntary.

In the classrooms with "adequate" learning environments, more academic work was done (i.e., more tasks were completed). In general, this was a result of a more structured feedback system than existed in the dysfunctional environments. There were more likely to be predictable consequences if assignments were not completed (e.g., 10 minutes less of recess if math homework was not done). Often, a systematic approach to accounting for assignments (done/not done) was sufficient to inspire completion, and this was evident in most classrooms of this type. However, this was not enough to inspire dedication to, or interest in, the task, since it gave the student no feedback about quality of effort.

In the classrooms with orderly learning environments, students were generally more closely monitored, both for disciplinary infractions and for academic work. These above-average managers were more likely to tell an observer exactly how any student was doing on a given task, and the students themselves received ongoing praise or correction. In some cases, the teachers actually used information from constant interaction with the students to adjust pace or tasks, or to expand the review portion of the lesson. In the less effective classrooms, this use of feedback to inform instructional planning was extremely rare.

Monitoring in the most effectively managed classrooms was nearly constant, and the incentive system worked well because students knew they would be judged on the quality of their effort. These teachers were the legendary ones with "eyes in the back of their heads," and students were keenly aware of this. Moreover, even among those teachers who closely followed a mandated curriculum, pace and approach were modified according to an ongoing assessment of student need.

* Constant monitoring in Ms. Pasco's third-grade classroom. In Ms. Pasco's classroom, student involvement in academic tasks is extremely high, despite the fact that the students represent a wide range of achievement levels. Much of Ms. Pasco's success in dealing with student differences comes from her constant monitoring of student progress. Following the district mandate, most of language arts instruction occurs in a whole-class arrangement (the teacher has eliminated reading groups). A lot of reading instruction involves the whole class reading text together, and Ms. Pasco is very concerned about the needs of the low-ability readers. A lot of her instructional strategies were developed to help the slower readers understand the meaning of the text.

  Ms. Pasco occasionally works with small groups of students selected at random. The purpose of these groups is to assess student progress. During approximately 10-minute sessions, she has students take turns reading a few sentences. She usually does not interrupt them as they read, but sometimes she explains the meaning of words in the text she thinks they might not know and occasionally asks some questions to see whether the students understand what they are reading.

  During the limited amount of weekly seatwork time (consisting of a teacher-prepared packet of materials related to that week's theme), Ms. Pasco works with the students who appear to be having trouble.

As noted in the next section, careful monitoring of learning does not necessarily imply constant evaluation for correctness. The expert managers used a wide range of evaluation criteria, and standards varied by instructional style. Reading teachers can play close attention to level of understanding or mechanics or both. The best monitors were not always the teachers with the strongest emphasis on right answers.

Motivational Strategies

Teachers use a variety of approaches to motivating students, and many of these are closely connected to the feedback mechanisms in place. In Year 2 of the study, when all the classrooms studied intensively except one fell into one of the two orderly categories, we paid particular attention to the ways teachers captured (or lost) student interest in academic work.

In particular, we asked observers to focus on the teacher's motivational orientation in order to distinguish those classrooms where teacher strategies stressed completion of tasks from those where challenge and thinking were emphasized. We then asked them to characterize the classrooms accordingly as either "learning oriented" or "performance oriented." Following the work of Brophy (1983) and Marshall (1988), we were looking for distinctions between incentive systems that were based on intrinsic vs. extrinsic rewards.

Not surprisingly, many of the successful managers used both types of approaches to motivating students, often combining some variation of a point/demerit system with emphasis on the meaning and value of the academic tasks required. However, teachers from classrooms with orderly, restrictive learning environments tended to rely more heavily on extrinsic reward systems.

In several classrooms with orderly, enabling learning environments, monitoring and feedback are exhaustive, but may not be so closely connected to specific consequences. In these rooms, it is apparent that for most students learning is indeed its own reward. For example, in one inner-city sixth grade, we overheard an unusual amount of "free-time" conversation about books the students were reading and possible ways of solving the problem puzzles teachers had made and displayed in the cafeteria. At another inner-city school, a fourth-grade teacher constantly reminded students that the purpose of various activities was to learn, to accept challenges, or to have fun rather than simply to "win the game" or get the right answer.

One of the Year 2 second-grade classrooms included a number of students who had had significant behavior problems with their teacher the previous year. Their new teacher--an expert manager--succeeded in getting their attention early on, and the students quickly came to enjoy the challenging work they were required to do. The teacher used a variety of approaches to cultivate motivation to learn (rather than merely to complete tasks), including modeling of interest in ideas and designing challenging but carefully structured activities.

A few of the most successful managers were able to shift the locus of the reward system as students became more independently motivated over the course of the year. In one sixth-grade classroom, for example, the teacher had established an elaborate system of rewards for both work habits and behavior. By midyear, all but one of these systems had disappeared. The one that remained was the class point reward system for everyone working hard or everyone handing in homework. Students had learned to be responsible for their own learning and could now exert pressure on one another for academic performance to attain group goals. In several classrooms, this internalized accountability system was evident to observers; several site visitors similarly described the motivational orientation of different classrooms by noting that "point systems don't seem to be necessary in this room."

Pacing

The pace of the instructional agenda may affect management concerns in two ways. Many teachers proceed through lessons at a brisk pace as a management technique, and this may be a successful motivational device. On the other hand, in the dysfunctional classrooms, teachers were more likely to march through material to meet the requirements of the district's scope-and-sequence directives, unaware that the majority of students were being left behind. Many students became effectively "lost" for the year, although some were adept at mimicking appropriate behaviors.

In one classroom, for example, the following lesson took place on the day when the teacher felt she needed to cover congruence in mathematics. The teacher decided to have the students make congruent shapes with manipulatives. She handed out the blocks and said:

> "What we have here are pattern blocks. I want you to make some congruent shapes on this paper and trace them. Now these are someone else's and I don't want to see anyone stealing them. I'll come to your house and look for them. Now make some figures and trace them."

The teacher and aide then spent the next 20 minutes walking around telling students to sit down, to be quiet, and to draw their figures. Only 3 of the 21 students drew congruent figures; most just drew pictures or made bridges or other objects with the manipulatives. Students weren't bothered as long as they were on task, although many students clearly had no idea what the task was. In this way, the classroom "got through" the concept of congruence.

In the more competently managed classrooms, much of the off-task behavior that occurs stems from inappropriate pacing and the resulting inability to hold students' interest. In the best-managed classrooms, the pace of lessons varies more according to student response and is rarely fixed, as it is in classrooms with dysfunctional or adequate learning environments. In classrooms with orderly but restrictive learning environments, teachers were still very conscious of curriculum guidelines and often focused on "getting through" a specified amount of material in a given time period.

In the most effectively managed classrooms, the pace of instruction tended to vary by task and degree of student understanding. When the pace was uniformly brisk, special arrangements were made for students who didn't catch on immediately, whether or not there was ability grouping--for example, all students might read the same material, while the slower readers had extra practice on the same readings with an aide.

There was great variation in the amount of pressure teachers experienced to stay on track or, in some cases, to be on a particular chapter on a particular day. Furthermore, there were enormous differences in how teachers responded to this pressure. Some teachers, particularly inexperienced ones or ones new to a mandated curriculum, adhered exclusively to the scope-and-sequence guidelines provided by the teachers' manuals. Partly to give themselves a sense of structure and partly as a management technique, they were unwilling to provide their own embellishments to the recommended activities. With a relatively homogeneous group, a brisk, steady pace by the book can be a successful management tool. Too often, however, many students are left behind, eventually tuning out and frequently causing disruptions along the way.

More creative teachers (and those who were more confident in their management skills) were often more flexible in pacing. Some could keep up a steady beat but vary the rhythm for some students; others used creative grouping arrangements to address student differences--sometimes even when these were proscribed by the district or school management.

The interrelationship between rate of instructional delivery and classroom management underscores the complexity of searching for explanations of teacher effectiveness. Although pacing can be fruitfully used as a management tool, it is itself affected by management concerns. Questions of appropriate pacing become still more complex when choices about how fast to move, how much to review, and when to move on are constrained by decisions made outside the classroom.

Student and Teacher Talk

The amount and quality of student-teacher and student-student discourse are obviously determined by many factors besides management concerns--most importantly, the requirements of specific academic tasks. The relationship between classroom discourse and management is a complex one, since the quality of talk can be both a facilitator and an outcome of effective classroom organization.

In classrooms that were less well managed, discussion of behavioral matters tended to dominate student-teacher interaction--the teacher scolds an offender, the student responds to the allegation. In the more extreme cases, evaluative comments by the teacher occurred throughout lessons, and variations of "Of course you don't know the answer--you were talking to your neighbor" punctuate all or most of the interaction. Because of the predominance of management concerns, little extended discourse about academic matters occurs. In one extreme example, a third-grade teacher stated that her foremost goal in reading was for the students to "learn to sit quietly and listen"; since they had not internalized this, for the last few months of the year she did not allow them to read or do anything during the schoolwide Sustained Silent Reading Time.

As teachers become more competent managers, less talk time is devoted to procedural and behavioral matters. However, in classrooms with "adequate" learning environments, teachers were typically still uncomfortable with extended discourse on any topic, and direct instruction tended to occur in short segments with rapid-fire, closed-ended questioning sequences. Some of these teachers were trying partner and cooperative learning arrangements with varying degrees of success; without careful monitoring, these tasks seemed to engage students for short periods of time only.

In classrooms with orderly, restrictive learning environments, where management is effective but uninspiring, student-teacher interaction was still highly structured and formulaic, although teachers in these classrooms tended to be better managers of cooperative learning activities when they attempted them. Since an orderly classroom allows for more spontaneous activity on the part of both teacher and student, teachers had freedom to experiment with extended discussions and different forms of student-student interaction. Teachers who created orderly, enabling environments took advantage of the opportunity. Although interaction might still be of the traditional question-and-answer type, these teachers were often more comfortable with--and more expert at managing--cooperative or peer learning activities. The following example is typical of one teacher's first grade:

- Spontaneous peer interaction in Ms. Brown's first grade. Student-student and student-teacher interaction occurred frequently and fairly constantly throughout math instruction. During the lesson on counting systems, the student-student interaction increased spontaneously when Ms. Brown instructed the class, "I want you to take out 25 cents worth of nickels. How many? Five. How many nickels in 25 cents? Five." Ms. Brown did not tell them to work together, but the students started punching them out of the cards and counting them together. Those who finished quickly helped the others.

  During another lesson on different ways of getting the sum of five, the students worked in pairs with baskets of manipulatives to make different patterns. They came to Ms. Brown in their pairs and showed her how many different ways they could make five. Later in the year, this pattern continued even when the students were working on computation worksheets.

  This type of peer interaction also occurred during language arts activities. In both language arts and math, the students were extremely enthusiastic about their work. This high level of engagement did not mean that this was a quiet classroom. There was often a great deal of activity and noise in the room. As students finished their work and had it checked, they began free-time activities that were student-directed and interactive.

Personalization of Instruction

Making instruction personally meaningful to students can increase student engagement in academic tasks and encourage general cooperation with the teacher's agenda, thereby reducing potential management problems. This may be accomplished in a number of ways; individual teacher choices about personal connections to students often reflect personality differences and comfort levels with diverse populations rather than training. In our sample of classrooms, the more expert managers were more likely to demonstrate some combination of the following approaches.

Showing respect for, and interest in, students as individuals. Many teachers simply showed more consideration for their students as people; this was evident in the way they spoke, listened, and responded to them. In some cases, this meant that teachers also knew a great deal about their students' personal circumstances and family backgrounds. A few teachers worked or lived in the community (one had taught for years in the local YWCA) and had maintained relationships with the families over time. Others had less direct experience with the families, but nevertheless made efforts to understand students' unique circumstances. This attention does not necessarily translate into altered instructional approaches, and more restrictive teachers were just as likely as enabling teachers to develop this type of personal connection with students.

Using personal experiences as a basis for teaching concepts and skills. Many teachers used their knowledge of student backgrounds to elicit interest in and explain academic tasks. Common examples of this approach, evident across management styles, include reference to practical application in the learning of skills and linking reading and writing activities to students' own lives. In several cases where teachers were not comfortable probing for student feelings, they freely used anecdotes from their own lives to introduce or embellish material.

In classrooms with orderly, enabling learning environments, teachers were more likely to draw frequently on an experiential base for instructional purposes. A few teachers used student personal experiences as the source of integration of material across subject areas. One sixth-grade teacher, an enthusiastic proponent of integrated approaches to language arts instruction, told us, "Ultimately, everything that is taught should be tied to the real world." For her, all student learning consists of students' constructing meaning out of their own experiences, and her ideal curriculum would have all instruction revolve around themes that facilitate this process.

Acknowledging and respecting students' cultural backgrounds. The teachers' ability to personalize instruction reflected their beliefs about, and approach to, differences in student backgrounds. Because this issue is so central to instruction aimed at the children of poverty, we deal with it at length in a separate chapter (Chapter XIII). As shown in that chapter, teachers who communicated to students that their cultural backgrounds were of value in the classroom engaged the children more consistently in academic learning.

Fragmentation or Coherence

The maintenance of order in the classroom and the effectiveness of the academic learning environment may both be influenced by the fragmentation of student experiences across the school day. This lack of coherence in instruction may come about in a number of ways.

Division of learning activities into discrete segments without explicit connections among them. This common cause of reduced student engagement in poorly managed classrooms seems to derive from a number of sources. First, some inexperienced (or unimaginative) teachers who rarely venture away from the teacher's manual will often construct a series of lessons that are episodic and fragmented. Second, some districts may reinforce these distinctions by requiring adherence to sometimes illogical sequences of instruction (e.g., practice for standardized tests). Finally, more traditional teachers may impose structure on themselves as a management tool, thus conforming rigidly to time slots of their own creation. In all these cases, students are left to make connections among tasks by themselves, and many are not able to do so.

Interruptions in instructional flow caused by school schedule imperatives. Many of the reasons for lack of instructional coherence are beyond the control of the teacher (see Chapter XV for a discussion of school and district influences on instruction). Although many of our classrooms followed the traditional elementary pattern of students' remaining with their teacher for most or all of the day, other schools were departmentalized for math and reading, rotated in "circles" for different subjects, offered instruction in special subjects away from the home classroom, or had a number of pullout programs. These programs may have important instructional benefits, but the net effect of these arrangements was often to reduce or eliminate the possibility of uninterrupted blocks of time for instruction, thereby making continuity--and management- problematic.

Unsuccessful attempts at integration across subject areas. Because there is increasing awareness of the need to help students make connections in order to learn material effectively, more teachers are attempting to relate different tasks to each other. Often, however, something seems to get lost in the translation; we saw numerous examples of lessons where the links were used more as segues from one activity to another, with little or no follow-up. For example, in one second-grade rural classroom, the teacher often tried to connect tasks in different subject areas:

- A missed opportunity to help students make conceptual connections. On one day, Ms. Julius had the class do a mapping exercise in social studies. In math, the students had to string rubber bands across peg boards and then describe to another student how to construct the same shape without looking at the example; the point was that in giving and receiving instructions, students would have to use rows and columns of pegs as coordinates to complete the task successfully. It was clear that both exercises were designed to be used together through the concept of coordinates, longitude, and latitude. However, Ms. Julius never made this link explicit; nor, as it turns out, did she rely on longitude and latitude during the mapping exercise, although the words were reviewed just before pulling out the maps. In similar activities, Ms. Julius often fails to reinforce connections, and potentially coherent lessons appear fragmented.

Among the teachers who established orderly, enabling learning environments, we did observe many examples of successful integration. A few of our teachers relied on rotating themes (oceans, the forest floor) and derived lessons in all subject areas from them. At least two of our teachers were adamant about refusing to incorporate required activities, such as test practice or word lists, if they seemed inappropriate or were presented out of context.

Lack of coordination between supplemental programs and instruction in the regular classroom. The sources of fragmentation discussed above were often exacerbated by a lack of connection between supplemental and regular instruction, as will be discussed more fully in Chapter XIV. When it occurred, this problem was due partly to forces beyond the control of the classroom teacher (e.g., supplemental program staffing and operating procedures), but teachers who created the most effective learning environments took steps on their own to minimize the tendencies toward fragmentation that often accompany supplemental instruction.

Student Responsibility for Learning

Very few of the teachers with dysfunctional or adequate learning environments ever successfully ceded partial control of the learning process to their students. A number of teachers had tried activities that required more active student participation (peer helping, cooperative learning) and subsequently retreated from these approaches because they felt that students did not do well without constant monitoring and structure. Classrooms with orderly, restrictive environments were almost entirely teacher-directed; although expertly managed, they never allowed student input into the structuring of tasks other than in brief intervals after assigned work was completed.

In classrooms with orderly, enabling environments, although instructional agendas were still controlled predominantly by the teacher, there was allowance for more student discretion and responsibility. Whereas some teachers moved into more independent learning as the year progressed, a few were able to orchestrate student-directed activities successfully from the first day by carefully explaining ways of making choices and making expectations clear. Teacher modeling of thinking strategies, steps in problem solving, or approaches to group work was evident in every classroom where students were actively engaged in independent work. One second-grade teacher, for example, frequently modeled "good help" (showing another student how you arrived at the solution) and "bad help" (just giving someone the answer) when students worked in pairs to solve a problem. A sixth-grade teacher encouraged a great deal of student-student interaction, but structured it carefully to ensure that students are meaningfully engaged:

- A structured approach to student-student interaction. Ms. Liu draws on the TRIBES social skills program to help guide her frequent cooperative learning activities. Before students start their group activity, Ms. Liu sets the stage and makes expectations explicit. Sometimes she asks them, "What should I see when you're working together?" and they respond with comments such as "heads together," "Siamese," "leaning on your chin and elbows." She then asks, "What might I hear if you're working together?" and they answer, "talking," "compliments," "oh, yeah!" and "help me." Another time she told the class, "The skill you're working on is involvement." Indeed, she often spent time talking with the students about the group process itself and how it works best. After one group activity, Ms. Liu asked the students to think about the kinds of participation that went on in the group: "Look at how your group participated. Did people talk together? Were heads together? Was there eye contact? If not, talk about that in your group.... How did you come to agreement? Looks like most did. Is it OK to disagree sometimes?" In her attempt to help the students understand how they learn, Ms. Liu asked the reporter to write down "the thinking that goes on in the group." When she realized that reporters were only writing down the steps that they used to get the right answer, she encouraged them to describe what they tried that did not work as well.

Other teachers of this sort focus on strategies for independent learning throughout the school day on nongroup tasks as well. One fourth-grade teacher in a rural school emphasizes the responsibility students have for their own learning by sticking to a simple rule: she never gives answers to student questions if they are capable of figuring it out by themselves, by asking a friend, or consulting a reference.

Designing Appropriate Academic Tasks

Teachers clearly differ in their ability to draw on a wide repertoire of management techniques. Sometimes a structured system works well, but even then teachers must be flexible enough to deal with unexpected disruptions and unfamiliar problems. Although fairness and consistency are general advantages in maintaining classroom order, some teachers do make allowances for individual students' circumstances: what works for some children will not necessarily be right for everyone.

Perhaps the most difficult skill of all involves the ongoing selection of appropriate academic tasks. Teachers in sample classrooms varied enormously on this dimension. This essential component of effective instruction is related to pacing, monitoring, and grouping arrangements. Many of the less effective managers were more likely to rely exclusively on published materials for assignments and sequence. Expert managers were more able to adapt materials flexibly to their changing student needs. We observed only a few teachers who were consistently able to achieve a balance between challenge and opportunities for success. Like appropriate pacing, this is a component of both an orderly classroom and effective instruction. The majority of the disruptions and off-task behaviors we observed in the classroom can be traced to either frustration or boredom, which in turn emerges from tasks that are too difficult or from routinized tasks that are completed mechanically and without interest.

Managing the Learning Environment Across the School Day

In this final section, we first address similarities and differences in management styles in all subject areas across the school day. We then focus on the relationship between management and the academic learning environment and suggest some implications for academic instruction.

Similarities and Differences Across Subject Areas

Not surprisingly, most teachers tend to be fairly consistent across the school day in their approach to the first few management dimensions discussed above: dealing with disruptions, consistency of routines, feedback, and accountability. These dimensions appear to be more related to personal style, and the resulting classroom climate is relatively constant. This was not the case for those dimensions more closely tied to instructional decisions, such as pacing, student interaction, and student responsibility for learning. These approaches depend on teacher beliefs, background, and subject matter knowledge. As a result, many of the teachers we studied seemed very different at various points during the day.

At least two of the Year 2 teachers, for example, emphasized the importance of learning concepts in mathematics through extensive use of manipulatives and small-group work, while remaining faithful to a traditional basal, worksheets, and ditto system in reading. Conversely, many of our teachers employed a variety of strategies to maximize understanding in reading--some even giving up the basal series altogether--while following the math textbook to the letter. From our interviews, it was evident that most of these cases can be explained by different levels of training. Implementing alternative approaches is hard work and requires a great deal of organization and planning; few teachers are able to attempt them in several areas simultaneously (this issue is discussed more fully in Chapter XV).

Expert managers with unusual confidence in their abilities were able to alternate instructional patterns to suit specific goals across the school day. One second-grade teacher created two distinctly different learning environments well suited to her academic goals. When students are sitting on the rug in rows in front the teacher, they are to attend to the teacher and refrain from talking to other students. During these segments, the teacher is usually giving information or asking questions to assess their understanding. When students work on specific assignments, they are allowed to work wherever they choose within the room; they may talk with each other and move around freely. Because the teacher monitors the students continuously throughout the less structured segments, student engagement is high throughout the day.

The Relationship Between Order and the Academic Learning Environment

Teachers' ability to create effective learning environments depends on a combination of management style and instructional decisions. When management concerns are paramount, choices about instructional strategies may be more limited. Even when maintaining order is not a persistent problem, successful implementation of activities that provide challenging learning opportunities requires a great deal of teachers--even expert managers. As Doyle (1991) points out, presenting students with novel work makes tricky demands on teachers: given the level of ambiguity and possible frustration implicit in these tasks, student engagement is likely to be uneven much of the time. Teachers often respond defensively by relaxing accountability standards or significantly reducing their demands for higher-level tasks.

During our 2 years of data collection, we paid particular attention to isolating those factors that seemed to contribute to classroom environments where students are engaged in meaningful work. The following characteristics appear to be most influential in facilitating an appropriate balance between management demands and instructional choices.

Degree of teacher tolerance for noise, ambiguity, and uneven engagement patterns. Challenging and novel classroom activities are often noisy and may require a great deal of student movement. We found that many teachers simply have different thresholds of sensitivity to the amount of disorder required by much independent or group work. A few of the most expert managers were able to retain a sense of control over their own agenda while allowing for a great deal of student participation. Those with less confidence in their abilities to keep the program of action in place will rein students in long before. One of our second-grade teachers described her difficulty in giving control to students. When she worked with math manipulatives, engagement rates seemed intermittent; she preferred to lead them through the friendly, fast-paced competitions of math facts that kept 100 percent of the students on task.

Teacher background and preparation in subject matter. From the teachers we observed who took risks with challenging activities in one subject area and not in another, it was invariably the case that teachers had less training, and were far less confident, in the activity where they followed traditional practice.

Teacher beliefs about the needs of the particular population. One teacher told us that she would not do more independent activities with her class that was two-thirds boys because "boys need more structure." Teacher convictions about what kind of environment will most benefit their group affect decisions about both discipline and academic matters. Typically, teachers who believe that students need a firm grounding in the basics will adopt a more elaborate incentive system to maintain order, combined with carefully defined, nonambiguous tasks emphasizing correctness--the proverbial "tight ship." On the other hand, those teachers in our sample who had firm convictions about the necessity for students to learn through constructing their own meanings made many of their instructional and management decisions accordingly.

Characteristics of classroom groups. Some classroom groups are better suited to project work and independent learning. Those that have had coaching in similar strategies in previous years, for example, are much more likely candidates. Classrooms with high transiency rates may be at a particular disadvantage when it comes to more challenging activities, since learning to work productively together is often a long, cumulative process. Indeed, those teachers in our sample with the highest mobility rates were typically the least adventurous.

Teacher ability to motivate students without exclusive reliance on external reward systems. Complex and challenging tasks are least amenable to structured accountability systems with points earned along the way for task completion. Teachers who were able to capture and maintain student interest in academic work in other ways achieved much better results with novel approaches.

Teacher facility with design of appropriate tasks and consistent monitoring. The classrooms where meaningful learning was taking place were run by teachers who successfully achieved the delicate balance between challenging students enough to keep them highly engaged and demanding too much and causing them to lose interest. This balance was achieved through accurate ongoing monitoring of student progress, frequent modeling of strategies, and carefully structured activities with explicit directions. The high level of task engagement that results from such a thoughtful orchestration of events makes attention to management per se nearly unnecessary.

The perfect combination of the above elements was rare in the classrooms in our sample. In these few cases, described throughout the chapter, instructional decisions were able to take center stage. More often, interaction between ways of maintaining order and the implementation of instructional strategies was reciprocal and dynamic; management issues and academic considerations would each dominate the scene for periods of time. Our concern should be to create the conditions, some of which are described above, under which instructional choices can consistently dictate management decisions, rather than the reverse.

Implications for Academic Instruction

In the final analysis, it is clear that "management" of the academic learning environment and the nature of what is taught or how it is taught are inextricably linked. It is thus not surprising to find the association so clearly presented in Table 55: nearly all of the managers of "orderly, enabling" learning environments approach the teaching of one or more of the three subjects under study in the "most alternative" way considered in this study. Conversely, those teachers confronting a continuing problem of order in their rooms are unlikely to choose the most alternative instructional strategies. A third or fewer of them have been classified that way.

There is no simple way to disentangle the reciprocal relationship between management and instruction that is implied by such a finding. An orderly environment for learning is thus both a prerequisite for academic instruction and learning, and a consequence of the kinds of academic work students do.

Table 55

RELATIONSHIP BETWEEN ACADEMIC LEARNING ENVIRONMENT AND ALTERNATIVE INSTRUCTIONAL APPROACHES

Type of Academic Learning Environment (n of classrooms[a])	Of classrooms with each type of learning environment, the percentage (and number) exhibiting the most alternative approach to instruction in one or more areas.[b]
Dysfunctional (n = 6)	33% (2)
Adequate (n = 7)	28% (2)
Orderly	
• Restrictive (n = 12)	50% (6)
• Enabling (n = 15)	87% (13)

a - Based on analysis of 40 classrooms studied intensively in Year 1.

b - "Most alternative" = (1) in mathematics, focus on multiple topics with attention to conceptual understanding; (2) in reading, high emphasis on strategies that maximize understanding; and (3) in writing, extensive opportunities for writing extended text.

Nonetheless, the nature of the learning environment as we have defined it--a quality that pervades the school day--is not synonymous with the approach to instruction in a particular subject area. Although they were likely to be actively pursuing instruction aimed at meaning and understanding in at least one subject area, few teachers with orderly, enabling environments did so in all three subjects (see discussion in Chapter XV).

The problem of establishing classroom order confronts teachers in the kinds of schools we are studying from the very first day of the year. At that time, laying a secure foundation for human interactions in the room over the year is all-important; without a reasonable resolution of the ensuing struggle, not much academic learning of any kind will take place. The most effective managers describe the process of laying this foundation in almost the same terms as any aspect of their curriculum: it is a curriculum to be taught and must be explicitly and systematically introduced to students, with associated rewards, sanctions, and reinforcement. Success with this curriculum early in the year may or may not be accompanied by immediate academic learning--little may have been conveyed about the content of reading, mathematics, or whatever, but children feel safe, respected, and attended to, at the same time that they feel pushed and expected to perform. The importance of reaching this point cannot be overestimated in classrooms serving large numbers of children from low-income families.

Yet, in a paradoxical way, the resolution of management issues reflects children's response to the kind of work and work routines they experience. Students in the kinds of classrooms we have been studying typically are not patient with work that is frustrating (because it appears too difficult, incomprehensible, or embarrassing) or, on the other hand, mindless (because it demands too little of them or is simply repetitive). Thus, in classrooms in which there is a great deal of seatwork that is unconnected (in the students' minds) to anything important, interesting, or even familiar, teachers face a more difficult time establishing order effectively in the classroom. This is ironic because some of these teachers emphasize seatwork precisely because they want to control the class. Classrooms with an interesting and varied diet of academic work are more likely to fall into an acceptable or exemplary management pattern.

The resolution of basic management issues--those related to the achievement of an orderly learning environment--cuts across subject areas. Although there are important connections between how the classroom is managed and the way particular subjects are taught, teachers in the study classrooms all exhibit a basic management style that pervades all parts of the school day. Thus, those who manage reading instruction well are, for the most part, likely to establish an orderly environment during mathematics lessons, and so on. But that is not to say that teachers are able to create an "orderly, enabling" learning environment in more than one subject area. Conversely, classrooms with dysfunctional learning environments tend to exhibit poor management in all subject areas. The management challenge to teachers in schools serving the children of poverty thus encompasses all areas of the curriculum.

Ultimately, choices about management approach affect the kind of academic learning experience available to children. At the same time that management issues tend to be resolved at a level that transcends the teaching and learning of particular subject areas, choices of management approach predispose those subjects to be taught in certain ways or rule out other kinds of teaching, or both. The "tight"--and, from one perspective, "effective"--management of classrooms with orderly, restrictive learning environments, for example, appears to inhibit spontaneous responses of students to tasks, ideas, or discoveries they may be making as the school day unfolds. In such circumstances, extended discussion of the meaning of what has been read (a key dimension of reading instruction in Chapter VII) or student-student interaction while writing (an important dimension of writing instruction, as described in Chapter X) are unlikely to happen. Thus, the nature of the management system can interfere with, or enhance, the prospects for certain kinds of instructional activity.

Our overall conclusion is that the more classrooms exhibit orderly, enabling learning environments, the more room there is for academic/

instructional considerations to guide or control what is taught and how it is taught, and the more evidence there is that such considerations have already been paramount in the teacher's instructional planning and execution. On the whole, we were struck by how often the academic learning environment was set by management choices made with little thought to academics, rather than vice versa. In the extreme case of the dysfunctional classroom, this fact is obvious; in many other classrooms, academic learning is happening, but it seems to be driven as much or more by basic management considerations as by academic-learning goals. On the other hand, the more classrooms exhibit orderly, enabling learning environments, the more freedom teachers seem to feel--or create for themselves--to experiment with and enrich the academic curriculum they are teaching.

XIII MAKING ACADEMIC INSTRUCTION WORK FOR CHILDREN FROM DIFFERENT BACKGROUNDS

This study examines effective instructional strategies in schools and classrooms with a high percentage of the children from low-income families. Up to this point in the report, we have dealt primarily with the "children of poverty" as a monolithic group. In fact, the student sample is quite diverse (as is this segment of the student population generally), varying along a number of key dimensions, as suggested by the following demographic characteristics:

- Poverty level. The schools and classrooms we studied serve students who are relatively poor--on average, 65 percent receive free or reduced-price lunches. However, the sample of students range from those whose families are in extreme poverty to those who come from middle-class, professional families.

- Ethnicity/Race. Drawn from three states in diverse geographic regions, our student sample includes a broad range of ethnic and racial groups: overall, 25 percent are white, 42 percent African-American, 18 percent Hispanic, 9 percent Asian/Pacific Islander, 1 percent American Indian, and 5 percent "Other." Yet even these categories mask important differences within groups. For example, the "Asian/Pacific Islander" group includes Filipino, Japanese, Chinese, Laotian, Cambodian, and Samoan students.

- English-language proficiency. The study sample included a small number of recent immigrants with no English proficiency, a significant number of students whose home language was other than English and who demonstrated various levels of limited English proficiency, and other students who spoke nonstandard English in their home communities.

Students in the study sample come from a variety of family backgrounds and national origins. The following portraits of students on whom we collected more detailed information illustrate backgrounds that differ from the mainstream culture of many students within each school:

- Claude. Claude is an African-American boy in the third grade of an inner-city elementary school serving a diverse population of students. Claude's father is incarcerated, and his mother is only intermittently involved in his life. Yet Claude's grandparents, with whom he has lived for the past few years, are highly supportive of his education. They have bought him a computer and regularly show up at school to talk to his teacher and remind her that any problems should be reported to them immediately. Claude is one of the top students in the class and functions as the class computer expert, knowing the Apple IIe much better than either the teacher or the instructional aide.

- Yee. Yee is a first-grade student in an urban school. He and his family immigrated last year from Hong Kong. Both of Yee's parents are very supportive of his schooling, although they have little formal education of their own and speak virtually no English (the mother is a seamstress and the father is a cook in a popular Chinese restaurant). Because he does not think the neighborhood streets are safe, Yee's father walks him to school and picks him up each day. Unfortunately, Yee's father is often forced to work overtime, leaving Yee in the custody of his teacher until 5:30 or 6:00 p.m. some days.

- Marisa. Marisa, a third grader, came to this country from El Salvador 3 years ago. She lives with her parents, an uncle and aunt, and her three brothers and sisters in a two-bedroom apartment near school. Marisa's parents, according to the teacher, understand little about the structure of schools in the United States, yet they believe that school is important and make sure that Marisa gets the same message. Marisa shows up at school each day with a freshly pressed dress and a new ribbon in her hair, applies herself assiduously through the day, and always stays after school to help the teacher clean the room. She is, in the words of her teacher, "an angel."

As these portraits show, children are much more complex than their demographic markers alone indicate. Being Hispanic or poor or immigrant by itself tells us relatively little. Yet our work, as well as previous research (e.g., Heath, 1983), suggests that there are concrete aspects of students' backgrounds (which are often highly correlated with ethnicity, poverty, and immigrant status) that do affect how students respond to instruction and content. We know that students arrive at school with patterns of discourse, ways of interacting with adults and peers, and perceptions of the purpose of schooling and their likelihood of success. These culturally generated characteristics may help to explain how the children interpret and react to what takes place in the classroom. Differences in students' cultural backgrounds may also affect how teachers react and what opportunities they offer students.

The relationship between student background and classroom teaching and learning raises two questions that we have not addressed up to this point: How do teachers respond to students from different backgrounds? Do their responses have any effects on student engagement or student learning? Previous research in the area suggests that teachers' responses can be important determinants of school functioning (Delpit, 1988; Tharp, 1989; Winfield, 1986). This and other research (see Shields, 1991, for a review) suggest the following working hypothesis:

> *In general, the more teachers acknowledge, demonstrate respect for, and build on the skills, knowledge, language, and behavior patterns that students bring to school, the more likely students will be to become engaged in, and benefit from, academic learning.*

In the remainder of this chapter we will address the two questions and the hypothesis in light of our study findings. First, drawing on both quantitative and qualitative data sources, we describe how teachers in sample classrooms respond to differences in students' backgrounds. Next, we examine how differences in teachers' responses are related to both student engagement and the broader instructional strategies teachers use to convey content. Finally, we summarize our findings and discuss their implications.

In presenting the following analysis, we emphasize that the study was not designed explicitly to address the issue of teachers' response to students' background. For example, we do not have systematic data on the cultural relevance of instructional materials that teachers introduce. Still, classroom observers were trained to consider how teachers took student differences into account. The following analysis is based on the sections of the qualitative classroom reports and the coding forms that address this issue.

<u>How Teachers Respond to Differences in Student Background</u>

On the basis of the classroom reports, we can categorize teachers along two overlapping dimensions regarding their treatment of differences in students' backgrounds. The first of these combines teachers' perceptions of students' backgrounds (positive or negative) and teachers' actions (to provide appropriate learning opportunities or to exclude students from such opportunities). We use the terms <u>constructive</u> and <u>nonconstructive</u> to describe the two ends of this dimension. This category is similar to Winfield's (1986) differentiation between teachers who assume responsibility for student learning and those who shift that responsibility to the students or others. Constructive teachers believe that students can learn, whereas nonconstructive teachers begin with the assumption that students are inherently limited in their ability to learn because of their backgrounds.

The second dimension involves the degree to which teachers are consciously aware of student differences and actively take steps to deal with them. We label the two ends of this dimension <u>passive</u> and <u>active</u>. Teachers on the passive end of the continuum either don't notice or choose to ignore differences in student backgrounds. In contrast, active teachers believe that they understand the important characteristics of their students' backgrounds, and they use teaching strategies and curricular materials that reflect their convictions.

We combine these two dimensions into a single continuum along which we can array the sample teachers' responses to student differences. As portrayed in Figure 4, we use the degree of constructiveness as the key dimension, noting that there are both active and passive responses in each of these categories. The figure reflects the working hypothesis, which could be restated simply as "the more teachers take students' backgrounds into account to increase learning opportunities, the better for student engagement and learning." Thus, the most constructive responses are those at the far right of the continuum, that is, those that most actively take students' backgrounds into account for constructive purposes. Following the same logic, responses that actively take students' backgrounds into account in a negative sense are considered the most nonconstructive. Passive responses fall somewhere along the middle of the continuum.

Figure 4

A CONTINUUM OF TEACHERS' RESPONSES TO DIFFERENCES IN STUDENTS' BACKGROUNDS

Nonconstructive				Constructive
Active	Passive	Passive	Active	Proactive

Using this framework, we have categorized sample teachers into five groups according to their predominant style of response to student differences: "nonconstructive, active"; "nonconstructive, passive"; "constructive, passive"; "constructive, active"; and "constructive, proactive." The last category includes a small number of especially active teachers. Following, we describe each of these categories and provide specific examples.

Nonconstructive, Active Responses

A small set of teachers hold negative stereotypes about students from specific backgrounds. They believe that all but the exceptional child from a certain cultural or economic group possess significant limitations that cannot be overcome. Teachers holding these beliefs are likely to take active steps in the classroom to restrict the academic opportunities of such students. Some teachers in this category rationalize their behavior by saying that they do not want to embarrass or frustrate these students with work that is too difficult or advanced. An example of this type of response in action follows:

- Low expectations in an urban first grade. Ms. MacDonald's first-grade class, like the school as a whole, is approximately 50 percent Hispanic, 50 percent white. Ms. MacDonald locates the roots of the problems in her classroom in the home lives of the Hispanic students. According to her, factors like sexual abuse and a lack of proper nutrition--which are out of her control--make it next to impossible for her Hispanic students to learn in class. Observations throughout the school year show that Ms. MacDonald's perceptions result in different treatment of Hispanic and white students. White students are routinely not criticized for behavior that would lead to punishment for the Hispanic children. Ms. MacDonald calls only on white students to read aloud--arguing that it is better not to embarrass the Hispanic children, who she claims will learn more by listening to proper models. The "high" group in the class is all white and receives all of its instruction from Ms. MacDonald; the "low" group is all Hispanic and receives most of its instruction from a classroom aide, who is bilingual.

Ms. MacDonald's teaching strategies demonstrate how negative beliefs about students' backgrounds lead to lower expectations (e.g., that they would not be able to read aloud), which in turn lead her to provide students with fewer learning opportunities. Not surprisingly, Hispanic students perform poorly in this classroom, a fact that Ms. MacDonald paradoxically uses to justify her methods further.

Nonconstructive, Passive Responses

Other teachers hold no prejudice against students because of their backgrounds, yet at the same time know little or nothing about children's lives outside of school that might affect their participation in instruction. This ignorance leads to missed opportunities, lessons that are often irrelevant to children's lives, and sometimes misunderstanding of student behavior, resulting in misjudgments of students' needs. Perhaps in an attempt to avoid controversy or overt discrimination, teachers who respond to student differences in this way often teach a "homogenized" curriculum in which all students are viewed and treated as middle class and "all-American."

- A culturally homogenized curriculum in an urban third-grade classroom. Ms. Ryles has been a third-grade teacher for 30 years, 25 of those years in her current school. Until 3 years ago, when implementation of a court order resulted in the busing of students, her school and students were all white. Now most of the students in the school, and all the students in her classroom, are African-American. On the surface, this radical shift in the composition of her classroom does not seem to faze Ms. Ryles. She doesn't know much, if anything, about her students' home lives and doesn't think it important to know such things, given her overall belief that "for the most part these kids are capable of learning."

> Because she does not see this group of students as fundamentally different from her previous classes, Ms. Ryles has made no changes to either the content or the strategy of her instruction. Although this stance appears to be neutral, we perceived many missed opportunities in her classrooms. For example, one day Ms. Ryles taught a lesson on Navajo Indians, noting, "A long time ago, Indians were the only people who lived in this country. Then the Europeans came along and bought all their land. So the government put aside some land just for the Indians to have for their own. They reserved the land for them--just like you reserve a seat at [a downtown concert hall]--and that's why it's called a reservation."
>
> Although Ms. Ryles' account could be considered inappropriate for any student group, it seems especially so for her class of African-Americans, all of whom came from low-income backgrounds. Although her previous students may have made reservations at the concert hall, this group generally does not. Moreover, she obviously missed an opportunity to explore parallels and differences regarding the experiences of Native Americans and African-Americans. In any case, her rendition of the story of the Navajos sparked little interest in the students, reflecting a broader lack of intellectual excitement and engaged learning in the classroom.

In essence, Ms. Ryles' classroom is not an exciting place to learn--and this seems to be at least in part a function of her ignorance of her students' lives outside of school and her inability to connect learning to their lives.

Constructive, Passive Responses

On the surface, constructive, passive responses are similar to those in the nonconstructive, passive category. They demonstrate no negative attitudes or dispositions toward student differences, nor do they represent adaptations of teaching and content to accommodate or reflect these differences. Unlike those in the nonconstructive, passive group, however, teachers who respond more constructively tend to possess a basic awareness of students' backgrounds (some are very familiar with students' cultures). In addition, these teachers possess uniformly high expectations for students, regardless of their backgrounds.

Perhaps most importantly, teachers who respond to student differences in a constructive, passive manner design and implement instruction so that students can bring their personal experiences into the classroom. For example, students may be asked to write about something important to them. Yet, in creating such experiences, the teacher does not design assignments to be based on specific aspects of the students' backgrounds (e.g., reading stories about leaving home or traveling to strange country in a class with many immigrant students). Thus, the learning experience approaches the students' experience in a somewhat passive manner. The following example illustrates this type of response in action.

- High expectations, a focus on learning, and missed opportunities in an inner-city sixth-grade classroom. Ms. King teaches sixth-grade reading in an inner-city alternative school emphasizing mathematics and science. Half of the class population is African-American, and the other half is white. The socioeconomic status of the students ranges from low to middle income. Academically, the students achieve at average and above-average levels. Some speak in Black English vernacular, some in Appalachian dialect; others speak Standard English. Ms. King has high expectations for these students: "I will not lower my standards because of any student's background.... Students will rise to meet what I expect, and I expect much. If I did not, they would lower their performance to move down to the low standards I set."

  She is also concerned that the curriculum she presents be relevant to her students. "Anything that is taught should be tied to the real world." Thus, in a social studies lesson on Russia, she asks students to write about the similarities and differences between their lives and the lives of children in Russia. In a discussion of a book about a character left alone on an island, she asks students to address their own feelings about isolation.

  However, her definition of the "real world" does not include approaching students on the basis of their specific cultural background. For example, during a discussion of death and violence, one student shared, "A cop got beat up" in her neighborhood. Ms. King immediately attended to the student's use of language. "You mean a police officer?" Another student reporting on police abuse then volunteered the information that "a police officer" hurt a man. He used the vocabulary that Ms. King desired, but the conversation that followed did not directly address the issue of police-community relations, although the opportunity had presented itself.

  In sum, Ms. King is an enthusiastic, academically demanding teacher. She elicits high engagement from her students. She challenges their thinking and accepts their comments in class. But she does not design instruction or choose content that is explicitly tied to students' backgrounds.

For teachers who respond to students in constructive, passive ways, uniform student skill development (including higher-order skills) is the overarching goal of the class. Students are expected to succeed in spite of their backgrounds. At the same time, perhaps because of their lack of focus on students' backgrounds, these teachers appear to miss opportunities to build on what students do know and fail to draw connections in the material to students' out-of-school lives.

Constructive, Active Responses

Like their more passive counterparts, teachers who approach student differences in a constructive, active way tend to hold uniformly high expectations for student learning and believe that it is possible to overcome whatever disadvantages certain students bring to school (e.g., a lack of print awareness). Unlike the previous group, however, these teachers believe that good teaching must build explicitly on students' cultural backgrounds. For these teachers, it is important to communicate to students explicitly that their cultural background is not a "problem" to be overcome but a strength to be acknowledged and taken advantage of.

- Acknowledging student differences in an urban first grade. Mr. Callio teaches mathematics to a combined first-/second-grade bilingual class and language arts to English-dominant first graders. He is bilingual in Spanish and English and has taught this population of students (Latino, African-American, and white) for 12 years, 9 of which have been at this school. A strong sense of community and a dedication to multiculturalism characterize the faculty of this school. Mr. Callio has had training in bilingual education and is a mentor teacher.

  Mr. Callio's classroom is alive with pictures from different parts of the world, showing the different ethnic, racial, and cultural groups represented in his students. One display reads: *"Yo soy Latino y orgulloso"* ("I am Latin and proud of it") in big letters surrounded by pictures of pyramids, indigenous Mesoamericans, and other Latino faces. Another reads, "I am African-American and proud" and has pictures of African people, places, and artifacts. These changed to Chinese pictures with English, Spanish, and Chinese labels when it was Lunar New Year and to student-made materials for International Women's Month and Cinco de Mayo. The decor of the room reflects awareness and respect of different cultures and races and the accomplishments of women, and it demonstrates an honoring of students' work. Mr. Callio argues that it is imperative to provide positive self-images and role models if a teacher expects students to be driven to succeed.

> Mr. Callio uses his Spanish extensively in the classroom--and not simply to help those students with limited English proficiency. Rather, he argues that Spanish is an important language to know and encourages his monolingual English speakers to try to learn it. One of the top students in the class, an African-American male, regularly tries to piece together Spanish sentences. Other examples of Mr. Callio's attempts to bring culture into the classroom include his use of Spanish dance steps in telling stories and the use of trade books based on African folk tales.
>
> Within this context, Mr. Callio holds high expectations for his students and demands strict accountability for the work assigned to them. In general, his teaching focuses on higher-order skills and conceptual thinking. Yet, he recognizes that this particular population of students does not arrive at school with all the skills he would like them to have. So, for example, he incorporated phonics into his reading instruction because his students do not have a firm basis in decoding. In short, Mr. Callio's approach reflects both a respect for the strengths and an awareness of the problems of students' preparation for school.

Teachers of this sort base their response to student differences on an awareness of home or background factors that can constrain school performance, but also on a recognition of the strengths that their students bring to the classroom. They acknowledge students' backgrounds by adapting aspects of the curriculum content and style, building student background into the classroom activities and routines. However, these teachers do not initiate curricula explicitly designed to deal with student differences.

<u>Constructive, Proactive Responses</u>

The final category includes actions that represent an especially proactive approach to student differences. Like the previous group of teachers, those who respond proactively share a commitment to seeing students achieve with their cultures intact and celebrated. Like their active counterparts, these teachers are aware of the strengths students bring with them to school as well as the extra-school factors that can hinder students' academic performance; and they are also confident that, within their classrooms, students can achieve. These teachers believe that they can create conditions within their classrooms that will enable <u>all</u> students to learn.

Beyond affirming each culture, however, teachers who respond proactively design instruction to build explicitly on students' strengths and to address and ameliorate academic or social problems partly rooted in students' home lives. In addition to choosing a specific curricular material or exercise (e.g., a trade book about Africa or an essay on slavery) to maintain students' interest and communicate a respect for culture, as do teachers responding in a constructive active manner, proactive teachers alter the method of teaching in response to students' cultural characteristics. These teachers not only use content and strategy to send signals of respect and to pique interest, but also seek to take advantage of culturally generated ways of learning to teach students to acquire new skills.

- Building curriculum around student differences. Ms. Tonouchi teaches a fifth-grade class of 26 students, over half of whom are of Asian descent. Ms. Tonouchi is Japanese-American and speaks "passable" Spanish, Japanese, and French. She works hard to create opportunities for students to bring their cultures into the classroom and to communicate to students a respect for their cultures.

  For example, Ms. Tonouchi sought and received extra funds from a local foundation to purchase a series of trade books that would serve as the basic reading material in the class. The books focused heavily on the lives of inner-city minority adolescents and their struggles growing up in big cities. She explicitly chose books that addressed issues relevant to Asian students, who she thinks are often overlooked in discussions about minority youngsters. Moreover, in every subject area, Ms. Tonouchi worked hard to provide opportunities for students to direct their own learning. In mathematics, students choose the topics they will analyze for graph-making exercises, for example. In language arts, students are asked to write short books, following the structure of a book or story the class has read, based on important characters in their own lives.

  Beyond these activities, Ms. Tonouchi also adapts instruction in response to students' strengths and weaknesses. For example, she recognizes that her Asian students possess the strength of being able to work on their own with little structure from the teacher. She builds on this (and uses the students as role models for others) by providing many opportunities for students to direct their own learning in small groups. At the same time, she argues that many Asians are at a disadvantage in this school because of their shyness and reticence to speak out in class--a trait respected in certain Asian cultures but often disabling in this school of many strong personalities. Consequently, Ms. Tonouchi structures numerous learning opportunities in which students are required to speak out forcefully. She asks the students to participate in dramatic activities (they recently staged a class performance of "The Three

Pigs Operetta"), and often uses bean-bag tossing and other techniques to get students out of their chairs and "acting out" (in a positive way) during class.

What differentiates what Ms. Tonouchi and her proactive colleagues do from the way other teachers in our sample respond to student differences is that they fashion their instruction in relation to generalized characteristics of students' home cultures.

Teachers' Responses in Relation to Instruction and Student Engagement

In an attempt to make sense of the teachers' complex responses to student backgrounds, we have used the qualitative classroom reports to describe five types of responses. Like all typologies, this one is somewhat artificial. There is really a continuum of instructional responses, ranging from those that exclude students from learning opportunities because of their backgrounds to those that are explicitly tailored to fit the learning styles of students from certain cultural groups. Of course, there are few classrooms in our sample at these extremes. Most teachers we have studied are relatively passive about dealing with student differences, either because they are ignorant of such differences or because they argue that differences are unimportant. Moreover, because teachers do not always respond in the same way and may change their approach to student differences as the school year unfolds or when teaching different subjects, it is often difficult to classify individual teachers. We have opted instead to categorize their responses into recognizable, modal types and to carry out analyses based on the predominant pattern of responses that typifies each classroom.

Quantitative data from observations of instruction in all sample classrooms provide a way of looking systematically across all classrooms in the sample at teacher response to student differences. For each classroom observation, the coding form included a question that addressed teachers' response to students' backgrounds for each subject area. For example, following each round of visiting, observers answered the following regarding the teaching of writing: "In what ways did instruction across this week connect writing to students' backgrounds or base of experience?" In response, observers could mark up to four categories: "No connection to students' lives"; "Students wrote about themselves or their experiences"; "Discussion was aimed at personal or cultural implications of writing topics"; and "Prewriting activities highlighted students' backgrounds." Similar questions were asked about instruction in reading and mathematics.

Although these types of connections represent only one aspect of teachers' response to student backgrounds and so do not reflect all dimensions of the typology of responses discussed above, the connections and the response are highly related. Using the observation codes as a rough indicator of the nature of teachers' responses to students' backgrounds, we are able to conduct analyses using the full sample of teachers for the 2 years of the study. Table 56 shows the overall patterns of teacher response for each of the three subject areas and in each year. Here we have classified classrooms according to the variety of ways in which instruction was connected with students' backgrounds.*

Several patterns emerge, generally consistent with the typology of responses described above. On the whole, teachers do not take many steps to connect instruction to students' backgrounds. For each subject area in each year, instruction in the majority of classrooms (ranging from 65 percent for Year 2 writing to 88 percent for Year 2 mathematics) made little or no connection to students' backgrounds. In contrast, only a small percentage regularly connect their instruction to students' backgrounds in two or more ways. Perhaps reflecting the nature of the subject matter and traditions for teaching it, connections to students' lives were more likely to be made in reading and in writing than in mathematics.

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* By averaging across observation periods the number of different ways instruction was connected with students' backgrounds, we created an index ranging from 0.0 (= connections were never made) to 4.0 (= three or more types of connections were made).

Table 56

EXTENT TO WHICH TEACHERS CONNECT INSTRUCTION TO STUDENTS' BACKGROUNDS

Extent of Connection[a]	Reading	Writing	Mathematics
	Of all teachers conducting instruction in each subject area, the percentage exhibiting each degree of connection.		
Year 1	(n = 62)[b]	(n = 51)[b]	(n = 66)[b]
None	26	20	42
Little	55	59	44
Moderate	15	22	14
Extensive	5	0	0
	101[c]	101[c]	100[c]
Year 2	(n = 68)[b]	(n = 69)[b]	(n = 67)[b]
None	19	15	34
Little	49	49	54
Moderate	30	29	11
Extensive	3	7	2
	101[c]	100[c]	101[c]

a - Based on an index indicating the variety of ways in which instruction connected with students' backgrounds (see Volume 2).

b - In most instances, the same teachers are counted in the tally for each subject area, because most sample teachers taught all three subjects. A few classrooms had departmentalized arrangements, in which different teachers took mathematics and language arts. The numbers in each subject area differ slightly because of missing cases and, in the case of writing, teachers who simply taught no writing at all.

c - Percentages do not all sum to 100 percent because of rounding error.

Implications for Teaching and Learning

How teachers respond to students' backgrounds has important implications for teaching and learning in the classroom. Our descriptions of the five different types of response point to a number of possible positive and negative effects of the different approaches on the learning environment of the classroom.

At one extreme, classrooms in which nonconstructive, active responses predominate have a number of characteristics that are likely to impede student learning. Because of their cultural background, some students in these classrooms are excluded from important learning opportunities. In Ms. MacDonald's first-grade classroom described above, for example, Hispanic students are not given the opportunity to read orally. In other such classrooms, children of a certain background are physically separated from the other children and often are taught by a less qualified instructional assistant. For the students who are denied learning opportunities, these are not effective classrooms. Student engagement tends to be low; in such situations, little learning is likely to take place.

Classrooms in which teachers tend to respond in nonconstructive, passive ways appear to be less damaging for students. These teachers do not actively exclude students from learning, yet through ignorance of students' backgrounds, lessons often appear to be irrelevant to students and teachers sometimes misunderstand students' actions and work. In addition to not relating instruction to students' lives, these teachers also tend to take fewer steps to help students direct their own learning. These teachers tend to run conventional, teacher-directed classrooms focused on acquiring basic skills. Overall, these classrooms tend to be unexciting places to learn, and student engagement appears to be relatively low.

Classrooms in which teachers' responses were classified as constructive, passive, by contrast, are apparently good places to learn. The teachers hold high expectations, believing that all students can and should achieve, regardless of their background. These teachers tend to go beyond a focus on the acquisition of basic skills, creating opportunities for students to think critically, communicate meaningfully, and address real-world problems. As such, although these classrooms are generally taught in ways that conform to the "conventional wisdom" described at the beginning of this report, they are structured to allow students to direct their own learning to some extent. Consequently, learning in these classrooms includes opportunities for students to relate their lessons to their own lives (for example, by creating original prose to communicate about something important to them). These are classrooms in which students appear to enjoy learning and in which students are highly engaged in academic pursuits. At the same time, these classrooms are characterized by apparent missed opportunities; because teachers fail to take students' backgrounds into account, what is learned may have less intrinsic value and interest for students.

In classrooms typified by constructive, active and proactive responses to student differences, teachers also expect all students to achieve at high levels in both basic and more advanced skills. They differ from the previous category of classrooms in their explicit and active connection of classroom learning to student backgrounds. Moreover, teaching in these classrooms is more likely to fit an alternative model providing extensive opportunities for students to direct their own learning and placing relatively greater emphasis on conceptual understanding and meaningful communication, as opposed to a primary emphasis on skill learning. In general, these are exciting places to learn in which students are highly engaged in innovative projects, often involving teamwork, and are likely to be learning a great deal.

Thus, the classroom reports suggest that as teachers move along a continuum from responses that exclude students from learning opportunities because of their backgrounds, to those that ignore such differences, to those that build on these differences as learning opportunities, student engagement and excitement for learning seem to increase. In Table 57, we examine the relationship between student engagement and the extent to which teachers connect instruction to student backgrounds.

Table 57

THE RELATIONSHIP BETWEEN STUDENT ENGAGEMENT AND THE EXTENT TO WHICH TEACHERS CONNECT INSTRUCTION TO STUDENTS' BACKGROUNDS

Extent of Connection[a]	Student Engagement Ratings[b]		
	Mathematics	Reading	Writing
Year 1	(n = 62)	(n = 61)	(n = 50)
None	4.0 (1.0)[c]	3.6 (1.3)	4.2 (1.1)[c]
Little	4.1 (.7)	4.2 (.7)	4.1 (.7)
Moderate	4.0 (1.3)	4.5 (.4)	4.4 (.5)
Extensive	--[d]	4.8 (.3)	--[d]
Year 2	(n = 67)	(n = 67)	(n = 65)
None	3.9 (.7)	3.4 (.5)	2.9 (1.3)
Little	4.1 (.8)	4.1 (.7)	4.1 (.7)
Moderate	4.3 (.4)	4.2 (.6)	4.2 (.5)
Extensive	--[d]	4.7 (.4)	4.4 (.3)

a - Based on an index indicating the variety of ways in which instruction connected with students' backgrounds (see Volume 2).

b - Scale averaged across observed classes, from 1 (= consistently low engagement) to 5 (= consistently high engagement).

c - Standard deviations appear in parentheses.

d - No cases or only one case in this cell.

These figures from the full sample of classrooms show a fairly consistent pattern for reading and writing: except Year 1 writing classrooms, the more the teacher took steps to bring students' backgrounds into the classroom, the more students were engaged in academic learning. For mathematics, however, there is no consistent pattern (although, in the second year, a slight trend in the same direction as reading and writing)--reflecting, in part, the fact that very few teachers make explicit connections to student backgrounds in that subject area (see Table 56).

To be sure, the differences in engagement rates shown in the table are relatively small, reflecting the limited range of variation on this variable in the sample of classrooms we chose to study. Nonetheless, the pattern in the data regarding language arts instruction is unmistakable, if subtle: closer connection to student backgrounds is clearly linked with higher student engagement.

Our analysis of the qualitative classroom reports also suggests that the more teachers directly tie instruction to student backgrounds, the more likely they are to adopt alternative instructional approaches marked by a focus on conceptual understanding and critical thinking. These are the teachers who focus on both skills and concept learning in multiple mathematical topics, who provide significant amounts of time for extended text writing, and who emphasize strategies aimed at maximizing understanding in reading. Thus, looking across the full sample of teachers, we would expect teachers rated highest in their efforts to relate to students' lives to be those who have adopted the most alternative approaches to instruction in one or more of these subject areas.*

Table 58 examines this relationship with all sample teachers for the 2 years of the study. Here, for both years and all three subject areas, the relationship suggested by qualitative classroom reports holds up well in the full sample of teachers. In most cases, a majority of teachers who connect

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* As explored in Chapter XV, few teachers in our sample were likely to be pursuing the most alternative instructional strategy in all three subject areas.

Table 58

RELATIONSHIP BETWEEN TEACHING FOR MEANING AND THE EXTENT TO WHICH TEACHERS CONNECT INSTRUCTION TO STUDENTS' BACKGROUNDS

Extent of Connection[a]	Of all teachers exhibiting each degree of connection to students' backgrounds, the percentage placing high emphasis on meaning and understanding.[b]		
	Mathematics	Reading	Writing
Year 1	(n = 62)	(n = 62)	(n = 32)
None	4	13	25
Little	21	18	29
Moderate	67	56	43
Extensive	--[d]	33	--[d]
Year 2	(n = 67)	(n = 68)	(n = 42)[c]
None	13	0	0
Little	33	24	20
Moderate	57	35	54
Extensive	100	50	75

a - Based on an index indicating the variety of ways in which instruction connected with students' backgrounds.

b - "High emphasis on meaning and understanding" = (1) in mathematics, focus on multiple topics with attention to conceptual understanding; (2) in reading, high emphasis on strategies that maximize understanding; and (3) in writing, offering extensive opportunities for extended text writing.

c - Excludes grades 1 and 2; in Year 1, grades 3 and 5; in Year 2, grades 4 and 6.

d - No cases in this cell.

instruction to students' backgrounds to a moderate or high degree are also teachers who place the greatest emphasis on meaning and understanding in reading, writing, or mathematics instruction. In contrast, only a handful of teachers who do not connect instruction to students' lives are also teachers who focus instruction on conceptual understanding and meaningful communication. As we have shown in previous chapters, students in these classrooms also tend to achieve at relatively high levels in both basic and higher-order skills.

Teachers' response to students' differing backgrounds is but a single part of the complex way teachers manage instruction and learning in their classrooms. The classroom reports suggest that teachers who hold negative perceptions of students from certain backgrounds often manage classrooms, adopt disciplinary approaches, and group students in ways that restrict student opportunities and fail to engage students' attention. At the other extreme, the reports suggest that teachers who view students' backgrounds positively tend to organize instruction in ways that increase learning opportunities and provide for more student-directed learning that engages students in exciting learning tasks.

From this perspective, the fact that in the full sample of teachers we can show (in reading and writing) that student engagement in learning is positively related to the extent to which teachers take student backgrounds into account does not suggest that teachers' attempts to connect instruction to students' lives by itself leads to higher engagement. Rather, we would argue that the vast majority of teachers who actively seek to build their instruction on student backgrounds manage instruction in a variety of ways that in combination create an exciting learning atmosphere that engages students. Put a different way, we would argue that one reason alternative approaches to instruction result in higher student achievement is that such approaches tend to include active strategies to connect classroom learning to students' backgrounds. Conversely, we would expect that a teacher who took pains to connect instruction to students' lives but who otherwise adopted repetitive, skills-focused instruction would not create an exciting learning environment and thus would be unlikely to produce higher engagement or achievement.

XIV SUPPLEMENTING INSTRUCTION IN THE REGULAR PROGRAM

As one would expect for a group of schools serving high concentrations of children from low-income families, the schools in our sample enjoy support from a variety of special-purpose programs. This chapter identifies the programs and mandates affecting these schools, describes and analyzes several major instructional models found in supplemental programs, and finally highlights the instructional issues raised by the presence of these programs.

Sources of Supplemental Instructional Support

Federal, state, and local programs and mandates provide support for supplemental services in these schools. Each school's mix of services reflects characteristics of its student population and of the programs available in its state and district.

Because of their relatively high concentrations of poverty, schools in this sample participate in the federal Chapter 1 program.* This program offers extra dollars to high-poverty schools, with the requirement that the dollars support extra services for students who are performing poorly in academic subjects. In its most recent legislative overhaul, Chapter 1 acquired a stronger focus on bringing participants up to the level of performance expected for their grade level, including performance in more advanced skills. This change was intended to discourage schools from focusing their Chapter 1 programs on low-level drill in basic reading and math skills. In addition, the law emphasizes the need to coordinate Chapter 1 instruction with the regular classroom program. Within these mandates, districts and schools are free to design and staff their Chapter 1

*Chapter 1 of Title I of the Elementary and Secondary Education Act.

programs as they choose, using reading specialists, math specialists, and instructional aides either inside or outside the regular classroom.

The federal presence is also felt in these schools through supplemental services mandated under the Education for All Handicapped Children Act. Students with disabilities are identified through a formal diagnostic process that includes consultation with parents. Once identified, the students receive services congruent with their particular needs, with an emphasis on maximizing their participation in regular classroom instruction. For students in the classrooms we observed, special education services generally consist of spending part of the school day in a resource room with a special-education teacher.

Many students with limited English proficiency receive special services as a result of state law or federal civil-rights mandates. The intensity and design of these services depend heavily on local and building-level decisions, but the general idea is to ensure that students make a transition, at an educationally appropriate pace, to participation in English-language instruction. For students whose English is limited, the special services may take the form of supplemental classes in language development or in-class assistance from someone proficient in their home language.

Table 59, which displays data on classroom and student participation in externally funded supplemental instruction, shows that Chapter 1 is the major presence in these classrooms. This is particularly true in language arts, which is much more likely to be the focus for Chapter 1 instruction than mathematics. As Table 60 shows, there are no major differences between the served and unserved classrooms. The classrooms with supplemental instruction do not contain more students from low-income families than the classrooms without such instruction, despite the element of targeting on poverty that is present in Chapter 1 funds allocation. However, the served classrooms do contain more students of color, which reflects primarily the demographic characteristics of the six districts we studied.

Table 59

CLASSROOM AND STUDENT PARTICIPATION IN SUPPLEMENTAL PROGRAMS (YEAR 1)

	Supplemental Instruction in: Language Arts	Supplemental Instruction in: Mathematics
Classroom participation[a]: Of all classrooms, the percentage that participated in--		
• Any supplemental program	78	50
• Chapter 1 program	65	26
• Special education program	24	19
• Other supplemental program (e.g., ESL/Bilingual)	38	23
Grade-level participation: Of all classrooms at each grade level, the percentage with any supplemental program--		
• Grade 1	88	52
• Grade 2[a]	85	42
• Grade 3	68	50
• Grade 4[a]	81	54
• Grade 5	76	48
• Grade 6[a]	82	56

	Either Language Arts or Mathematics
Student participation[b]: Of all students within each classroom, the average percentage who are served by--	
• Any supplemental program	37
• Chapter 1 program	30
• Special education program	2
• Other supplemental program (e.g., ESL/Bilingual)	5

a - Based on data from observers' visits.
b - Based on data from classroom rosters, which were not broken out by subject area.

Table 60

CHARACTERISTICS OF CLASSROOMS SERVED AND NOT SERVED BY ANY SUPPLEMENTAL PROGRAMS (YEAR 1)

Classroom Characteristics	Served (n = 72)	Not Served (n = 11)
Poverty level: Average percentage of students within the classroom on Free or Reduced-Price Lunch program	64 (29)[a]	69 (32)[a]
Racial/ethnic background: Average percentage of students in the classroom who are of minority background	72 (35)	56 (47)
Initial achievement level: Fall pretest score in NCEs on CTBS/4 tests of--		
• Reading comprehension	43 (10)	41 (9)
• Mathematics concepts and applications	43 (9)	44 (12)
Pupil/staff ratio: Ratio of students to instructional staff (teachers, aides, specialists)--		
• During reading instruction	15:1 (7)	12:1 (4)
• During mathematics instruction	16:1 (7)	17:1 (10)

a - Standard deviations appear in parentheses.

Two districts in this sample offer special services as a result of desegregation proceedings. Because they have some schools that are racially imbalanced, they have agreed to put extra resources into these schools. Student/staff ratios are higher in these schools, and specialists are available for help with reading, mathematics, and instruction in English as a second language (ESL), as the composition of the student body warrants.

Finally, most of the schools have computer labs offering instruction that supplements regular classroom work. Unlike the other services described above, instruction in the computer lab is not targeted to particular types of students; it is offered to all. However, we discuss it here because it has several similarities to the other types of supplemental instruction, notably the fact that it addresses language arts and mathematics but is subject to varying degrees of control by the classroom teacher.

Instructional Models Found in Supplemental Programs

No two classrooms in this study are alike in their configuration of supplemental services. Their students are eligible for different programs; the same program is staffed differently from school to school; individual staff capabilities vary, as do the working relationships between special staff and classroom teachers. Thus, the set of services a child can receive and the way these do or do not connect to regular instruction are virtually unique from classroom to classroom. For analytic purposes, however, we can distinguish among models of supplemental instruction according to their location (outside or in the regular classroom) and staffing (with aides or certified teachers). Readers should bear in mind that most classrooms experience more than one of these models, and many students do as well.

Table 61 shows the relative prevalence of pullout and in-class instruction with different staff configurations within Chapter 1, which is the largest program serving these classrooms. As the table shows, in-class aides predominate, but pullout instruction also has a substantial presence. The table also shows the average number of minutes per session of supplemental instruction; the frequency of sessions varies a great deal, however, from daily to weekly.

Table 61

DELIVERY OF SUPPLEMENTAL INSTRUCTION--CHAPTER 1 PROGRAMS
(YEAR 1)

	Language Arts	Mathematics
Delivery model (Chapter 1 programs): Of all classrooms served by Chapter 1, the percentage employing each model--		
• In-class aides	64	72
• In-class specialist	23	0
• Any form of pullout	41	22
• Replacement	7	11
• Add-on	5	0
Time spent in supplemental instruction: Average minutes per session spent by students receiving any form of supplemental instruction--		
• In the regular classroom	39	40
• In a pullout room	48	32

In this section, we describe each general model of supplemental instruction. The examples used here are chosen because they exemplify the way a model works. We have also chosen examples that illustrate both the positive and negative aspects of a model, according to our best judgment.

Supplemental Instruction Outside the Regular Classroom

Supplemental instruction outside the regular classroom is generally intended to supply students with specialized remediation in the skills they lack. In this sample of schools, the instructors in pullout settings are almost always specialist teachers: rarely do students leave their classrooms to receive supplemental instruction from an instructional aide, unless a specialist teacher is also present in the pullout room. This model of supplemental instruction typically relies on a relatively formal diagnosis of children's needs, either on an individual basis (e.g., in special education) or for a group (e.g., ESL instruction for Spanish-dominant children).

Compensatory/Remedial Services Outside the Regular Classroom--Remedial services provided by Chapter 1 and state- or locally funded specialists often follow this model. Often, in this sample, these services are aimed at improving students' performance in discrete skills. The connection to the regular classroom program is fairly weak, especially when the regular program is a more integrated or academically advanced one.

- Skills practice in a fifth-grade pullout program. Students from a fifth-grade class receive specialized remediation from one or both of two specialists, the Chapter 1 teacher and the locally funded reading resource teacher. The latter program, in particular, focuses on practicing skills in isolation. The Chapter 1 program in this school relies on a form, developed by the Chapter 1 teacher, that summarizes which children need help with which skills, as shown by their performance on a criterion-referenced test.

- Skills-oriented instruction in a second-grade "replacement" classroom. Five second graders in another school receive all their language-arts instruction in a separate Chapter 1 classroom. Using the same basal reader as the rest of the class, but lagging slightly behind their classmates in the reader, they have a program with a heavy focus on basic skills: spelling, vocabulary, phonics, and decoding. They do much less extended reading than the rest of the class and virtually no extended writing.

- Extra drill in a first-grade pullout program. Fifteen first graders in still another school go to the Chapter 1 reading room for 45 minutes, where they split into groups that work with two teachers and two aides. The activities observed on a typical day include a drill on vowel sounds (featuring flash cards, exaggerated sounding out, and answers in unison from the children); a word recognition game; a workbook several levels below the regular class work; and an aide reading from a trade book. The classroom teacher thinks this program is a waste of time because of its heavy skill focus and limited demands on the children; she says, the children just come back from the reading room "with another 'sh' ditto when they learned 'sh' months ago...they never do any writing up there."

As the last example shows, this model is one that can stir strong feelings among teachers. When specialized remediation has its own instructional agenda that differs from that of the teacher, the teacher tends to ignore it or dislike it. In other cases, however, teachers respect the specialists' expertise and consider the supplemental instruction a useful way to shore up students' skills. As we discuss later in this chapter, these differing perceptions appear to have an important influence on the amount of communication between regular and special teachers.

A contrasting case is that of the Chapter 1 mathematics instruction in another school:

- Conceptually oriented math in a fourth-grade pullout. Fourth-grade mathematics in the Chapter 1 room focuses on concepts and makes extensive use of manipulatives, in contrast to the regular teacher's program, which follows the text closely and includes a great deal of drill. The three Chapter 1 participants spend two mathematics periods per week in Chapter 1, at a time when their classmates are having either direct instruction or seatwork.

Thus, it is not necessarily the case that supplemental instruction has a more conventional, skill-oriented focus than the regular classroom. In our sample, however, more conventional instructional content does dominate supplemental instruction in pullout settings. The following examples illustrate a relatively rare model for supplemental instruction--that of advanced work or enrichment that goes beyond the regular classroom program:

- Pullout enrichment instruction from a multicultural resource teacher. Gifted students in a fifth-grade class receive extra instruction in language arts from a multicultural resource teacher. They read and write about different cultures and make presentations to the school during assemblies.

- Pullout instruction featuring higher-order thinking skills. Students from several grades in another school participate in a modified version of the Higher Order Thinking Skills (HOTS) program, which takes place in the computer lab and focuses on the development of thinking skills detached from particular academic subjects. Although HOTS classes are supposed to take place four times per week and to continue all year, this school has stretched the services to cover more students and therefore has cut the frequency to two periods per week for half the year. This HOTS program is partly under the auspices of Chapter 1.

- Supplemental instruction during intersession at a year-round school. In the same district, a year-round school offers Chapter 1 services during intersessions. Students who are selected by their classroom teachers can volunteer to participate in the program, which includes elaborate writing projects as part of language arts and hands-on problem solving (e.g., measuring a snake) and various computer-based activities as the major foci in mathematics.

- Opportunities to write in an ESL lab. One ESL lab offered fifth graders many opportunities to write, unlike nearly every other supplemental instructional program observed in these schools.

Special Education Resource Rooms--A number of classrooms we studied were served by special education resource rooms, a classic example of pullout instruction, where a specialist teacher works to remedy the educational deficits identified in each child's individualized education program. Special education is not a prominent part of the instructional scene for any of our classrooms, since only two or three children at most participate in it. In general, the resource room represents a kind of Bermuda Triangle for the instructional program: the classroom teachers tend to know little or nothing about the instruction that takes place there. One fifth-grade teacher complained that she had asked the special education teacher for a written report on what she was doing with the children but had never received one. In another school, a student assigned to the resource room for 3 hours per day simply didn't go there, with the result that he effectively had no academic instruction all year (since his regular classroom instruction was far over his head). Although these examples are extreme ones, they illustrate the disconnection between much of special education and most classrooms in our sample.

ESL Instruction Outside the Regular Classroom--Similarly, the ESL instruction offered in separate settings in these schools typically proceeds along a track that is independent of regular classroom instruction. For example:

- First-grade ESL instruction separated from instruction in the regular classroom. A group of students leaves a first-grade classroom for 40 minutes every afternoon. While their English-dominant classmates who have stayed behind in the regular classroom read a story, ask questions, make predictions, and talk about the components of the story, these students participate in language-development activities such as singing songs and learning rhymes.

- An ESL lab for fifth and sixth grades. Four fifth graders leave their classroom every day during reading time to go to the ESL lab, where they and five sixth graders work on vocabulary development, with lots of opportunities to write. A different program takes eight students out each day to work with the learning resource teacher, who uses a third-grade reading series, language-development exercises from workbooks, and other materials to build fluency in spoken English.

The Special Case of Computer Labs--Instruction in the computer lab differs from many other kinds of instruction discussed here in two respects: it is not funded from outside sources, and it is not targeted to particular students. However, it is worth including here because it does supplement regular classroom instruction and because it presents a remarkably homogeneous story across our sample. In virtually every case where students have access to a computer lab, the story is this: once a week, either half the class or the full class spends 30 to 45 minutes in the computer lab, where students work on software selected by the computer specialist in consultation with the classroom teacher. A primary aim of this work is to provide drill and practice on isolated skills through a medium that the children enjoy more than workbooks. There is usually an attempt to match the skills to those being taught in the regular classroom, usually in mathematics but often in language arts as well, but the success of these attempts is limited by the availability of appropriate software.

Supplemental Instruction in the Regular Classroom

Regarding Chapter 1 and other programs, many policymakers have expressed reservations about supplemental instruction offered outside the regular classroom, charging that it may foster a fragmented instructional experience for students. Thus, a number of schools have moved to implement in-class models. Our study offers a good chance to see what these look like. In this sample, in-class instruction is typically staffed by aides. Some models use both teachers and aides, and some use only teachers. We discuss each in turn here.

In-Class Aides: Help with Seatwork and Clerical Chores--Help with seatwork is an especially common mode of supplemental instruction in this sample of schools and classrooms. Almost always provided by an instructional aide, this help is often available on an ad hoc basis for any child who asks. Sometimes, though, it is restricted to certain children. When it is funded by Chapter 1, it is restricted to eligible children. In other cases, the help comes from a bilingual aide and is offered only to those students who speak another language.

Help with seatwork serves three main functions in the classroom. First, by providing extra adult supervision for seatwork, it frees the teacher to concentrate on a small group of students while the others can be productively occupied. This is especially common in reading instruction, where the teachers often work with small groups. Second, it gives some reinforcement for the skills that the students are practicing in their seatwork; this is true in both reading and mathematics instruction. Third, it reduces students' frustration and apparently contributes to their productivity by enabling them to receive answers to their questions more quickly. (However, in at least some cases the students might derive more long-term benefit from puzzling out the answer themselves rather than relying on an adult to help.)

Sometimes the seatwork helper stations herself or himself at a table in the classroom, where students know that they can bring their questions. In other cases (or at other times) the helper circulates around the room, pausing to help individuals. A typical example is the mathematics help available from a Chapter 1 aide in this first-grade classroom:

- Seatwork helper in a first-grade mathematics classroom. The aide comes into the room unobtrusively at the beginning of the math period. She usually works with one child at a time on assignments that the teacher has given to the whole class. Occasionally, she pulls one or more children aside for drill on math facts or to play a game. To the teacher's regret, the aide is allowed to work only with the six children eligible for Chapter 1 services.

The bilingual aides sometimes sit right next to a particular child who needs help, as is the case in another first-grade class:

- Bilingual aide as translator and seatwork helper. If a student who can speak no English is enrolled in the class, the teacher usually has the student sit with the aide when the teacher believes the child cannot follow the instruction. During this time, the aide translates for the student and gives him or her manipulatives (designed by the teacher) to use. The teacher reports that usually this kind of isolation lasts for only about a month.

Help with seatwork is available for only part of the school day in these classrooms, but it can be available for as much as 4 hours per day. The most complicated arrangement is found in one classroom where three or four different aides are present for about 40 minutes each.

Although there seems to be a general feeling that help with seatwork is a good thing for students, one first-grade teacher pointed out a drawback--that students can become too dependent on adult help. She commented that she watches for signs of dependency and asks the aide to "pull back" if it seems to be developing. We would guess that this is a problem in other classrooms, but teachers do not seem to worry much about it.

Other problems may develop because of the instructional style of an aide:

- An aide whose instructional goals differed from those of the classroom teacher. While the regular teacher in one second grade uses writing instruction as a vehicle for students' self-expression, the aide focuses much more on neatness, correct spelling, and content that seems correct to her. For instance, during one observation, the students observed and measured their bean plants, then used this information to write about their plants. One student wrote that her plant had been eaten. The aide said, "You mean growing. It hasn't been eaten." The student erased what she had written and dutifully wrote, "My plant has been growing." Her plant had, in fact, been eaten.

Using an aide to provide help with seatwork may be a model that reflects an underlying problem of the aide's unpredictable availability or limited instructional skills. Some teachers might plan a more structured supplemental learning opportunity for their students if they could count on a staff member (a) being there, and (b) having the needed skills. But when the aide "usually appears at math time," as one of our classroom write-ups says, the teacher must necessarily fall back on an unstructured use of the aide's time. And another teacher who uses her Chapter 1 math aide for help with seatwork is concerned that the aide will do things that might confuse the children. Although these teachers did not tell us that help with seatwork is a way of making the best of a poor resource, we think this might be the case.

Some aides serve largely in a clerical capacity. The reasons include the aides' limited skills, their unpredictable availability, or the availability of other sources of help with academic instruction (e.g., in the classroom where a student teacher took over the role of seatwork helper that the aide had previously filled).

- Aide as clerical helper in a fifth-grade class. The aide assigned to a fifth-grade classroom, who was a teacher in Hong Kong before emigrating to the United States, is scheduled to be in the room from 10:00 to 12:00 to help with both language arts and mathematics. However, she arrives unpredictably because she is in great demand as a translator for the whole school. The teacher therefore finds it impossible to plan with her. As a result, in language arts the aide does mostly clerical work such as filing, correcting papers, and making dittos. In math, the teacher sometimes leaves her a note indicating which students need extra help with their seatwork.

In-Class Teachers or Aides: "Pull-Aside" Instruction or Special Grouping--In several classrooms, the supplemental instruction that takes place inside the classroom would be no different if it took place elsewhere in the building. This instruction includes what could be called the "pull-aside" model, in which a specialist teacher or an aide pulls a small group to the back of the room for special instruction or practice in skills that the students are judged to need. It also includes grouping arrangements that provide different experiences for subgroups within a class.

In these cases, a major function of supplemental instruction is to provide students with extra work or differentiated work in a small group, inside or outside the regular classroom. The following examples illustrate the purposeful and regular use of special grouping arrangements:

- Pull-aside reading by a first-grade aide and remedial specialist. A first-grade class has the traditional reading groups, each of which spends time with the teacher, but the lowest group receives two extra doses of instruction. A state-funded reading resource teacher takes the group into the hallway outside the classroom and conducts regular lessons that emphasize phonics. An aide also works with this group at another time during the day, following a lesson plan from the teacher.

- Supplemental teachers and aides as instructors for separate reading groups. Another first grade has a 3-hour block of language arts instruction in the morning. Whole-class instruction is interspersed with small-group work, in which the regular teacher, regular aide, Chapter 1 teacher, and Chapter 1 aide each take one group. The teacher characterizes the Chapter 1 groups as providing "remediation for students with deficits in several skill areas."

An important part of the story in both of the above examples is that these classrooms are under a mandate to provide whole-class instruction. As the teacher in the second example says, her less able students "have to struggle along with the smartest in the whole [class]." Concerned that these students will be unable to keep up, these teachers (and others in our sample who are reluctantly adopting whole-class instruction) welcome a special small-group intervention as a supplement to their whole-class technique.

Another first-grade classroom, not using whole-class instruction, offers Chapter 1 students a "pull-aside" intervention:

- Aide-provided pull-aside instruction that is linked to the teacher's lesson plan. The Chapter 1 aide pulls five to seven students into a small area at the back of the classroom for 30 minutes each day. There, she carries out language arts activities that follow the classroom teacher's written plan. On one occasion the students' assignment was to write a play, but more often the tasks were focused on discrete skills such as identifying vowels, and the materials used were the basal readers or flash cards.

In other classrooms, supplemental grouping arrangements represent a division of labor between the teacher and the aide for reading instruction:

- Aide and teacher pursuing diverging instructional goals. A first grade has a bilingual aide in the back of the room for most of every morning. As the year progressed, the aide's program became more and more independent of the teacher's, with the aide's preferred topics of vocabulary and phonics taking the place of the teacher's original lesson plans.

- Division of labor among reading groups in a third-grade classroom. In a third-grade class, the teacher allows the aide to choose which of the two reading groups she will work with. The aide usually chooses the lower group because she considers that group easier to prepare for. The teacher and the aide cover the same skills, but the groups work in different readers. The observer for this study also characterized the teacher as doing more creative activities, while finding that the aide was not as good at explaining things or knowing when to explain them.

Clearly, the lower reading group in this last classroom is placed at a disadvantage by this arrangement. The strengths and weaknesses of the other special grouping arrangements that we observed are less clear-cut. The "triple dose" in the first example in this section seems likely to help students (if it does not bore them to distraction). In the second example, it is not entirely clear whether Chapter 1 provides something extra to participating students, since every child in the class has the same amount of small-group time. What it does is (1) permit the teacher to include reading groups within a whole-class model and (2) provide differentiated instruction, geared to a lower level of skill development.

In-Class Teachers: Team Teaching and Demonstration Lessons--In some cases, specialist teachers enter the regular classroom on a regular basis. Sometimes they provide "pull-aside" instruction to an identified group of children, but in other cases they teach the whole class and work with the teacher on instructional improvement.

- Supplemental program specialist as team teacher in a fourth-grade classroom. A mathematics specialist, funded under a desegregation consent decree, conducts the mathematics instruction for a fourth-grade class once each week. At the beginning of the year, he and the classroom teacher went through the text together and decided who would cover which topics. He focuses on concepts and understanding, using manipulatives and modeling approaches to word problems. Also, as the only African-American man teaching in this school where almost all students are African-American, he brings a cultural dimension to some of his instruction--for instance, his lessons on graphing include clippings that illustrate the achievement gap between African-American and white students in the district.

- Itinerant supplemental teachers as staff developers. Another district revamped its Chapter 1 program during the course of our study. In the study's second year, itinerant teams of staff developers funded by Chapter 1 spent 2 to 5 weeks at each school. The teams conducted inservice sessions on topics related to the district's new integrated approach to language arts instruction, and they demonstrated mathematics and language arts lessons in the regular classrooms at the request of individual teachers.

The use of supplemental programs as a source of staff demonstration lessons expanded in the second year of our study. We cannot say that this represents a wider trend, but it may. Clearly, many districts are looking for alternatives to the customary model in which specialist teachers pull individual students out of their classrooms for tailored instruction. A staff-development role represents one alternative for these teachers.

Supplemental Instruction That Extends the School Day or Year

A relatively rare instructional model is the use of supplemental programs to increase the amount of instructional time available to students. We found just two examples of using outside funding in this way. One is the Chapter 1 program offered during intersession in a year-round school, which features a relatively high-level curriculum. The other is an after-school tutoring program funded by Chapter 1 in another school. But a few schools and individual teachers do use local funding sources to offer opportunities for extended time in instruction of various kinds:

- After-school tutoring. After-school tutoring in test taking is offered for third-grade students with average skills, on the theory that boosting these students' performance is the most efficient way to improve the school's average scores on its standardized test.

- Extra help at lunchtime and after school. Two regular classroom teachers in different districts, one in fourth grade and one in sixth, make themselves available at lunchtime and after school to give extra help to students who request it.

We saw more instances of extended-time services in the study's second year than in the first, suggesting a possible trend, but the number of instances was still small.

Supplemental Instruction as a Source of Materials and Equipment

Although extra staff members represent the primary contribution of supplemental funding, the materials and equipment purchased with this funding are also a significant resource in some schools. These include the materials purchased with special funding, some materials developed with outside support, and computer labs installed with special funding.

- Supplemental program resource rooms as a source of instructional materials. Three of the schools have particularly attractive, well-stocked resource rooms. Two of them, funded by Chapter 1, display trade books for the students who receive services in the room. (A Chapter 1 aide commented that this was especially important in previous years, when that school's regular classroom instruction in reading relied exclusively on basal readers.) The third school has used Chapter 1 and other grants to assemble a room full of materials that classroom teachers borrow for their thematic units.

Putting It All Together

Most classrooms experience more than one of the supplemental instructional models described here. Three examples can illustrate how the programs add up for particular classrooms. (The third example represents the most complex configuration of extra help in this study.)

- Configuration of supplemental instruction in a sixth-grade classroom. A sixth-grade classroom has a Chapter 1 program in reading and a locally funded program in mathematics. The Chapter 1 program serves 22 of the 30 students in a pullout setting, where two teachers instruct them in comprehension strategies (e.g., finding the main idea and distinguishing general statements from statements of detail), the use of new vocabulary words, and phonics. Meanwhile, the other eight students are reading and discussing novels with the regular teacher. In mathematics, an instructional assistant takes five to eight students into the coatroom to work with a skill until they master it.

- Configuration of supplemental instruction in a fifth grade. In a fifth grade, a Chapter 1 teacher works with students individually during math, helping the student through every step of the problem; she says her philosophy is to "never let a student get the wrong answer in the first place." An aide takes four or five students to a partitioned room for part of the regular math lesson, providing special practice on that day's topic. Two students go to the Chapter 1 reading teacher for most of the year during the time when they have assigned seatwork (resulting in a heavier homework load for these students); the teacher says this instruction is coordinated with regular teaching. Finally, a locally funded reading specialist pulls different groups occasionally for isolated skill practice in language arts.

- Configuration of supplemental instruction in a third grade "language development" classroom. A third-grade "language development class" has 22 students, of whom 8 are native English speakers. The class size is small because of the district's desegregation consent decree. Three aides each spend 40 minutes in the room; one works with the reading group that the teacher does not work with; another sits at a table in the back of the room and offers extra help to students identified by the teacher; still another works with students of limited English proficiency who need ESL instruction or support in language arts and math. During May and June, a resource teacher took over from the first aide in teaching one reading group. The assistant principal taught lower-achieving math students, starting with five students at the beginning of the year, sending three back to the classroom in January and the others back in the ensuing months. Students also go to a computer lab periodically, taught by another specialist, who plans computer instruction with the classroom teacher.

Contributions and Limitations of Supplemental Programs

The purposes and designs of supplemental programs differed in many ways across the classes we studied, but a fundamental distinction is the one between funding that is targeted to specific students and funding that is intended to support or alter instruction for the school or class as a whole. Special education, ESL, and most Chapter 1 programs in these schools fall into the former category; their design revolves around serving some students (whether in or out of the classroom, by an aide or a teacher) and not others. In the latter category, supporting across-the-board strengthening of instruction, are the local funds provided under desegregation orders as well as a small portion of Chapter 1 funding. The uses of these funds included classroom aides who could work with any student or do clerical tasks. A more innovative use of the funds was professional leadership in the school: in some cases, the specialist teachers supported by supplemental funds offered demonstration lessons, staff development, and materials to help teachers who were trying alternative approaches to instruction. (Contrary to many local educators' beliefs, this can be a legal use of Chapter 1 funds when the assistance is carefully designed to strengthen classroom teachers' capacity to work with participating Chapter 1 students.)

Bearing in mind these differences in program design, we discuss here several issues that are crucial in assessing the programs' contributions: their instructional content and methods, their targeting, communication among supplemental and regular staff, and supplemental staff expertise.

Instructional Content and Methods

In our analysis of supplemental instruction, particularly as described in the qualitative write-ups, we sought to understand the instructional content and methods and to compare them with those of the regular classroom program. As already discussed in this chapter, we found enormous variation in this regard--from innovative and challenging instruction to rote drill on low-level mechanics. Some of that variation--as well as the most common themes--is captured by data summarized in Table 62, which lays out for both mathematics and language arts the principal focus of supplemental instruction observed in Year 2 of the study (few such observations were done in Year 1).

As can be seen in the table, three-quarters or more of observed supplemental instruction--inside or outside the regular classroom--focused on basic skills. The percentage was greatest in pullout settings (84 percent and 88 percent, respectively, for language arts and mathematics). Our qualitative analysis indicates that a focus on basic skills is especially common in services targeted to low-achieving students, such as Chapter 1 services. In many cases, however, students were often engaged in activities that may have brought them closer to the kinds of understanding that have been a focus of analysis in earlier chapters. This includes much of the supplemental instruction that was not targeted to low achievers, for example, supported by funding associated with desegregation. In more than half of all instances of supplemental language arts instruction, students were reading text, and in

Table 62

WHAT IS TAUGHT IN SUPPLEMENTAL INSTRUCTION
(YEAR 2)

Foci of Instruction[a] in Each Subject Area	Locus of Supplemental Instruction: In the Regular Classroom	Locus of Supplemental Instruction: In Pullout[b] Rooms
Language arts: Of all classrooms with students participating in a supplemental language arts program, the percentage in which supplemental instruction focused on--	(n = 29)	(n = 27)
• Reading or language mechanics skills	78	84
• Reading text	59	63
• Writing composed text	33	21
• Oral communication	11	32
Mathematics: Of all classrooms with students participating in a supplemental mathematics program, the percentage in which supplemental instruction focused on--	(n = 21)	(n = 14)
• Practice with arithmetic computation skills	74	88
• Practice with other math skills	16	13
• Conceptual understanding of mathematics	42	50
• Applications to unusual or unfamiliar problems	0	0

a - During observation periods.

b - In which four or more students from the classroom were served. The study team did not observe supplemental instruction outside the regular classroom that involved only one, two, or three children.

almost half of the mathematics instances, some attempt was being made to enhance students' conceptual understanding of mathematical material. It is noteworthy that writing is so infrequently a focus of supplemental instruction.

For some classrooms, the content and methods of targeted supplemental instruction come into focus more clearly when contrasted with the instruction offered to the nonparticipating students.

- Contrasting content of supplemental and regular instruction in a second-grade classroom. The Chapter 1 participants in a second-grade classroom spend 40 minutes each day revisiting the skills that were taught in regular reading instruction. The emphasis is on reading mechanics (e.g., syllables, the "ooh" sound). At the same time, the non-Chapter 1 students are with the regular teacher, reading text, being read to, or writing.

In this case and several others, supplemental instruction is tied to a sequence of discrete skills taught out of context. Similarly, in several classrooms supplemental instruction provides the teacher with a buffer against the unwelcome encroachment of whole-class instruction. While reluctantly exposing the entire class to the same instruction, the teacher looks forward to breaking the class into small groups, some of which work with supplemental staff on skills that are considerably less advanced than those that the other groups practice. The departure of the targeted students--either to a pullout room or to separate groups in the same classroom--seems to free up the regular teacher to place more emphasis on meaning and understanding with the remaining students.

Targeting of Instruction

Some supplemental services are offered to whole classes (e.g., demonstration lessons from specially funded teachers who function as instructional resources for the school). Others are offered to individuals or small groups on an ad hoc basis, as the need arises. Still others focus on a group that remains stable over time. In general, locally funded services have more flexible targeting, while Chapter 1 and special education, because of their more formal mandates for fiscal or programmatic accountability, serve a more stable group. At the two extremes of flexible and stable targeting are the following examples:

- Flexible, ad hoc targeting of sixth-grade supplemental instruction. One sixth-grade classroom contains lots of people, all pitching in to help with activities the teacher has designed. There are drop-in visitors from two teachers' colleges in the area, a student teacher, a volunteer from a local company, a volunteer on leave from her undergraduate studies, and a Chapter 1 aide. They may help prepare or pass out materials, circulate among groups, or tutor students individually. Overall, the volunteer help seems to help students complete their work a little faster and with a little less frustration. Most students work with someone for some reason, and the many group configurations help decrease the chances of attaching a stigma to students who receive individual assistance.

- Stable, long-term targeting of supplemental instruction in a fourth-grade classroom. The Chapter 1 reading teacher in a fourth-grade room spends 50 minutes in the coatroom with four or five students each day, overlapping at least part of the language arts block. She generally plans and implements her own instruction, using materials at lower reading levels than those the regular teacher uses. The students who work with her are unlikely to catch up with their classmates in reading: they remain in Chapter 1 for years.

These two approaches reflect different underlying philosophies about targeted supplemental instruction: is it ad hoc help, geared to helping students keep up with the class, or is it a separate and relatively permanent track? Although this study did not generate data that would allow us to judge the relative merits of the two views, the former is more in line with current theories of curriculum and instruction.

In response to federal and state programs that emphasize serving particular students and not others, school districts and schools have become adept at sorting students and arranging differentiated services for them, whether inside or outside the regular classroom. The question is whether this enhances or limits these students' learning opportunities. The fact that some students remain in supplemental programs for years, coupled with our other findings about the frequent focus on basic skills in these programs, suggests that it may often do harm.

Communication Between Supplemental and Regular Staff

As long as supplemental services are distinct from the regular classroom program, there will be an issue about the connection between services. In this study, we found a continuum from connection to isolation between supplemental and regular instruction. We saw some effective partnerships between teachers and aides and between pairs of teachers. We also saw teachers who supervise their aides closely because they think they have to, and a few who have given up on supervising aides with whom they disagree. We saw many supplemental programs that operate in isolation from the regular classroom--with educational effects that we are most often unable to judge, although there are a few cases of special instruction that clearly mires students in isolated, low-level skill drills.

Our study generated some data on the working relationships among staff--and, in particular, the classroom teacher's degree of control over supplemental services. The most important determinant of the classroom teacher's degree of control appears to be the staffing of supplemental instruction: teachers customarily tell aides what to do, particularly when the aides work in the regular classroom; they do not tell other teachers what to do. Thus, although there are some exceptions, most of the in-class instruction provided by aides is relatively closely connected to the regular classroom program. The teacher often writes a set of instructions for the aide or presents the aide with materials to use with students.

By contrast, when classroom teachers and supplemental teachers work together, they are engaging in a planning or collaboration session. It is more time consuming than giving instructions to an aide, and both parties contribute to the discussion. Such planning and collaboration happens when it is administratively feasible (that is, when time is specifically set aside for it) and when the teachers want it to happen (that is, when they like and respect each other enough to feel that collaboration is worthwhile).

Teachers who perceive specialized remedial instruction as valuable tend to have more communication with the supplemental program specialists, but it is probably not accurate to say that better communication improves the perceived contribution of the program. Instead, it seems at least as likely that teachers are inclined to communicate more with the specialists whose skills and programs they respect.

Scheduling has a big influence on the extent of joint planning; for example, an aide who helps with seatwork may be available in the classroom for only an hour or two, which may not coincide with any of the teacher's planning time. The district and school can increase or decrease teachers' and aides' opportunities to plan. For example, the unpredictable schedules of some supplemental staff can seriously detract from their ability to plan with teachers. The other side of the story is found in those districts and schools that are deliberately working to increase the opportunities for collaborative planning, as in the following example:

- An attempt to facilitate joint planning between supplemental and regular teachers. The Chapter 1 director in one district places a high priority on joint planning. Thus, each teacher who serves Chapter 1 children is supposed to have a weekly three-way planning session with the Chapter 1 aide who works in the classroom for language arts and the reading resource teacher for the building. Initially, there have been flaws in this arrangement: a resource teacher whose time is divided between two buildings acknowledges that she has such limited contact with students that she relies on the instructional aides' assessments of students' work and recommendations for assistance, rather than contributing much expertise of her own to the planning process. The Chapter 1 director recognizes this problem and plans to hire more resource teachers next year.

Another important determinant of working relationships among staff members is the stability of supplemental instructional arrangements from year to year or even within a school year. An important conclusion from our qualitative analyses is that from the perspective of the classroom teacher, supplemental services and staff members come and go in mysterious ways. It seems to be rare for a teacher to face a stable configuration of programs and supplemental staff from year to year. Some examples can illustrate the problem:

- The unpredictable calls for a bilingual aide to serve as school translator. While bilingual aides may be nominally assigned to classrooms, they may also be the school's only available translators for parents who come to the office. Some of our teachers could not count on their Spanish-speaking or Southeast Asian instructional aides to be in the classroom because these aides were so often called on to serve as translators.

- Supplemental staff pressed into service as substitute teachers. In the second year of the study, one district decided that it could no longer afford to spend so much money on substitute teachers and that supplemental program staff would have to fill in for absent classroom teachers. As a result, supplemental instruction was severely curtailed.

- Instability in supplemental staff from year to year. Because of changes in external funding or instructional decisions made at the district level, staff configurations change from year to year in supplemental programs. In several schools, classroom teachers expressed disappointment that resource teachers were no longer available to work with children. The reasons for their unavailability varied: one district laid off all its ESL teachers, then tried but failed to rehire them; two other districts decided to reduce the role of pullout instruction in their Chapter 1 programs.

Summarizing our findings on communication, then, a few general conclusions emerge. First, there appears to be a trade-off between staff qualifications and communication: instructional aides with little education are typically responsive to the classroom teacher's directions; programs staffed by specialist teachers range from close communication to no communication with classroom teachers. Second, schools and districts can generally improve the connections between programs when they build joint planning time into staff schedules. Finally, the instability of supplemental services from year to year (or even day to day) seriously detracts from communication, as well as program quality more generally, in some instances.

Staff Expertise

In general, aides are at the low end of the skills continuum and teachers at the high end, although there are many individual exceptions to this pattern (see Table 63--which also illustrates a countervailing advantage of many aides, namely, the greater likelihood that they share a cultural background with racial or linguistic minority students in the class).

The background and expertise of supplemental program staff predispose them toward teaching certain kinds of content (if they teach at all) and even toward certain methods of teaching. Thus, at one extreme, the aides with the least training in reading or math are likely to teach basic skills in a highly traditional way, whether or not the regular classroom teacher has emphasized different things. Such staff are typically not equipped to help teach comprehension strategies or to probe students' reading at other than a literal or recall level of understanding. At the other extreme, specialists are often at least as prepared as regular classroom teachers to handle more challenging teaching approaches. For example:

- A mathematics specialist who acts as an instructional leader in his school. The mathematics specialist in one school, funded with extra local money as a result of a desegregation order, is a leader in changing mathematics instruction in his school. He has provided teachers with ideas and materials, and he runs a mathematics laboratory where all classes participate in innovative lessons and techniques (e.g., the use of laser disks).

Classroom teachers vary in the way they handle the issue of supplemental staff expertise. Some teachers keep a close watch on their aides' help with seatwork because they do not have a very high opinion of the aides' skills; others assign clerical tasks to aides for the same reason. However, classroom teachers who think specialist teachers are not very skilled are not often able to do anything about this problem.

Similarly, teachers vary in their responses to the supplemental staff members who have wide repertoires of instructional skills. Some are eager to learn from these staff members and have arranged opportunities to do so (e.g., by remaining in the room while the supplemental teacher works with the whole class). Others are either unable or unwilling to watch their colleagues at work and thus do not know what these staff members bring to the overall instructional resources of the school.

Summary: How Supplemental Programs May or May Not Contribute

The dominant purpose of supplemental programs in these schools is to provide targeted services for selected students. As we have seen, this often

Table 63

CHARACTERISTICS OF SUPPLEMENTAL INSTRUCTION PROGRAM STAFF
(YEAR 2)

Staff Characteristics	Language Arts		Mathematics	
	Aides (n=35)	Specialists (n=23)	Aides (n=24)	Specialists (n=18)
Training and expertise				
• Richness of background in subject area: Index of relevant professional development from 0 (= least) to 6 (= most)	2.0	3.5	2.1	4.0
• Educational level: Percentage with BAs (aides) or MAs (specialists)	32	48	--[a]	--[a]
• Average years teaching this kind of student population	9	16	--	--
Ethnic/linguistic background				
• Percentage with minority racial/ethnic background	74	46	--	--
• Percentage with same language as some or all of LEP children in room	86	17	--	--

a - No separate data for mathematics.

means that instruction focuses on the basic skills in which these students have shown deficiencies. The targeting may be relatively flexible or relatively permanent; the services may involve seatwork practice with an aide that builds directly on the day's classroom lesson, or a virtually separate curriculum with a specialist. In a smaller number of schools, targeting is not a main feature of program design, and supplemental programs are designed instead to upgrade instruction for whole classes or whole buildings; this is a feasible use of local desegregation funding, and it can sometimes be accommodated into a Chapter 1 program design as well.

In schools that take the latter approach, where supplemental staff teach demonstration lessons, offer other forms of professional development, and generally bring ideas about teaching for meaning and understanding--the contribution of supplemental funding can clearly be in line with the instructional alternatives discussed in this report. There are, of course, pitfalls in this endeavor: specialist teachers vary in their skill as staff developers, and this way of organizing supplemental services may neglect the needs of low-achieving students. However, we saw examples that convinced us of the promise of this approach.

Where supplemental instruction serves primarily to differentiate instruction for students of varying abilities, its contribution and limitations are clear-cut. Differentiation is useful in many instances, and sometimes necessary. There are children who are literally lost in the flow of activity in the regular classroom; for them, a largely separate, specialized curriculum may be the only answer. Flexible targeting of services on students who are experiencing temporary difficulty also seems to fit those students. In some other cases, however, differentiation seems to serve no useful purpose and may even be harmful. The potential harm comes from a focus on a sequence of basic skills taught out of context and from reliance on instructional aides who are often poorly educated.

Ironically, federal and state policy directives can reinforce these unfortunate instructional features: when a program like Chapter 1 is supposed to be cl(ely connected to the classroom program and tailored to students' needs, it is not unreasonable for educators to design an in-class program staffed by aides, under the classroom teacher's supervision, that drills students on the specific skills they lack. This study's findings suggest that policymakers may need to emphasize other features of effective supplemental programs besides student targeting and communication with teachers. Ideally, program policy could be built around instructional designs that facilitate students' mastery of a demanding academic curriculum.

Ultimately, the question of the specific contributions made by supplemental instruction to the academic learning of individual children cannot be answered by studies such as ours that focus on curriculum and instruction at the classroom level. Only research that follows individual children can properly assess the impact of supplemental services on learning. Our investigation makes it clear that, in principle, supplemental instruction has much to offer, and in many instances it appears to accomplish much. We have also identified many barriers that diminish the contributions that supplemental instruction is likely to make to students' acquisition of the advanced skills on which analyses in earlier chapters have focused. There is good reason for the designers of supplemental instruction to ask themselves whether and how these contributions might be strengthened.

PART FIVE:

STUDENTS, TEACHERS, AND SCHOOL SETTINGS AS INFLUENCES ON ACADEMIC INSTRUCTION

Each classroom in the sample represents a unique set of variables that combined to produce an environment for academic learning over a school year. There are, first of all, the students with their individual characteristics, personal histories, and learning styles or needs, as well as the classroom group--an entity that is more than the sum of its parts, with its own distinctive character. Then there is the teacher, with his or her singular array of background, training, and experience. The interactions between teachers and their students are embedded in schools and districts, each with policies, norms, and support mechanisms that can have an impact on every classroom in some way. Finally, each classroom sits within a state context, which may have a strong influence, albeit indirect, on what teachers do.

Previous chapters in this report have presented contrasting patterns of instruction and management across the sample classrooms. We now consider the forces and factors that drive classrooms toward one or another profile of mathematics or language arts instruction, classroom management, response to student differences, or pattern of supplemental instruction.

There is striking consistency in the kinds of explanations that pertain across subject areas. We discuss the most important forces at work in each category, noting their influences on the way teachers manage the learning environment and teach each subject area. The analyses we present draw heavily on both the qualitative case reports from classrooms studied intensively and quantitative indicators from the full sample of classrooms. These indicators are not equally available for both years; consequently, tables are presented for the year in which we have the most complete data.

XV STUDENT AND TEACHER CHARACTERISTICS THAT SHAPE ACADEMIC INSTRUCTION

We consider first how the patterns of instruction we have described reflect the nature of students and teachers. As analyses in Chapters IV, VII, and X have indicated, there are associations between the presence of instruction aimed at meaning and the characteristics of students or their teachers. Similarly, the nature of classroom groups and the backgrounds of teachers are related to the types of academic learning environment described in Chapter XII (some of which are linked to teaching for meaning).

Here, we synthesize and extend the analyses presented in earlier chapters to get at two underlying questions: (1) Are the alternative practices we have been studying appropriate and feasible for the more difficult to teach among the children of poverty? (2) In what ways do teachers' preparation, knowledge, and beliefs influence their attempts to teach for meaning and understanding?

The Nature of the Student Population

It is easy for educators to assume that the more impoverished the student population, the less appropriate are instructional approaches that depart significantly from a "basic skills only" orientation. The chapters in this report concerning mathematics, reading, and writing have assembled evidence that calls this notion into question. But it is useful to review evidence related to questions alluded to in the earlier chapters: within the study sample, is instruction that emphasizes meaning and understanding more likely to be used in classrooms with children who come from more affluent backgrounds and, as some might assume, more able to handle challenging academic work? Are children receiving alternative instruction brighter, on average, than others exposed to more conventional forms of instruction? Do they differ in other important ways?

Data noted in earlier chapters, and summarized in Table 64, give partial answers to these questions. By and large, the poverty level of students exposed to alternative instructional approaches is the same as that of children in classes exposed to other instructional approaches. In some instances (e.g., mathematics in Year 2), students exposed to the most alternative forms of instruction start out the year somewhat higher in achievement, but more often the differences between these groups are small. Other differences, not shown in the table, do exist but are often an artifact of the demographics of districts selected for the study. For example, students receiving the most alternative forms of instruction tend to have fewer minority children than those receiving the most conventional instruction in mathematics, reading, and writing--13 percent, 19 percent, and 10 percent fewer, respectively. These differences are not particularly large and are attributable primarily to one district (District 5), with a 95 percent minority population and virtually no examples in either year of instruction exemplifying the most alternative practice in any subject area (the reasons for this have much to do with the school and district policy environment, discussed later in this chapter).

The nature of the students in the classroom accounts for less of the variation in curriculum and instructional approaches than one might think. Still, the nature of the student population in some classrooms presents challenges that may in some cases dissuade teachers from adopting alternative approaches (or dissuade principals from assigning teachers to these classes who would be likely to pursue alternative instructional practices). The management of academic learning environments is a case in point: classroom demographics help explain some of the variation in the way teachers manage their classrooms, but the obvious student characteristics--class size, ethnic and linguistic heterogeneity, degree of poverty, and mobility--do not tell the whole story.

- Class size. Although smoothly run classrooms tended to be on the small side--or to have at least one aide for part of the day, thus reducing the pupil/teacher ratio--a few of the most effective managers also had more than 25 students.

Table 64

RELATIONSHIP BETWEEN STUDENT CHARACTERISTICS AND TYPE OF INSTRUCTIONAL APPROACH (YEAR 2)

	Student Characteristics	
Type of Instructional Approach	Poverty Level: Average Percentage of Students in Classroom on Free or Reduced-Price Lunch Program	Initial Achievement Level: Average Classroom Mean NCEs CTBS Pretest Score [a]
Mathematics		
• Arithmetic, skills only	55 (18)[b]	45 (8)[b]
• Arithmetic, skills and concepts	65 (26)	45 (12)
• Multiple topics, skills only	61 (26)	45 (14)
• Multiple topics, skills and concepts	64 (28)	50 (9)
Reading		
• Little or no emphasis on understanding	60 (19)	40 (10)
• Moderate emphasis on understanding	61 (25)	45 (9)
• Great emphasis on understanding	64 (30)	43 (11)
Writing		
• Little or no extended writing	60 (24)	43 (7)
• Moderate amount of extended writing	62 (26)	46 (9)
• Great deal of extended writing	62 (25)	45 (8)

a - For mathematics, the CTBS/4 Concepts and Applications test; for reading and writing, the CTBS/4 Reading Comprehension test.

b - Standard deviations appear in parentheses.

- Ethnic and linguistic heterogeneity. Most of the dysfunctional classrooms, for example, were multiracial groups of more than 27 students. Howevnr, the most chaotic classroom of all was a single-race classroom that varied between 14 and 18 students during the year.

- Poverty level. There is a similar lack of correlation between poverty measures and management effectiveness. Although the classrooms with the lowest levels of poverty (that is, with fewer than 30 percent of the students on the Free or Reduced-Price Lunch Program) tended to fall into the "well-managed" groupings and none were dysfunctional, the 14 classrooms in which 100 percent of the children received free or reduced-price lunch were distributed fairly equally among all categories of management; 4 were in the "orderly, enabling" group.

- Student mobility. The number of students entering and leaving classrooms also varied across all groups; classrooms with the highest mobility were not necessarily the most likely to experience management problems.

Homogeneity of classroom composition--by ethnicity or language background--was not necessarily an advantage for successful management. Although the all-white schools in one rural district had no classes that fell into the "dysfunctional" category, several all-white classrooms elsewhere had a variety of management problems. At the same time, where classes were tracked by ability level (or where one teacher taught the two higher reading groups in a grade, for example) the higher groups tended to gravitate toward the "orderly, enabling" category.

There are still many instances in which the nature of the classroom group predisposes teachers to adopt a particular approach to management. Moreover, there are other characteristics of the students in the classroom not reflected in the measures discussed above. The obstacles to academic learning experienced by low-income families in the rural areas we studied are different from those encountered in a violent, inner-city neighborhood, and these factors, too, had their effect on what was taught and how. For example, teachers were especially reluctant to assign homework in the inner-city schools primarily because they felt it would not get done.

There is no way to ignore the fact that classrooms with high proportions of low-SES students typically present teachers with a high concentration of special obstacles to overcome--that derive in part from language barriers, dysfunctional families, isolation, and (for some older children) substance abuse. These obstacles do appear to play an important role in shaping curriculum and instruction, but so do the kinds of factors discussed below regarding teachers, the school, or the district policy environments within which they operated. To their credit, the teachers in the most challenging settings did not give up because the problems seemed insurmountable. Understandably, some gravitated toward more routine, more structure, more skills-based instruction, and the path of least resistance--principally, it seemed, for their own psychic health. The result for children was a more restricted range of curriculum and learning opportunities.

Teachers' Preparation, Knowledge, and Beliefs

In many ways the chief architects of the students' learning experience (although not necessarily of the curriculum), the teachers in sample classrooms approached their task with varying degrees of professional preparation, knowledge, and beliefs about what they were teaching. These attributes of the teacher formed a web of influences that shaped the nature of what was taught and how it was taught. Certain characteristics were clearly associated with the presence or absence of instruction aimed at meaning and understanding. We review below what we have learned about the following in relationship to teachers' choices about curriculum and instruction:

- Teachers' ability to "do it all"--be innovative, manage the learning environment expertly in all areas, motivate all kinds of children regardless of need, and make a personal investment in teaching children from impoverished backgrounds.
- What teachers know and believe about the subject matter they are teaching.
- What teachers know and believe about the students they are teaching.

The Myth of the "Superteacher"

It is no secret that the alternative approaches investigated in this study demand a lot from teachers. Perhaps the easiest--and least useful--

explanation of all is that only the "best" teachers would take on the challenge of teaching multiple mathematical topics with attention to conceptual understanding, employ instructional strategies that maximize understanding, and provide numerous opportunities for extended text writing. In short, this explanation asserts that teaching for meaning and understanding is appropriate for the teachers who can "do it all," who can work magic with difficult classrooms, but not for the large majority of instructional staff who appear to possess less innate talent, competent as they may be, or who are willing to devote only 8 hours per day to their teaching career.

The study data shed light on this notion, but the answers are not simple. We would summarize what we have learned as follows. There are a few (very few) "superteachers" in the schools we studied, and they were likely to gravitate toward instructional approaches that aim at meaning and understanding. A larger number of teachers, who would probably be deemed "good" but not exceptional by a wide range of observers, are also attracted to these approaches, as are some teachers who are clearly ineffective. Those who stick to instruction aimed at basic skills mastery also include many who would be judged "good" and some who would be thought "excellent" by a wide variety of educators. Because instruction aimed at basic skills offers a path of least resistance, this approach probably attracts, on average, a larger proportion of teachers who have not yet mastered the difficult art of teaching--in <u>any</u> pedagogical tradition--in schools that serve the children of poverty.

As can be seen in Table 65, there are practically no teachers in our sample who were extensively engaged in instruction emphasizing meaning and understanding in all three subject areas we studied, and relatively few (18 percent) who did it in two areas. In other words, alternative instructional practices are more a matter of specialization, at least at this point in the professional development of the teachers we were studying. Some schools capitalized on this fact and organized instruction so that teachers could specialize for much of the day through teaming and departmentalized arrangements; in such instances, teachers were able to offer a richer menu of learning opportunities in the subjects they taught. Thus, from the point of

Table 65

LIKELIHOOD OF TEACHING FOR MEANING AND UNDERSTANDING IN MORE THAN ONE SUBJECT AREA
(Classrooms Studied Intensively in Year 1)

Number of Subjects	Regarding the extent of engagement in instruction aimed at meaning and understanding among the 40 classrooms studied intensively, the percentages (and numbers) that were...	
	Most extensively engaged[a]	Least extensively engaged[b]
None	43 (17)	48 (19)
1 or more	58 (23)	53 (21)
2 or more	18 (7)	20 (8)
All 3	3 (1)	10 (4)

a - "Most extensively engaged" = (1) for mathematics, focus on multiple topics, with emphasis on conceptual understanding; (2) for reading, great emphasis on strategies that maximize understanding; and (3) for writing, extensive opportunities for extended text writing.

b - "Least extensively engaged" = (1) for mathematics, focus on arithmetic computation only; (2) for reading, little or no emphasis on strategies that maximize understanding; and (3) for writing, few or no opportunities for extended text writing.

view of alternative instructional practice, there were few teachers who could "do it all." The table displays an interesting corollary: few teachers in the study sample exhibited the most conventional forms of instructional practice in more than one of the three subject areas. This fact refutes what could easily be assumed--namely, that teachers who approach one subject area in a conventional manner are likely to conduct all of their teaching in this mode.

Nonetheless, as suggested in Chapter XII, there is clear evidence that the "better" managers of classroom learning environments were more likely to teach for meaning and understanding in one or more areas and somewhat less likely to teach with basic skills mastery as their primary goal. Evidence related to this assertion appears in Table 66. Among the 23 Year 1 classrooms classified as "most alternative" in one or more subject areas, 56 percent exhibited "orderly, enabling" environments while only 18 percent were considered "dysfunctional" or "adequate." The pattern among the 21 classrooms pursuing the most conventional approach in one or more subject areas was nearly opposite: the percentage of these classified as having "dysfunctional" environments (24 percent) exceeded the percentage having "orderly, enabling" environments.

The relationship between academic learning environments and approach to mathematics, reading, and writing has already been discussed in Chapter XII, but the underlying issue is worth reiterating here. Are alternative instructional approaches appropriate only for "good" teachers? The data just presented suggest a several-faceted answer. To do these approaches well requires more of teachers; those who have mastered other aspects of the teaching craft are likely to master these approaches more quickly. Nonetheless, teachers across the spectrum of teaching competence attempted to focus their instruction on teaching for meaning and understanding. Regardless of their initial proficiency with teaching, many found ways to improve their teaching by adopting alternative practices.

In considering whether alternative practices are appropriate only for "superteachers," it is important to take note of teachers' personal

Table 66

TYPES OF ACADEMIC LEARNING ENVIRONMENT
AMONG CLASSROOMS MOST AND LEAST EXTENSIVELY
ENGAGED IN INSTRUCTION AIMED AT MEANING AND UNDERSTANDING
(Classrooms Studied Intensively in Year 1)

Type of Academic Learning Environment	Percentage (and number) of classrooms with each type of academic learning environment, among the classrooms that were... Most extensively engaged[a] in teaching for meaning in one or more subjects (n = 23)[c]	Least extensively engaged in teaching for meaning in one or more subjects (n = 21)[c]
Orderly, enabling	57 (13)	14 (3)
Orderly, restrictive	26 (6)	33 (7)
Adequate	9 (2)	29 (6)
Dysfunctional	9 (2)	24 (5)
	101 (23)[d]	100 (21)

a - "Most extensively engaged..." = (1) for mathematics, focus on multiple topics, with emphasis on conceptual understanding; (2) for reading, great emphasis on strategies that maximize understanding; and (3) for writing, extensive opportunities for extended text writing.

b - "Least extensively engaged..." = (1) for mathematics, focus on arithmetic computation only; (2) for reading, little or no emphasis on strategies that maximize understanding; and (3) for writing, few or no opportunities for extended text writing.

c - The two sets of classrooms overlapped for those classrooms that were most extensively engaged in alternative practices for one subject area, and at the same time least extensively engaged in another subject.

d - Percentages do not sum to 100 due to rounding error.

commitment to their work and the student population they were teaching. More than their colleagues emphasizing the mastery of basic skills, teachers who taught for meaning and understanding invested a considerable amount of personal energy, time, and even resources in teaching this student population. Although we have no systematic quantitative data in this regard, our qualitative analyses suggest that the teachers emphasizing meaning and understanding tend to have pursued this approach at some personal cost to themselves.

The pattern of personal investment in reading instruction illustrates the point.

- One veteran first-grade teacher commented that her husband had started to give her a hard time about the number of evenings and weekends she committed to preparation for teaching as she experimented with a whole-language approach to reading instruction. She also acknowledged spending "a small fortune" on professional books and periodicals.

- A third-grade teacher in another district looks on her class each year as the children that she and her husband (a retired school principal) never had. She "spoils" her classes with personal expenditures to enrich the classroom environment.

- Another teacher, although nearly burned out after over 30 years of teaching, is intent on exposing her students to as many experiences as possible. This year, in addition to many field trips to local cultural institutions, she directed her fifth graders in a production of *Macbeth*.

Teachers in these classrooms are also likely to be risk takers. (The same could be said of the teachers responding in "constructive, active" or "proactive" ways to student differences--see Chapter XIII.) They are willing to try new things, but maintain a healthy skepticism until a new approach to reading instruction has proven itself. They do not seem to adhere slavishly to any particular school of thought on the best way to teach reading but rather develop their own eclectic styles that tend to be dynamic rather than static. In several of the classrooms in this group, teachers were spending their first year with a new literature-based basal reading series combined with top-down mandates to present the same material to all children; others were voluntarily experimenting with greater use of trade books and an integrated approach to reading and writing.

What Teachers Know and Believe About Their Subject Areas

What teachers know and believe about the subject areas they are teaching stems from various sources, among them, their prior preparation through degree work and inservice professional preparation, their ongoing interaction with colleagues, and their own discoveries while preparing for instruction and interpreting the apparent results in the classroom. The long-term result of these experiences is a slowly evolving set of beliefs about what is to be taught and how to go about it.

Subject-Related Professional Development--The relationship between professional development and teachers' tendency to emphasize meaning and understanding is not consistent across subject areas or years, as can be seen in Table 67. In mathematics, for example, Year 2 teachers teaching multiple topics with conceptual understanding had somewhat lower indices of professional development in mathematics than those teaching arithmetic skills only. The table also makes clear that advanced degrees, by themselves, say little about the propensity of teachers to depart from conventional practices. This is not surprising when one considers that many teachers in the study sample received their master's degrees at a time when "basic skills only" instruction was more in vogue and more widely believed to be the best thing for "disadvantaged" students.

The numbers in the table, however, give only the crudest picture of the extent of prior preparation among teachers in the study sample. By themselves, these data indicate little about what teachers know and believe about the subject areas they are teaching. A more fine-grained understanding of the issue comes from examining the kinds of professional development teachers have had in particular subject areas, based on analysis of qualitative case reports. Overall, it is clear that few of the teachers in the study sample have been offered a particularly rich diet of professional development. Some with apparently sound credentials and many continuing education credits know little about recent pedagogical developments in each subject area. Others, who have less apparent exposure to staff development overall, have become very knowledgeable about alternative practices.

Table 67

RELATIONSHIP BETWEEN TEACHERS' EXPERTISE OR EXPERIENCE AND TYPE OF INSTRUCTIONAL APPROACH

Type of Instructional Approach	Teacher Characteristics: Highest Degree: Percentage with M.A.s	Extent of Subject-Related Professional Development: Index from 1 (= Least) to 6 (= Most)[a]	
	(Year 2 Only)	Year 1	Year 2
Mathematics			
• Arithmetic, skills only	21	1.9 (1.1)[b]	4.3 (1.3)[b]
• Arithmetic, skills and concepts	53	2.3 (.8)	3.9 (1.5)
• Multiple topics, skills only	50	2.3 (1.2)	4.7 (1.8)
• Multiple topics, skills and concepts	25	3.4 (1.2)	3.6 (1.5)
Reading			
• Little or no emphasis on understanding	26	2.5 (1.1)	4.1 (1.2)
• Moderate emphasis on understanding	38	2.6 (1.1)	4.3 (1.4)
• Great emphasis on understanding	31	2.8 (1.2)	4.4 (1.0)
Writing			
• Little or no extended writing	50	2.0 (1.0)	3.7 (1.3)
• Moderate amount of extended writing	25	2.7 (1.2)	4.1 (1.5)
• Great deal of extended writing	23	2.2 (.9)	4.8 (.9)

a - Index indicates the extent of inservice, preservice, and other professional development related to language arts or mathematics. Index in Year 1 is based on observer ratings, in Year 2 on teacher self-report.

b - Standard deviations appear in parentheses.

Mathematics is a case in point. Here, the experience in professional development or teacher preparation programs (or lack thereof) seems linked even more clearly to sheer exposure to, and awareness of, approaches that make mathematical understanding a central goal. Most teachers in our sample (and indeed, nationwide) have not been exposed--at least, not in any intensive way--to alternative approaches to mathematics instruction. It is not surprising, then, that many teachers focus on arithmetic computation with little emphasis on underlying concepts. By contrast, teachers in classrooms that focused on conceptual understanding as well as arithmetic computation have often sought out special training to improve their skills in teaching mathematics. The same cannot be said for the first group of teachers. For example, among teachers in the conceptually oriented group:

- One first-grade teacher enrolled in a graduate credit course on teaching mathematics. She was observed to make less and less use of the textbook as her confidence and knowledge about mathematics instruction grew.

- A third-grade teacher had attended workshops on mathematics put on by a state group.

- Two other first-grade teachers in one school, who had developed a mathematics curriculum combining textbook, manipulatives-based activities, and a conceptually oriented mathematics program, described themselves as having participated in "every mathematics workshop they could get to" over the past 8 years.

Professional development opportunities usually are not available in the normal course of events within school districts, so the pattern of teacher preparation we have just described reflects not only the individuals' drive to prepare themselves but also the availability of training in which this can happen. The differences across schools, discussed later in this chapter, regarding the likelihood of adopting alternative practices, are in part a function of access to training. Nonetheless, as the examples above suggest, there is clear evidence that teachers in the kind of schools we are studying must want the professional development--in some instances, want it badly--before the requisite experiences begin to accumulate over time.

Beliefs About the Subject Area and How to Teach It--Out of their professional development experiences, background knowledge, and formal preparation, teachers forge an image of the subject area they are teaching and how it should be conveyed to the students they are working with. These conceptions of the subject area and beliefs about how it should be taught appear to be very strong among the teachers in our sample and have much to do with what transpires in their classrooms.

Beliefs about writing are an obvious example. We detected four basic conceptions of writing among the teachers we studied. The first two, which treat writing as a necessary tool for learning and as a means of communicating thoughts and ideas, are strongly associated with the pattern of instruction in classrooms offering frequent opportunities to write extended text. The third, which treats writing as a system of rules to be mastered, is closely linked to the pattern of instruction that prevails in classrooms where little or no extended writing is done. The fourth view, of writing as an outlet for self-expression, cuts across the groupings to some extent but is not particularly prevalent in classrooms offering little opportunity for extended text writing.

The four views of writing are not mutually exclusive. Some teachers held more than one view, but no one held all four. In most cases, one view dominates a teacher's thinking and is subsequently expressed in the way he or she carries out the writing program.

- <u>Writing as a tool for learning</u>. Some teachers saw writing primarily as a process that facilitates the individual's ability to clarify thinking, analyze information, solve problems, and develop or demonstrate understanding. In this view, writing is not an adjunct to other subject areas but a tool necessary to understand fully the content presented in any area of the curriculum. Accordingly, the teachers who articulated this belief tended to encourage a great deal of extended text writing, in all areas of the curriculum.

- <u>Writing as a means of communication</u>. For other teachers in our study, writing, along with reading and oral communication, is seen as a vehicle for the exchange of ideas, opinions, and feelings. Teachers holding this belief tended to provide opportunities for students to communicate in writing and believed that the mechanics of writing would be learned mainly through use of the language. Some teachers in classrooms offering moderate to extensive opportunities for writing extended text held this belief.

- <u>Writing as a system of rules</u>. Many teachers in our study viewed writing as the mastery of writing mechanics. Almost all of these teachers taught classrooms in which little extended writing took place, and a great deal of time was spent learning and practicing discrete writing skills. Although such teachers might acknowledge communication as the ultimate purpose of writing, they interpret their goals as the teaching of the skills that enable communication to flow.

- <u>Writing as an outlet for self-expression</u>. Several teachers in the study placed less emphasis on writing as communication with others and more on writing as expression for oneself. Teachers holding this view of writing tended to offer numerous opportunities for extended text writing, often through journal writing.

These views of writing are powerful predictors of the kind of opportunities that are provided students. Although external factors such as textbooks and district policy played an important role, as described later in this chapter, there were nonetheless many ways for teachers to build writing into their academic program, regardless of the external constraints. Given the freedom, they tended to build and implement curriculum that was consistent with their view of writing.

In reading and mathematics, similar sets of beliefs about the subject area existed among the teachers in our sample, although these beliefs tended to be less clearly formed and articulated. In mathematics, for example, many of the teachers appeared to believe, as indeed do most adults (probably including a majority of parents and even of principals), that for young students, mathematics <u>is</u> arithmetic. Following this belief, arithmetic <u>should</u> be the dominant focus of elementary mathematics instruction, and drill with routine exercises is a very appropriate way to teach arithmetic. This belief is associated with the prevalence of "arithmetic-skills-only" instruction.

With regard to reading, teachers in our sample held a number of views in common and did not display the extreme positions that are part of the current debate about reading instruction. Virtually all the teachers on whom we concentrated the most intensive observations believed in teaching decoding skills and in engaging children's interest in, and understanding of, the written word through experiences with highly motivating text. But the reading teachers we studied placed different degrees of emphasis on skills versus understanding, and the roots of their differences seem to lie in strong preconceptions about what the skill of reading consists of, derived from their own education or preparation for teaching (now in the dim past for some veterans). Thus, there were some strong phonics advocates among the teachers we worked with, particularly at the first-grade level. (Only one school in the sample mandated a phonics-based approach to reading, and even it also offered a daily period of integrated language arts instruction.) Yet even the most ardent phonics proponents, for the most part, do not believe that children learn to read by phonics alone. They see knowledge of sound/symbol relationships as an essential tool that helps students become independent readers.

Interestingly, the teachers in our sample most committed to "whole language" principles incorporated some phonics into their reading instruction programs--typically by interspersing some traditional phonics drills throughout activities in an integrated language arts block. As we noted in Chapter VII, the teachers who concentrated on comprehension seemed far less defensive about the amalgam of strategies that they employed to bring children along in reading. If some phonics were indicated, then they did phonics lessons for a period of time. At the higher grade levels, the same was true for vocabulary development and word attack skills. No apologies were involved. These types of activities aimed at discrete skills were simply viewed as part of a sensible, comprehensive reading program.

What Teachers Know and Believe About the Children They Are Teaching

Subject matter knowledge and beliefs are not applied in a vacuum. Teachers draw on these resources as they fashion and execute an instructional program for a particular group of children, and, as we have noted elsewhere in this report, the children of poverty pose a considerable set of challenges for teachers. Several questions arise: are the teachers who know the students best also the ones who attempt to teach for meaning and understanding? What do teachers at the alternative end of the instructional continuum expect of their students, compared with other teachers? How do their knowledge and beliefs about the children affect the curriculum and instruction they offer?

A first set of answers is summarized in Table 68. In short, the data in the table indicate that, among the types of classrooms within any of the subject areas, there are no major differences in the teachers' expectations for student success. Generally speaking, the teachers in the study sample hold high expectations for student performance, reflecting the school and classroom sampling process. This process yielded as many committed conventional-approach teachers as others, who clearly believe their students can do as well by year's end regardless of the instructional approach. But the different groups of classrooms are taught by teachers who hold varying conceptions of what "doing well" means. The nature of the alternative curricula we have been studying sets a different and, in some ways, more demanding standard for student success.

On the basis of a rough indicator derived from teachers' questionnaire responses, teachers who were engaged in the most alternative approaches to mathematics and writing have a somewhat higher self-reported familiarity with students' backgrounds than teachers adopting the most conventional approaches to these subject areas (curiously, there is no difference for reading). The index is a simple count of different ways that teachers have become familiar with students' backgrounds (e.g., making home visits, doing volunteer work in the neighborhoods in which children live, having regular communication with parents). It is possible, also, that the degree of familiarity is a matter of the teacher's years of experience instructing this kind of student population; however, the data do not appear to bear this out, nor do they suggest that what teachers teach and how they teach it are related straightforwardly to how long they have been doing so. As the table indicates, teachers in all types of classrooms are relatively seasoned, once again reflecting our sampling criteria. Teachers pursuing the most alternative approaches to instruction have only slightly more years of experience, on average, than those pursuing the most conventional approaches (mathematics is something of an exception: the teachers favoring the most conventional approaches have little more than half the average years of experience of those who have opted for the most alternative approaches).

Table 68

RELATIONSHIP BETWEEN INSTRUCTIONAL APPROACH AND TEACHERS' EXPECTATIONS OR KNOWLEDGE OF STUDENTS (YEAR 2)

Type of Instructional Approach	Teachers' Familiarity with Students' Backgrounds: Index from 1 (= Least) to 7 (= Most)	Teachers' Expectations[a] for Student Success: Scale from 1 (= Most Can't Succeed) to 4 (= All Can Succeed at Grade Level)	Years of Experience Teaching Similar Kinds of Students
Mathematics			
• Arithmetic, skills only	1.7 (.8)[b]	3.2 (.8)[b]	5.5 (5.3)[b]
• Arithmetic, skills and concepts	2.4 (1.4)	3.2 (.7)	14.7 (9.2)
• Multiple topics, skills only	1.5 (.9)	3.4 (.7)	8.1 (6.3)
• Multiple topics, skills and concepts	2.2 (1.3)	3.2 (.6)	9.7 (7.8)
Reading			
• Little or no emphasis on understanding	2.3 (1.5)	3.0 (.7)	9.4 (8.9)
• Moderate emphasis on understanding	1.6 (.8)	3.2 (.5)	8.9 (7.2)
• Great emphasis on understanding	2.2 (1.3)	3.2 (.8)	10.6 (8.7)
Writing			
• Little or no extended writing	1.8 (1.1)	3.1 (.8)	8.7 (8.5)
• Moderate amount of extended writing	1.8 (1.1)	3.3 (.6)	9.2 (6.9)
• Great deal of extended writing	2.4 (1.2)	2.9 (.7)	10.4 (8.5)

a - Based on teachers' self-reports.

b - Standard deviations appear in parentheses.

But as the discussion in Chapter XIII made clear, much more is involved in teaching students from diverse backgrounds than years of experience or familiarity with these backgrounds. A combination of factors leads some teachers to value and build on student backgrounds, while others pay little attention to students' lives out of school or, in some cases, allow their beliefs about these backgrounds to limit what they offer certain students. The continuum described in Chapter XIII, ranging from "nonconstructive, active" responses to student differences to those classified as "constructive, active" or "proactive," represents the central range of difference among the teachers we studied. Ultimately, what teachers do with their awareness of student backgrounds seems to make the biggest difference. Those who emphasize meaning and understanding in mathematics, reading, and writing are more likely to draw on students' background as a resource for learning in all three subject areas, although not necessarily to an equal extent. Table 69 summarizes the data on which we base the conclusion. In reading and writing, for example, teachers who actively and constructively incorporate student backgrounds into their teaching are at least twice as likely as teachers who ignore student background in instruction (or focus on it in nonconstructive ways) to emphasize understanding in reading or offer students extensive opportunities for extended text writing. The same is not true of mathematics; however, when considering all teachers whose pattern of response to student differences is considered "constructive" (passive or active), the proportion adopting the most alternative forms of mathematics still exceeds that for teachers whose predominant response pattern is classified as "nonconstructive."

Table 69

TEACHERS' RESPONSES TO DIFFERENCES IN STUDENT BACKGROUND, IN RELATION TO INSTRUCTION AIMED AT MEANING AND UNDERSTANDING (YEAR 1[a])

Teachers' Responses to Differences in Student Background	Of all classrooms typified by each way of responding to differences in student backgrounds, the percentage engaging most extensively in teaching for meaning and understanding.[b]		
	Mathematics	Reading	Writing
Nonconstructive approaches, active or passive (n = 12)	10	18	18
Constructive, passive approaches (n = 18)	25	33	29
Constructive, active or proactive approaches (n = 10)	11	63	38

a - Classrooms studied intensively only (n = 40).

b - "Most extensively engaged..." = (1) for mathematics, focus on multiple topics, with emphasis on conceptual understanding; (2) for reading, great emphasis on strategies that maximize understanding; and (3) for writing, extensive opportunities for extended text writing.

XVI THE SCHOOL, DISTRICT, AND STATE ENVIRONMENT FOR ACADEMIC INSTRUCTION

Earlier chapters have established that classrooms engaged in teaching for meaning and understanding are not evenly distributed across school settings. Rather, schools and districts have distinctive profiles with regard to the prevalence of conventional or alternative approaches in the three subject areas.

In this chapter we review and synthesize the evidence regarding the distribution of instructional approaches across our sample. In so doing, we explore the particular features of school, district, and state settings that are most closely associated with the presence or absence of alternative instructional practices.

The School as an Environment for Academic Instruction

Our data make it abundantly clear that the school as a whole establishes an environment that supports or inhibits certain approaches to academic instruction. As Table 70 indicates, schools differed tremendously, both within and across districts, in the percentage of sample classrooms that emphasized meaning and understanding in mathematics, reading, and writing instruction. Take, for example, the two schools in District 1: both had nearly identical profiles of classroom types in reading and writing, yet were nearly opposite with regard to mathematics--approximately three-quarters of the classrooms in School 1 displayed the most alternative approach to mathematics, while barely a tenth of those in School 2 did so (the percentages of teachers adopting the most conventional approaches to mathematics differed in a similar way--none in School 1, compared with nearly half in School 2).

Table 70

CLUSTERING OF ALTERNATIVE AND CONVENTIONAL INSTRUCTIONAL APPROACHES WITHIN SCHOOLS (YEARS 1 AND 2 COMBINED)

School (n of classrooms)	Among sample classrooms within the school, the percentage with instruction most (and least) oriented toward meaning and understanding.[a] Mathematics	Reading	Writing
District 1			
• School 1 (n = 11)	73 (0)	45 (9)	57 (14)
• School 2 (n = 11)	9 (45)	45 (9)	63 (13)
District 2			
• School 3 (n = 11)	22 (44)	18 (9)	57 (28)
• School 4 (n = 7)	0 (57)	0 (56)	20 (20)
District 3			
• School 5 (n = 8)	75 (0)	40 (50)	75 (0)
• School 6 (n = 6)	25 (25)	0 (50)	0 (0)
• School 7 (n = 9)	44 (33)	0 (33)	40 (20)
District 4			
• School 8 (n = 10)	30 (40)	20 (10)	0 (33)
• School 9 (n = 8)	13 (38)	0 (38)	17 (33)
• School 10 (n = 10)	50 (20)	14 (14)	0 (50)
District 5			
• School 11 (n = 11)	0 (64)	0 (91)	0 (71)
• School 12 (n = 11)	9 (18)	0 (55)	0 (63)
• School 13 (n = 11)	0 (82)	0 (70)	25 (50)
District 6			
• School 14 (n = 8)	13 (38)	56 (11)	25 (0)
• School 15 (n = 8)	38 (38)	57 (14)	25 (0)

a - "Approaches most oriented toward meaning and understanding" = (1) for mathematics, focus on multiple topics, with emphasis on conceptual understanding; (2) for reading, great emphasis on strategies that maximize comprehension; and (3) for writing, extensive opportunities for extended text writing.

Other kinds of differences are apparent from examining the table. Certain schools concentrate on particular subject areas, and teachers' approaches to curriculum and instruction follow suit. The principal in School 3, for example, makes writing instruction a high priority; it is not surprising, then, that more than half of the sample classrooms in both years offered students extensive opportunities for extended text writing, while fewer than a quarter of the classrooms were considered most alternative in their approaches to reading or mathematics. By the same token, School 10, which housed a mathematics and science magnet program, included a high proportion of classrooms emphasizing multiple topics and conceptual understanding in mathematics, yet few or none exhibited the most alternative approaches to reading or writing. Occasionally, schools had a high proportion in all three subject areas of classrooms emphasizing meaning and understanding (e.g., Schools 1 and 5) or a correspondingly high proportion of classrooms characterized by the most conventional approaches (e.g., Schools 11 and 13).

Not all the differences among schools can be attributed to policies and conditions unique to the school. As the figures in the table suggest and as we will discuss later in this chapter, district- and state-level policies lead schools within the same district to resemble each other. Nonetheless, as our qualitative data from schools made clear, there are a number of forces within the control of school people that encouraged or discouraged teachers from adopting particular approaches to curriculum and instruction.

Our understanding of the influence of the school environment derives in large measure from qualitative data sources--repeated interviews with teachers in the study sample, principals, and others at the schools; observations in the schools over the 2 years of the study; and examination of instructional materials and documents related to each school. Three key facets of the school environment for academic instruction can be assessed quantitatively as well, drawing on data from the teachers' survey in Year 2: (1) the support offered teachers by school leaders and resource staff; (2) the degree of autonomy granted teachers over curricular decisions; and (3) the level of school resources available to the classroom. Data pertaining to each one appear in Table 71.

Table 71

RELATIONSHIP BETWEEN SCHOOL CHARACTERISTICS AND TYPE OF INSTRUCTIONAL APPROACH (YEAR 2)

Type of Instructional Approach	School Support for Instruction: Teacher Rating from 1 (= Least Satisfied) to 4 (= Very Satisfied with School Support)	Index of Teachers' Perceived Autonomy Over Curricular and Instructional Decisions, from 1 (= Little or No Autonomy) to 10 (= High Degree of Autonomy)	School Resources: Pupil/Staff Ratio
Mathematics			
• Arithmetic, skills only	2.9 (1.0)[a]	5.3 (2.6)[a]	17:1 (10)[a]
• Arithmetic, skills and concepts	2.8 (1.0)	6.7 (2.9)	18:1 (10)
• Multiple topics, skills only	3.6 (0.7)	6.8 (2.7)	18:1 (10)
• Multiple topics, skills and concepts	2.8 (1.1)	6.5 (2.6)	19:1 (8)
Reading			
• Little or no emphasis on understanding	2.9 (1.0)	6.1 (2.4)	16:1 (9.3)
• Moderate emphasis on understanding	3.4 (.7)	6.1 (3.0)	14:1 (8.0)
• Great emphasis on understanding	3.0 (1.1)	6.3 (2.8)	19:1 (10.7)
Writing			
• Little or no extended writing	3.1 (1.0)	5.5 (2.0)	17:1 (10)
• Moderate amount of extended writing	3.3 (1.0)	4.9 (2.6)	20:1 (9)
• Great deal of extended writing	2.6 (.9)	6.1 (3.1)	16:1 (10)

a - Standard deviations appear in parentheses.

School-Level Support for Instruction

Although teachers adopting different approaches to mathematics, reading, and writing appear to have comparable levels of satisfaction with school support for instruction, as shown in the table, the schools were not the same in the way they supported particular approaches to instruction, especially through the actions of the principal and resource staff. The principals in the sample schools vary a great deal in their approach to guiding instruction and managing the operation of their schools. The strongest principals offered both a clear sense of direction to teachers and a buffer against external pressures, as in the following instances:

- In one district that insisted on a new integrated language arts curriculum, the principal of one school we studied adamantly refused to allow her teachers to abandon a strictly phonics-based approach.
- In another school in a different district, the principal encouraged alternative approaches to language arts teaching among some faculty by telling them that it was unimportant whether the children scored high on standardized tests emphasizing discrete basic skills.

In other cases, principals did not see instructional guidance or buffering as part of their role; as a consequence, teachers were more on their own. Principals could do more than these two roles imply--in various ways, they set the tone for staff consideration of new practices (more will be said about this later in the chapter).

Resource staff could play a role that focused more directly on particular approaches to instruction. In School 1, the mathematics specialist made himself available to all teachers in the elementary grades on a regular basis to discuss their teaching of mathematics, to respond to their concerns and questions, and also to push them to incorporate problem-solving strategies more explicitly into their curriculum. The work of this individual in the school goes a long way toward explaining the high proportion of classrooms in the school orienting mathematics instruction toward multiple topics, conceptual understanding, and solving unfamiliar problems. Resource staff of this sort were not common in the study schools, but other individuals often played the function--for example, the Chapter 1 itinerant specialists who provided demonstration lessons and inservice staff development related to integrated language arts approaches for teachers in Schools 14 and 15. Although the staff of these schools were by training and basic convictions more sympathetic to skills-oriented language arts, they gained a greater appreciation of language arts techniques that focused on meaning and understanding from these professional development experiences, and several made substantial changes in their teaching approach as a result.

Professional Autonomy

"Support" from school leaders could range from gentle encouragement to strong suggestions--in some cases, heavy-handed requirements--that teachers adopt particular approaches to instruction. In so doing, leaders had to balance their impulse to lead instruction in a certain direction against their desire to protect and enhance the professional autonomy of teaching staff. The data in Table 71 suggest that there is some link between professional autonomy and the choice by teachers to adopt alternative instructional approaches. Although the differences in our index of autonomy are slight, they consistently indicate that teachers opting for instruction aimed at meaning and understanding perceived themselves to have greater autonomy over curricular and instructional decisions than those who pursued instruction dominated by the mastery of basic skills. Because the different types of classrooms tend to cluster by school, there is some basis for asserting that the school, in addition to the individual, was responsible for the degree of autonomy teachers felt. The point was made forcefully by teachers in schools that were dominated by principals with a directive, even dictatorial, style of decisionmaking. One such teacher complained at the end of the year:

> "I love teaching here. The children are wonderful; I have only 16 students in my first-grade class, a full-time aide, all the materials I need, and plenty of time for planning and collaboration with the other first-grade teachers. But sometimes I feel as though I am being treated like a child myself, and I find myself trembling at the thought of the principal coming through the door and discovering that my students don't know a vocabulary word."

The data on perceived autonomy must be interpreted several different ways. On the one hand, they say something about the teachers themselves.

Individuals who took on new approaches to instruction were more likely to find ways to be creative regardless of constraints imposed on them. But it was also clear that school leaders could enhance or inhibit these tendencies by the way they treated their staffs. For example, the teacher quoted above, whose teaching was characterized by the most alternative approach to mathematics, resigned from the school after the first year of the study rather than face the intrusive pressure of her principal for another year.

School Resources

There are many ways to look at questions of school resources, but one way--perhaps the way that matters most from the classroom teacher's point of view--is to examine how the level of school resources translates into adult time and attention in the classroom. The data in Table 71 make it clear that, looked at this way, the level of resources does not distinguish between classrooms of different types in any of the three subject areas. If anything, classrooms emphasizing meaning and understanding had slightly higher pupil/staff ratios than classrooms exhibiting a more conventional approach to instruction. The reasons for this pattern were numerous and especially obvious when visiting the schools. Many schools, for example, received additional funding as part of desegregation-related policies (e.g., a consent decree between the district and the local court). In some of these schools, the funds contributed directly to additional instructional staff who were worked into the routine of the regular classroom. In other cases, the money contributed only indirectly to instruction in the regular classroom.

There are other matters related to resources that are not captured by pupil/staff ratios, and our qualitative data suggest that the availability of basic instructional materials was of particular concern in at least a few schools. For example, in one school there were not enough textbooks to go around, let alone in-class libraries, reference materials, and the like--quite a different story from the situation of the teacher quoted above, who taught in an inner-city school that received ample funding for instructional materials and technology.

Other School-Level Influences

The quantitative data we collected do not reflect several other features of the school environment that clearly influenced teachers' choices of approach to instruction, in particular, the organization of instruction (including class assignment, scheduling, and other logistical matters), the overall structure of the school, and what might be termed the "staff climate." Some of these influences were quite obvious, as in the case of the schools that housed magnet programs (Schools 1 and 10). For example, the school with a mathematics and science magnet program had a disproportionately high percentage of teachers teaching multiple mathematical topics with emphasis on conceptual understanding. Other school-level influences were more difficult to pinpoint, as noted below.

Staff Climate--In one sense, a school can be thought of as a collection of teachers that develops a unique "staff climate" (school leaders, especially the principal, influence this climate considerably, but they are not solely responsible). Some schools, for example, have cohesive staffs, who support each other in various ways; other schools do not. The schools we studied varied tremendously in this respect. In schools with the most supportive staff climates, teachers were more likely to approach instruction with an emphasis on meaning and understanding. Elsewhere, individual teachers might make the choice to teach in a way that was at odds with conventional approaches, but they did so more out of personal conviction and sheer willpower. Colleagues thus offer a first level of support to teachers in their efforts to change what they do in the classroom. In a variety of informal ways, the teachers in our sample used their colleagues as a source of advice, consolation, materials, troubleshooting, and curricular direction. Occasionally, the relationship was formalized, as in the case of the teacher pairings within one school, through which teachers in the same grade level were given coordinated schedules and encouraged to plan and develop curriculum together (many pairs had taken good advantage of this opportunity).

Of course, peer "support" can both encourage and discourage departures from conventional wisdom, and on more than one occasion, we heard staff-room commentary that subtly undercut the intentions of meaning-oriented curricula that were in the process of being adopted. Moreover, in principle, school staffs might be as united and mutually supportive around instructional goals that gave the mastery of basic skills the highest priority. Several schools in District 5 approached this state of affairs, although their staffs could hardly be described as cohesive.

The staff climate reflects many things, among them the tone set by school leaders and the talents, interests, and other qualities possessed by the teachers who happen to be in the school building. Some of the schools we studied were apparently more effective than others at attracting and retaining a group of teachers who were likely to experiment with alternative instructional approaches.

District and State Policy Environment

Although it may enhance or dampen the influence of external forces, the school does not control events in the district and state policy environment that may be intimately linked to the kind of instruction taking place in classrooms. The result, noted in earlier chapters and in our discussion of school differences, is that these external forces can alter the profile of classroom types a great deal. The basic pattern is summarized in Table 72. The configuration of classroom types within each of the six districts displays a distinctive profile that cannot be attributed solely to student characteristics, teachers' decisions or capabilities, or school-level factors. Rather, district-level policies about curriculum, textbooks, and testing played a salient role in determining the presence or absence of different types of instruction, as did other factors related to school-level support, autonomy, and resources.

The net results of these forces are suggested by the patterns in Table 72. As noted in earlier chapters, some districts actively discouraged or simply did not encourage alternative approaches to instruction (see, for example, all subjects in District 5 or mathematics and reading in

Table 72

DISTRIBUTION OF CLASSROOMS WITH THE MOST ALTERNATIVE AND CONVENTIONAL APPROACHES, BY DISTRICT (YEARS 1 AND 2 COMBINED)

Type of Instructional Approach	Percentage of sample classrooms within each district exhibiting each type of instructional approach.					
	Dist. 1 (n=22)	Dist. 2 (n=18)	Dist. 3 (n=23)	Dist. 4 (n=28)	Dist. 5 (n=33)	Dist. 6 (n=16)
Mathematics						
• Focus on arithmetic skills only	23	50	20	32	55	38
• Focus on multiple topics plus conceptual understanding	41	13	48	32	3	25
Reading						
• Little or no emphasis on strategies that maximize comprehension	9	28	43	20	72	13
• Extensive emphasis on these strategies	45	11	17	12	0	56
Writing						
• Little or no extended text writing	13	17	10	33	61	0
• Extensive opportunities for extended text writing	60	42	50	6	9	25

District 2); others did the opposite (such as reading in District 6 or all subject areas in District 1). Although there were many factors at all levels contributing to these patterns, district-level decisions and actions left their unmistakable stamp.

Sometimes, these district-level forces acted as constraints, which limited the vision, the flexibility, or simply the resources of principals and teachers. For example, one district does not pay for copying machines in schools, thus requiring principals to spend large amounts of time and energy raising money for this purpose. This same district has nearly the lowest per-pupil expenditure in the state for instructional materials, so that students in the upper grades are not allowed to write in their "consumable" workbooks.

In other cases, school and district policies encourage experimentation (such as trying new or unusual curricula in magnet schools) or present opportunities for trying practices believed to be more effective (even if only to satisfy a school, district, or state requirement). As an example, teachers' use of a mathematics curriculum focusing on a broad array of topics occurred only in districts in which there was some encouragement, or an explicit mandate, for this to happen (often, but not always, originating at the state level). Virtually no teachers in the sample adopted such a curriculum in the absence of some strong urging from above; few would have opted for such a curriculum without such leadership.

The most influential forces explaining the distribution of classroom types across districts were school, district, and state policies related to curriculum, textbooks, and testing.

Curriculum Policies

Every district that we visited sets curriculum policies on reading, writing, and mathematics instruction. However, there are important differences in the degree to which these policies detail exactly what is to be taught, the sequence in which it is taught, and even the timing in the school year. The most prescriptive district policies favored basic-skills-oriented instruction. A consequence of these more prescriptive curricular policies appeared to be a higher degree of fragmentation in the curriculum, which made it harder for instruction emphasizing meaning and understanding to take root. Besides the degree of specificity in the curriculum, there is an important issue of how the curricular policy came to be established and with what kind of participation from teachers, schools, and central office.

Curricular guidelines from the district's central office can be exceedingly detailed. In one district, reading curriculum is set out in two-week increments or units, each of which is accompanied by a test that must be mastered before the next unit is started. In stark contrast, another district fits all of its objectives for reading instruction across a year onto several photocopied pages and leaves it to the teacher and school to determine how and when to reach the objectives. As might be expected, teachers in the former case feel more constrained than in the latter; it is probably not a coincidence that few of the teachers we studied in the former case were engaged in language arts teaching that deviated much from the discrete-skills-oriented curriculum advocated by the central office.

Both the district's curricular decisions and the organization of instruction in the school affect the degree of cohesion or fragmentation in the curriculum as experienced by children. Especially evident in the teaching of language arts, some of the districts and schools in the study had devised an overall curriculum that either tries to do too much or subdivides what children must learn into too many discrete boxes. The result is the same: fragmentation of the school day into a series of unrelated segments. In some classrooms, no activity ever lasts more than 10 minutes; by definition, then, there is no extended reading, or writing of extended text. In others, the daily and weekly reading instruction schedule is quixotic because so many other social and curricular goals have been inserted into a finite amount of time--drug education, clubs, assemblies, etc. The impression children get is that learning to read is of equal importance to talking with Officer Friendly about bicycle safety.

Among the districts, there appear to be some important differences in the way that curricular policies came to be, ranging from central office fiat to participatory planning involving many classroom teachers. Research has demonstrated quite definitively that teacher "ownership" of an innovation (or policy) improves its chances of being implemented. The experiences of districts in our sample that are in the process of implementing a change to more integration of reading, writing, and other aspects of language arts corroborate this finding.

In one district, this policy change occurred by fiat. Most teachers in this district were straining to understand what was expected of them during the time the study was taking place; many had given up halfway into the first implementation year. In two other quite disparate districts (one urban, one rural), planning for major curricular change in language arts had been a much longer process and included much more participation of classroom teachers. Several teachers in one of these districts told us that they felt personal responsibility for the new language arts curriculum. The other district has set up a 5-year plan for implementing an integrated language arts curriculum. Teachers have some choice about when they will begin to change their curriculum and instruction and how quickly they will proceed. In both these instances, the decision to revise the district's approach to reading instruction came from the top. However, because the means to the end have been more participatory and more realistic, with more attention to the research and theory behind the change, teachers in these two districts seem to have more investment in seeing it succeed.

Aside from the general features of curricular policy and how it was arrived at, there are specific expectations about the content of mathematics, reading, and writing instruction embedded in the curricular policies or guidelines that affect teachers' work. As the earlier discussion of teacher characteristics implied, not all teachers heed such policies in the same way, but in most instances that we have been studying, the very existence of the guidelines is a major feature of the teachers' landscape.

Guidelines or policies for the teaching of writing are a clear case in point. The most significant policy in this subject area was simply a declaration by school, district, or state authorities that writing must be taught and, along with that, what kinds of writing students are expected to master at what level. One of the six districts we studied placed very little emphasis on writing instruction; here, this aspect of language arts was viewed as an extra, to be included if reading skills were being mastered at a reasonable rate. More often than not, writing was ignored in the classrooms we visited in this district. At the other extreme are several districts that not only expect writing to be taught in every grade (including the first grade) but specify nine genres of writing that students are expected to be familiar with by the time they reach sixth grade. It is little surprise that classrooms in these schools showed signs of considerable writing activity--for example, walls were typically covered with students' written work, which changed as the year went on. Although many other factors contribute to this pattern, the simple fact that the district insisted that writing has high priority in the language arts curriculum (not a foregone conclusion in American elementary schools) has a clear impact on classroom practice.

Textbook Choices

Textbook choices go hand in hand with overall curricular decisions and are typically the province of the central district office, although textbook choices were made at the school level in some cases in our sample. As noted above and in earlier chapters, textbooks have an important role to play in each of the subject areas, especially in mathematics. In that subject, the conception of mathematics implicit in the textbook is usually the one our teachers adopted in their own instruction; most followed the textbook closely.

The situation was not greatly different in reading, although teachers in the sample classrooms were somewhat more willing, on average, to depart from basal readers than from their mathematics textbooks. In writing, they tended to be freer still of the dictates of the writing assignments contained in language arts textbooks. However, the influence of the language arts textbook depended in part on school or district policy about its use and in part on its match with the teachers' basic beliefs about the subject they were teaching. In some of the schools, teachers were required to use a specific textbook following a certain approach to teaching writing. In other schools, a textbook was available, but teachers could choose to use the book or to develop their own curriculum. Nonetheless, teachers who had strong views about the teaching of writing tended to find ways to "work around" the curriculum presented in the textbook, if it did not conform to their thinking. We found this situation across all writing teachers, regardless of how much or little they emphasized extended text writing. For example, in one district that had adopted a textbook emphasizing integrated approaches to language arts instruction, teachers wedded to a view of writing as a system of rules chose to ignore or supplement the textbook: in their classes, little extended text writing was done. Similarly, in other districts in which language arts textbooks stressed drill in language mechanics, many teachers offering extensive opportunities for extended writing did not use the textbook, believing that they could provide richer writing opportunities for their students in ways not presented in the textbook.

The choice of textbooks by school or district does little by itself to make up for teachers' lack of experience with the approach contained in a textbook. For example, in many of the classrooms we studied, teachers were using for the first time a new textbook series based on the integration of reading and writing. Most tried to follow the textbook, but many felt unsure of themselves and approached the textbook's writing lessons selectively and in a more limited way than was intended by the textbook authors.

Testing and Accountability Pressures

Testing of various kinds is an ever-present feature of the classrooms we studied, and in many ways this fact influences both instructional content and teaching approach. The pattern is especially clear in the case of mathematics and writing.

The effects of testing pressure were seen most dramatically in one of the six districts. For example, nearly all the mathematics classrooms from this district emphasized arithmetic skills only; the few that did more in mathematics lessons still stuck closely to arithmetic and did not add to it other mathematical topics or skill areas. This very large, poor district has a top-down approach to instruction, which stresses the frequent use of criterion-referenced tests (CRTs); in mathematics, these tests focus particularly on students' arithmetic computation skills. Certain instructional policies are mandated by the district, such as the requirement that teachers "pretest" each chapter of the mathematics textbook (which, itself, is centrally selected by the district). Taken as a whole, the district policies seem to shape teachers' views of mathematics teaching and learning. Unfortunately, the vision of mathematics instruction embodied in these policies is a restricted one.

In districts with a broader view of mathematics, teachers felt less pressure from tests, and a number of them took advantage of their perceived freedom in designing less conventional approaches to the mathematics they were teaching. These teachers did not seem as often to perceive pressure that their students perform well on standardized tests that emphasize proficiency in arithmetic computation. To be sure, there was some pressure, but it was far less common. Often, the effect of standardized testing on classroom instruction was negative, as the following examples illustrate:

- Teachers in one school (which is in a "problem area" of the city) place great emphasis on tests, because they hope to increase the status of the school by raising its test scores. Furthermore, believing that students will do better on the test if they are exposed to as wide a range of materials as possible, the teachers emphasize "covering" the textbook, at the expense of mastery.

- Large amounts of time in a school in another state are spent on test preparation. The tests include not only state-mandated standardized tests but also three separate administrations each year of the district's own criterion-referenced tests (CRTs).

- A well-prepared mathematics teacher in another school in that district sticks to the curriculum in a very rigid fashion. She understands that the CRTs are tied to material that she is supposed to teach, and if she doesn't cover the material, she will be held responsible for her students' poor performance.

It is true that there are state and district tests that matter for most of the teachers who teach a wide range of mathematical topics and emphasize conceptual understanding of mathematics. But somehow the pressures on these teachers seem less--for reasons that are not entirely clear from the available data. One reason may be that, in one state, the state proficiency test in mathematics uses the school as the principal unit of analysis. By contrast, in the district with the greatest degree of test pressure (which is located in another state), the unit of analysis is the classroom. In fact, individual teachers are very aware that the principal--and even the district's powerful central office--perceives test scores as an indicator of teacher performance.

With regard to writing, district testing policies exert a similar kind of influence, except that there seems to be a more pervasive pattern of teaching to the test. In this area of the curriculum, tests can both inhibit and promote teaching for meaning and understanding. On the one hand, districts in which the testing package aims most directly at discrete writing skills encourage that aspect of the language arts instruction to the exclusion or diminution of instruction in composing extended text:

- In the above-mentioned case of heavy testing in mathematics, students' mastery of language mechanics skills is also tested on a regular schedule. Not surprisingly, teachers teach these skills and, for the most part, ignore instruction involving extended writing tasks.

- In another district, which uses a popular standardized achievement test, teachers devote considerable time in late winter and early spring to preparing students for the multiple-choice language arts section of that test--which assesses comprehension and mastery of various reading or language mechanics skills. During the 6 to 8 weeks of intensive preparation for testing, teachers decrease their attention to extended writing.

On the other hand, testing programs that assess writing holistically--that is, through samples of extended text writing--appear to encourage writing instruction in which composing extended text is a priority. Three of the districts in our sample are in a state that has established a writing assessment program of this sort. In this state, a matrix sampling technique is used such that students in the same classroom may receive different types of writing prompts; accordingly, teachers feel the pressure to give their students writing tasks relevant to each of these writing types. The writing assessment program has been in place for a few years at the secondary level, but will begin soon at the sixth-grade level. Teachers in some of our sample schools are beginning to gear their instruction toward this fact.

One must keep in mind that testing is not the only influence on what is taught in mathematics, writing, or any area of the curriculum, for that matter. Rather, a complex interaction occurs between (1) what the tests cover, (2) how frequently they are administered, (3) the incentives or consequences attached to the test results and to which unit (teacher, school, or district), (4) how closely tests are aligned with what the district or school sets as curriculum, and (5) and how effectively schools or individuals are able to resist or counteract the inevitable pressures from the testing situation.

A feeling of powerlessness often manifests itself in situations where testing pressure is high. In some instances, teachers who stressed arithmetic computation, for example, felt torn between conflicting goals. One fifth-grade teacher perceived that the district policies, as well as the textbook itself, put a very high priority on computational skills. In addition, she believed that this is what was tested, saying to one of the researchers as the year progressed, "I dread how they are going to do on the CAT in a couple of weeks." Thus, although she wanted to focus more on conceptual understanding (and even sought help from a district supervisor, who arranged for her to attend an inservice session on the use of manipulatives), she felt an uncomfortable pressure, underscored by testing, to focus her efforts on arithmetic computation skills.

Summary: Balancing Support, Autonomy, and Pressure for Change

As the analyses in this chapter have made clear, policymakers' choices about appropriate teaching and learning and how to support it affect an individual teacher's actions in the classroom. Sometimes, all these forces push a teacher in a single direction, as in the case of a new teacher who found herself in a district that placed very little emphasis on writing instruction and mandated the teaching of reading through a structured phonics-based program. Furthermore, the principal insisted on quiet, orderly classrooms. Although the teacher had been trained in whole-language approaches and started the year emphasizing active student learning, she eventually yielded to the pressures and altered her style of teaching to bring it more in line with conventional practices.

More typically in the classrooms we visited, policies were not so clearly aligned to support--or inhibit--particular practices. As in the example below, most teachers received mixed signals about what to teach.

- Pressure for change without adequate support. Ms. Valencia has taught in the primary grades in an inner-city school serving a student population of mixed ethnicity for 6 years. Her own training in language arts emphasized a basic skills approach, with which she has become comfortable and which she believes produces good results with her pupils. In the last year, however, the district adopted a new, integrated language arts curriculum, virtually banned the use of ability grouping in reading, and requested that teachers introduce students to the writing process. At the beginning of the year, Ms. Valencia and her colleagues were introduced to the new curriculum in a 2-day training session, were handed new books, and were told by the principal to implement the new program.

  Ms. Valencia's reaction--a combination of excitement, fear, and confusion--was typical of many teachers in the study who faced similar circumstances. Although attracted by the idea of the new language arts approach, she was very uncertain about how to put it into practice. For example, in one writing lesson we observed, she urged the students to focus less on sentence structure and spelling and more on communicating their ideas. As she walked around the room, however, she could not help pointing out grammar errors and even berated a child for writing ideas she felt had strayed too far from the meaning of the story. Ms. Valencia was sending her students a mixed message about writing because of her own uncertainty about the best way to teach it and her lack of training in new techniques. Moreover, both the district and state tests focused on spelling, punctuation, and grammar. Within this context, she tried to teach both ways.

The story of a teacher from a different school within the same district, presented below, illustrates how teachers can develop new ways of teaching if school-based support reinforces a policy mandate.

- A successful adoption of alternative practices in language arts instruction. Mr. Fulton has been a primary teacher for 5 years, during 2 of which he has taught third grade in his present school. Like Ms. Valencia, he had received training in language arts that emphasized skills-based instruction, and he too began the school year faced with the formidable task of taking on the new district-mandated language arts curriculum. However, Mr. Fulton's principal brought together the school's faculty on the first day of school, informed them of the district mandate, and made it clear that no one should feel pressure to implement the program more quickly than they felt prepared to do. Moreover, she appointed a small committee composed of a reading specialist and two mentor teachers (all with extensive training in integrated approaches to language arts instruction) to lead the faculty through a review of the curriculum, to make recommendations, and to serve as resources to the other teachers. As the year progressed, Mr. Fulton incorporated more of the new program into his teaching, spending less time on skills-only teaching and more time providing students opportunities to write and manipulate extended text. At the same time, he retained several aspects of his former teaching approach (e.g., spending time each day reviewing phonics) because, in consultation with the reading specialist, he had decided his students could benefit from some skills-focused instruction.

The contrasting cases of Ms. Valencia and Mr. Fulton underscore the complexities involved in creating the conditions necessary for teachers to adopt alternative instructional approaches, especially when such approaches depart significantly from a teacher's own training and experience. These cases highlight three areas of policy that the analyses in this chapter indicate are central to the adoption of alternative practices:

- Pressure for change. Neither Ms. Valencia nor Mr. Fulton would be likely to have adopted alternative practices in language arts in the absence of external pressures to do so. Both experienced such pressure because they teach in a district that has adopted a whole-language-oriented curriculum, reflecting in large part the emphasis of state curricular frameworks.

- Professional autonomy. The two cases differ markedly in the degree of professional autonomy the teachers were offered as they struggled to change the teaching approach. Mr. Fulton's principal buffered him from district mandates, encouraging him to implement the new program at a pace with which he felt comfortable and to the degree he thought appropriate for his students. In contrast, Ms. Valencia was simply handed the new curriculum and told to put it in place. Although she sometimes deviated from the new curriculum, she did so with fear that she would be discovered.

- Professional support. Similarly, Mr. Fulton received much more assistance in devising a new approach to language arts instruction. He had regular access to a reading specialist and two mentor teachers whom the principal had charged with the task of helping classroom teachers integrate the new program into their repertoires. Ms. Valencia received no such support. Her school's language arts specialist did not provide technical support for teachers but instead pulled students out of classes for extra help.

Adopting instructional strategies that emphasize meaning and understanding typically means that teachers must fundamentally rework their conceptions of the subject they are teaching and their approaches to it. Mandating changes without giving teachers considerable professional support and the flexibility to adapt the mandate to their particular circumstances can often be counterproductive. In such instances, many teachers become confused and embark on new approaches without understanding them, resulting in ineffective teaching.

As Mr. Fulton's and Ms. Valencia's cases make clear, the school is often the front line of support for teachers struggling to make changes. Principals, mentor teachers, and specialists can play an important role in encouraging certain instructional practices and providing guidance on how to adapt such practices to the particular circumstances of that school. Just as important, principals can buffer teachers from the demands of zealous state and district reforms, by providing teachers the freedom to experiment with practices that are new to them.

Districts can exert strong pressure on the academic program through curriculum guidelines, textbook adoptions, and testing. We found that the district's conception of "improvement" may favor or reject the premises underlying alternative practices. The power of district policies is illustrated by the virtual absence of teaching for meaning and understanding in District 5 (see Table 72), where upgrading students' performance in basic skills has been an overriding policy aim.

Although more indirectly, state frameworks and assessment practices also influence classroom practice. Mr. Fulton's and Ms. Valencia's confrontation with a new language arts curriculum was initially set in motion by a new language arts framework and a concurrent change in state textbook adoption policies. The relatively high proportion of teachers adopting alternative practices in Districts 1, 2, and 3 reflects the fact that these districts are located in a state with a framework and associated testing that encourages these instructional practices.

These two cases and the broader study findings suggest that policymakers have to find a balance between pressuring teachers to change their practice and providing sufficient professional autonomy and support to make that change meaningful and appropriate. Among the districts and schools that we have studied are those that have made important strides toward striking this balance. The accomplishments of the teachers in these settings indicate that, even in the often difficult circumstances encountered in teaching the children of poverty, teachers have been helped to bring new meaning to the education their students receive. That is an achievement that policymakers can be proud of, and toward which all educational leaders should strive.

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Appendix

METHODOLOGICAL NOTES

4

Appendix

METHODOLOGICAL NOTES

In these notes, we review briefly the key features of the data collection strategy, the sample, the types of data collected, and the approach to developing quantitative measures. Readers will find more detail about these and other aspects of the study in Volume 2.

Data Collection Strategy

The strategy for data collection allowed us to investigate curriculum and instruction at several different levels. At one level, we studied the whole year's curriculum, as enacted in the sample classrooms. Information about the whole year's curriculum, derived from interviews, teacher logs, and examination of syllabi or materials, was necessarily somewhat superficial. We were simply unable to make a detailed record of everything that was taught across a 9-month period, nor would it necessarily serve the study purposes to have done so. At this level, our goal was to provide a descriptive overview of what was taught and how it was taught across the school year.

At a second level, we examined curriculum in greater detail during selected observational periods (2 weeks long in Year 1, 1 week in Year 2). Often, these periods coincided with defined instructional "units"; in other instances, we observed a "slice" of an instructional unit or simply a sample of an ongoing instructional sequence that was not organized into discernible units. In both years, we examined one period during each of the major time blocks across the school year--fall, winter, and spring. The data we collected about these time periods were derived from multiple sources: interviews, teacher logs, examination of materials or unit plans, and a descriptive writing sample collected at the end of the period. These sources permitted a more detailed description of what was taught and (to a limited extent) the instructional strategies used.

A third level of data collection was necessary to get a concrete picture of the actual content of instruction and the way academic instruction takes place in classrooms. Within each of the observational periods, we selected several days on which to observe instruction. To the extent possible, the days were chosen to represent the most central teaching and learning activities of the time period (testing days or review days, for example, were thus considered poor choices for observation). Observations were directed at both the whole classroom and selected target students within the room. By combining observational data with what we learned from "debriefing" interviews with the teachers (e.g., after each lesson), examination of the materials in use during the observed lessons, and interviews with target students, we were able to capture in considerable detail how teachers conducted instruction and how students responded to it.

The third level of data collection required too many research resources to be carried out in all sample classrooms. We therefore did intensive observation in a subset of classrooms--in Year 1, one of the two classrooms per grade was studied intensively (a total of 44 classrooms); in Year 2, one or two classrooms were chosen per school to allow further investigation of key strategies or other special issues (for a total of 23 classrooms). The other classrooms in each school were also observed, but not as frequently. For these classrooms, we relied more heavily on interview and log data.

To capture what students learned, we tested children twice, in October and May, in each school year. A battery of tests were administered to all students in sample classrooms across a 2-day period by members of the study team.

Other data were collected from teachers or from school and district sources:

- Student background data. From classroom rosters and school records we gathered basic demographic information about the students in the sample.

- Teacher survey data. In the second year, coded information from observational visits was supplemented by a survey of teachers to elicit information about their backgrounds and their attitudes regarding children, teaching, and the school setting.

- Data about the school and district setting. We interviewed principals and district office staff on several occasions to collect information about school and district policies, ethos, resources, staff development, and other features of the school setting that might influence the classroom.

Sample Construction

The sample was constructed by examining prior-year (1988-89) test score and demographic data for all school districts lying within a commutable distance (approximately 50 miles) of the three study team "home bases" (Washington, DC; Cincinnati, OH; San Francisco, CA). All districts with high overall levels of poverty (as indicated by Orshansky percentile) were examined to determine within them which elementary schools (1) served students of whom 50 percent or more came from low-income backgrounds, and (2) performed better than average compared with other schools serving comparable populations. Six districts that contrasted on key contextual factors (urbanicity, ethnic/ racial diversity), each with large numbers of candidate schools, were invited to participate in the study.

Once districts had agreed to participate, school selection was undertaken in consultation with district officials. Fifteen schools were chosen on the basis of the following criteria:

- Contrast in student populations served. Student populations included relatively homogeneous populations (e.g., all white or all African-American students; 100 percent from low-income backgrounds) and diverse populations (e.g., with different mixtures of white, African-American, Hispanic, and/or Asian-American children; with different percentages from low-income backgrounds).

- Academic performance level in the prior year. Schools' average test scores ranged from well above average in an absolute sense (e.g., above the 70th percentile) to the low end of the second quartile (approximately the 30th percentile nationwide).

- Contrasting organization and special program emphasis. The schools included two year-round schools, and several with magnet programs, among other special programmatic features.

• Willingness of the district, school, and school staff to participate in the study. Because some schools that met other criteria were not interested in being part of the study, more than 15 schools were contacted before the full sample size was attained.

For the first year of the investigation, 84 classrooms within these schools were selected, in consultation with the principals, from among the first, third, and fifth grades. Choices were based on criteria described in Chapter II of this report (the number dropped to 80 when one site visitor was unable to continue with the study late in the year). Choices were heavily constrained by the small number of teachers per grade. At most, there were four teachers per grade; we were selecting two per grade, and in some schools there were only two. In addition, our desire to exclude first-year teachers or those who were experiencing major problems in classroom management further limited our choices. In a few instances, we were unable to include more than one teacher per grade in the study sample.

A similar process was followed in the second year of the study, although with the additional constraint that we tried to choose classrooms that contained as many students from the first year as possible. In two school districts, elementary schools ended at the fifth grade; hence no sixth-grade classrooms were included in the study from the five schools located in these districts. The resulting sample for the second year included 72 classrooms.

Criteria for selecting the subset of classrooms for intensive study were different in each year of the study. During Year 1, one of the two classrooms per grade was included in this subsample to maximize the range of approaches to instruction we could examine closely. The following year, we selected 23 classrooms that showed particular promise for probing more deeply into effective practices in one subject area. Of these, approximately a third each were chosen because they were especially appropriate for examining alternative approaches to mathematics, reading, and writing instruction. In selecting these classrooms, we also took into consideration the potential for investigating questions related to classroom management and supplemental instruction.

Qualitative and Quantitative Data

Qualitative data were developed from the classrooms studied intensively in each year. Following each round of visits, site visitors summarized in narrative form what they had learned about each classroom, following a detailed analytic outline. At the end of the year, a lengthy qualitative report on each classroom was constructed that combined the summaries from each period of observation. These reports presented narrative discussions of: (1) classroom ethos and context, (2) the background and attitudes of all professional staff who worked in the classroom, (3) instructional approaches in each subject area and students' responses to them, (4) classroom management and the nature of the academic learning environment, (5) the role of supplemental instruction, and (6) the influence of external forces emanating from the school, district, or elsewhere. To create these reports, site visitors drew on all the data sources at their disposal--principally, classroom observations, teacher interviews, and the examination of instructional materials.

A similar, although shorter qualitative report was developed for each school by the team leader of the site visitors who went to that school. This report synthesized what the site team had learned across the 2 years regarding: (1) the general ethos and climate of the school, (2) the nature of the student population, (3) curricular organization and policies, (4) the organization of supplemental instruction, (5) the school as a workplace for teachers, and (6) the community and district context. This report combined what had been learned from the teachers' perspectives about the school with information gleaned from interviews with the principal and district office staff.

Quantitative measures came from four primary sources:

- Coding forms filled out following site visits. Each time field staff visited classrooms to observe, interview teachers, and examine curricular materials, they entered information about the observational period onto a coding form divided into sections for language arts and mathematics, and further subdivided into subsections corresponding to the actual observed lessons or the period within which these lessons took place. Some of the codes pertained to each observed lesson, others to the full period of time that was the focus of visiting (1 week or 2 weeks, depending on the year).

- Teacher surveys. During the second year of data collection, a survey was administered to all regular classroom teachers to elicit information about their professional backgrounds, their attitudes about the children they were teaching, and their perceptions of the school setting in which they were teaching. The items in this survey had been included in the first-year coding form.

- Student rosters/background data. The school or the classroom teachers themselves provided information on student ethnicity, participation in supplemental programs, receipt of free or reduced-price lunch, etc.

- Teacher logs. Regular classroom teachers in the study sample kept daily logs of instructional activities in mathematics, reading, writing, and other language arts, using a structured form provided by SRI (see Volume 2). Log forms were filled out from the time of pretesting (late October) to late May, a period that includes approximately 120 instructional days.

These data sources yielded different kinds of measures for analytic purposes. Because analyses concentrated on the whole school year and took the classroom as primary unit, the following types of analytic measures were used:

(1) Percentage of the classroom's students with a given attribute (rosters).

(2) Of all instructional days, the percentage on which a given activity, event, etc., took place (teacher logs).

(3) Across all observed lessons (or observation periods), the percentage on which a certain instructional strategy, material, etc., was used (coding form).

(4) Across all observed lessons (or observation periods), the average ratings by observers of some aspect of instruction (coding form).

(5) Across all observed lessons (or observation periods), an average count of something taking place in the classroom, such as the number of minutes students actually read text or the number of extended writing tasks assigned during the observation period (coding form).

Measurement Notes

Details of the measures used in analyses reported in the report appear in Volume 2. Below, we summarize a few key points about the nature and quality of measurement.

Levels of Measurement--All but a few variables were measured at the classroom level. In other instances, student-level data were aggregated to form classroom-level measures.

Reliability--Interobserver reliability was systematically assessed during the second year of the study by comparing observation codes for particular days on which pairs of observers watched the same lessons. Reliability coefficients were calculated as the ratio between agreements divided by total possible agreements. The average reliability across pairs was .85; no pair had a reliability less than .75.

Validation--The validity of measures used in analysis was established principally in two ways: first, by correlating what observers saw with what teachers coded in teachers' logs for all items that were identical, and, second, by comparing coded information and summary indices with qualitative case reports. Coefficients of agreement between teachers and the site visitors who watched their classes were calculated in the same way as interobserver reliability (agreements divided by total possible agreements). Average coefficients for the four sections of the log (reading, writing, other language arts, and mathematics) were .82, .91, .87, and .96, respectively. Values on various items were compared with qualitative reports to check their validity, and in constructing the classroom typology variables, classroom reports were used extensively for generating the typologies in the first place and as a check on the meaningfulness of quantitative data used subsequently to classify cases.

Missing Data and Imputation--There were significant amounts of missing data, especially in the first year, due to students absent from testing periods, classrooms dropped from analysis, teacher logs that were not returned, and coding form items that were left unfilled. These problems were handled as described in Volume 2 (see "Approach to Analyzing Outcomes").

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