DOCUMENT RESUME

ED 262 877 PS 015 378

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TITLE The Social Organization of Mathematics and Reading Instruction.
SPONS AGENCY Spencer Foundation, Chicago, Ill.
PUB DATE Apr 85
NOTE 13p.; Paper presented at the Annual Meeting of the American Educational Research Association (69th, Chicago, IL, March 31-April 4, 1985).
PUB TYPE Viewpoints (120) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Ability; *Class Organization; Classroom Environment; Curriculum Development; *Diagnostic Teaching; Grouping (Instructional Purposes); *Mathematics Instruction; Primary Education; *Reading Instruction; School Districts; *Teacher Response
IDENTIFIERS Instructional Format

ABSTRACT

This paper raises a series of questions about the nature of classroom instruction, in general, and about mathematics and reading instruction in the lower elementary school grades, in particular. It focuses on such aspects of the social organization of instruction as (1) the diversity of student populations, (2) the motivating force behind instruction, and (3) the social arrangements through which the on-going monitoring of student work transpires. Overall, the perspective on instruction is based on teachers' commitments to cover the curriculum that the central administration has put in place. The teacher's immediate task is seen to consist of the establishment of forms of instructional organization suitable for conveying the curriculum. The forms of instructional organization are thought of as being responsive to the amount and kinds of student diversity in classes and to what teachers regard as workable arrangements and workable instructional techniques. The workability of arrangements and of techniques is considered to be tied to the activities of monitoring student progress in an on-going fashion to determine when students should move ahead. Reading and mathematics, it is noted, differ in this respect and the difference is related to the fact that monitoring transpires primarily through a written medium in mathematics and an oral medium in reading. (RH)

THE SOCIAL ORGANIZATION OF MATHEMATICS AND READING INSTRUCTION

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Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, Illinois, April, 1985. The work reported here is based on material gathered through The Project on Classroom Organization, Instruction, and Learning directed by Rebecca Barr and Robert Dreeben. The Project was generously supported by the Spencer Foundation, and that support is gratefully acknowledged.

This paper is intended to raise a series of conceptual questions about the nature of classroom instruction generally and more specifically about mathematics and reading instruction in the lower elementary school grades. It will focus upon aspects of social organization that do not usually receive much attenion, such as the diversity of student populations, the motivating force behind instruction, and the social arrangements through which the on-going monitoring of student work transpires. It will not rely on references to specific investigations as its point of departure but rather will argue a set of contentions implicitly based on assessments of schemes commonly employed in the study of instruction. It will pertain as much to things left out of those schemes as to those included as well as to some of their underlying assumptions.

The first contention is that instruction, from a teacher's vantage point, is not in the first instance addressed to individual differences among students or to the maximization of individual achievement, as it is customary to believe, but rather to the problem of how to cope with the diversity of abilities (broadly conceived) among the students assembled in a class. The teacher's first task is to create some form of classroom organization suitable for carrying on instruction. The second is to provide instruction for the units so organized. By instructing the units, the individuals who belong to them gain the experience of being instructed, though obviously they deal with that experience individually. By implication, individual differences in learning are by-products of the experiences shaped

by the organization of instruction provided to what is invariably a collectivity of some sort and not products of the direct interaction between students and teacher.

There are only a few alternative ways to organize a class for instruction: as a group of the whole, or broken into subdivisions--from a small number of them up to a number that equals the size of the class. Traditionally we call these whole class, grouped, and individualized formats.

Instruction in reading and mathematics are usually carried out in different formats. The typical scheme for reading is the creation (usually) of from two to four groups. Because only one group can be instructed at a time, this arrangement must be combined with a second form, usually one that allows for individuals to work on their own. The typical scheme for mathematics is different. Teachers characteristically avoid grouping; they provide instruction in whole class and/or in individualized formats.

The key consideration here is that teachers cope with whatever units they have created. This means that whenever a group of a given size is treated in aggregate form, some consideration--deliberately or not--must be given to its range of abilities. If that range is large, the decision about the level at which to pitch the instruction becomes critical. When the members of a class are left to work independently, the teacher must decide how to use very small quantities of per/student units of time and must also consider the consequences of letting the dispersion of achievement increase as students invest different amounts of time, concentration, and ability in their work.

One must also recognize that the major resources out of which instruction is fashioned--time and curricular materials--are designed for large aggregates of students. Textbooks are characteristically adopted for a grade; all students in that grade, therefore, will be expected to use them irrespective of their appropriateness for individuals. The same thing is true about time. The schedules that determine the priority of subject areas and the length of class periods apply across the board and do not respect individual differences. For example, if a standard time unit is a class period, students who need both more and less time to complete their work will still get the same amount of time. Teachers might have leeway within these constraints, but the amount of leeway is often marginal compared to main blocks of time and material resources.

In any class setting, of course, students act on their own, but only in the context of constraints that the setting imposes. To think about instruction, then, as if teachers deal with each student directly, as if learning was the direct, unmediated result of teachers' influence on each student, is to misconstrue the nature of classrooms in a fundamental way. Students' learning, then, represents a resultant of forces that derive both from the setting and from each individual student; the relative influence of those forces is an empirical question. The setting itself is the teacher's creation; it is the solution to the first teaching problem: devising a way to deal with diversity.

The implication of this first contention for mathematics instruction is that if a large range of ability is represented in a class, as it usually is, the decision about instructional

organization turns on a small number of alternatives: proceed at a rate that allows the slowest to understand (and thereby hold back the abler students), proceed so that the middle or high ability students feel challenged (and thereby leave the slow students in the dust), or develop some combined strategy of instructing part of the class as a unit and coping with the rest on an individualized basis. The cost of individualizing instruction is its labor intensive quality and the small amount of per pupil time it affords. The latter constraint works to the benefit of abler students who are likely to need less explanatory time. Students who require a lot of time are not likely to get it in individualized form; and the more students like that there are in a class, the less likely they will receive one-to-one instruction directly from the teacher. A key consideration, then, in how teachers organize classes for mathematics instruction should be the composition of ability in the class.

The second contention pertains to what force drives instruction. I will argue that the driving force is a commitment by the school system and its agents (administrators and teachers) to convey knowledge and impart skills, or in blunter terms, to cover the curriculum. This commitment takes on different manifestations depending on the organizational level of the school system one considers. Central district officers write system-wide guidelines for the amount of time each subject area of the curriculum should receive. They also make binding decisions about which texts to purchase and by so doing establish the amount of curricular material available to be covered, the depth and complexity of the material, and its appropriateness to

each grade.

At the level of schools, curricular priorities are supported or undermined by the appropriateness of scheduling, the tightness of supervision, and the supporting of teachers. And at the classroom level, especially when at most only one set of textual materials is available for each subject--which is most of time--teachers express curricular commitments through the amount of material they try to cover over given units of time and by organizing instruction in ways that make coverage feasible.

While the nature of the driving force has seldom been an explicit topic of educational research or debate, a variety of implicit answers have nevertheless been given to that issue. Some view the matter to be located strictly in the classroom, lying in the nature of the social interactions, measured in rates, between teacher and students: in this vein, the literature has treated teaching as leadership; teaching as a language game; teaching as formulated in the categories of learning theory: arouse attention, reward, sanction, provide feedback; and so forth. While teaching certainly entails social interaction, one has to determine whether the different kinds of interaction are what make the conveyance of knowledge and skills possible or whether interaction is instead the circulating medium through which curricular commitments in the school system are transmitted. The instability and inconsistency of empirical findings based on relations between types of interaction and learning, as well as the lack of coherence in the relations among the various categories of interaction, provide little support for the view that social interaction is the driving force of

instruction.

Most views of instruction are formulated in interactional terms. An alternative perspective sees instruction as an exchange of student academic effort for grades. While this view might apply to academically oriented students in the higher levels of schooling, it hardly seems appropriate in the lower grades, part of whose agenda is to establish the currency of grades and the exchange relation based upon it in the first place. That is why teachers in the primary years seldom use formal grading and rely instead on more socially diffuse kinds of sanctions. It is hard to see how grade exchanges could propel instruction in the early years when students are first learning about grades as values and about what particular kinds of conduct will earn them.

There are still other implicit notions about the driving force, such as those that derive from cognitive psychology, but none of them incorporates the idea that one of the central purposes and organizing principles of schooling is to implement the curriculum. Cognitive approaches to instruction are based on categories of mental functioning. And while they have some implications for instruction, they do not provide a conceptual basis for identifying instructional influences that originate in the district, school, and class.

Several implications follow from the view that schooling is driven by the curriculum, that the curriculum resides primarily in graded textbooks, and--to include the point expressed in the first contention--that the curriculum is there to be assimilated by a population of students highly diverse in the relevant

abilities.

The first is that coverage of the curriculum will be an important consideration in determing what and how much is learned. Second, the substance of what is covered will be an important consideration. That is particularly true in the case of mathematics where texts are organized around sequences of problems of varying types and difficulty. How teachers select from the problems that texts make available, how much time they spend on problems of different types and difficulty, what sequence they follow, and how they allocate time between presenting new types of material and practicing on the old will influence what and how much students learn. Third, the learning of students will depend on how teachers feed varying diets of problems to students of differing abilities; in short whether instruction is differentiated even in the absence of ability groups, so prevalent in reading, and how.

One key issue in understanding the transmission of the curriculum is to identify correctly the units of coverage. In first grade reading, where recognizing words and their meaning sit at the top of the agenda, the coverage of words is the defensible choice. In later grades, when reading entails textual materials of greater complexity and when comprehension involves larger units of prose than simple narrative stories, and when interpretive questions arise that pertain to depth as well as coverage, the units are not so obvious. The same issue pertains to math especially when word problems and other problems that require arithmetic reasoning enter the curriculum.

In short, the nature of the curriculum as a body of

knowledge believed to be worth knowing and hence worth imparting constitutes a motive force that leads teachers to move from one thing to the next. Going from one thing to the next, how rapidly, how broadly, how deeply, represents the course of students' instructional experience. Teachers attempt to govern the tempo, breadth, and depth of coverage by adapting available materials to units of instructional organization designed to cope with the ability distributions of their students.

The third contention pertains to differences in instructional organization and why two subjects--reading and mathematics--are characteristically taught in different formats when the classroom distribution of abilities in each is usually diverse. Why, in other words, are there different organizational solutions to the problem of classroom diversity?

An approach to this question lies in the procedures teachers employ in an on-going fashion to assess students' progress through the curriculum and to diagnose the difficulties they are experiencing. In the case of mathematics, those assessments are made by visually inspecting what students have written on paper: the answers to problems with "the work" shown. The assessment of mathematics performance sometimes involves recitation, but oral answers to problems, while appropriate for mental arithmetic, do not reveal "the work" and thus do not provide an adequate basis for determining whether the students should proceed. If teachers can assay progress, identify what is wrong, and provide correction by briefly attending to what each student has written by circulating around the room or by having them come to the desk, ability grouping does not appear by comparison to be a more

feasible alternative. If students are having difficulty, however, a prospect more likely to arise with the less than the more able, one can readily imagine grouped instruction for the less able contingent in a class while the remainder work independently at their desks.

The situation in reading is quite different. A teacher does not know whether students can read a word or a sentence correctly unless they do so orally. There is nothing that precisely corresponds to "showing the work" indicating whether students can recognize words correctly or know their meaning. Indeed, when students read silently, there is no way for teachers to know at the time that they are getting things right. Accordingly, there is no diagnostic leverage, no way of knowing when it is appropriate to advance through the curriculum.

Instructing a group the size of the class would not afford much oral reading time to each student; too many others, moreover, would be unproductively occupied waiting for their turn. The creation of a small number of reading groups relieves this problem. It allows the teacher to instruct a small group in oral reading while allowing the remainder of the class to work independently on reading work by writing in workbooks. This second clause appears to contradict what I said earlier about writing providing an inadequate basis for determining students' progress in reading and understanding words. It is not really a contradiction because workbook activities in reading are designed for practice and the consolidation of learning already accomplished through group instruction. They do not contribute to reading instruction at the cutting edge, where new materials

likely to generate errors are addressed.

While both subjects require monitoring, the difference in medium makes grouping the more workable form of class organization in one case and not in the other. Of course, when there are different forms of organization and different activities to carry out, the interaction between teachers and students differs accordingly. The nature of the interaction, however, is determined by what makes it possible to monitor the written mathematical work of many students working alone or to assess the progress of students' oral performance while reading in a small group. I would maintain, therefore, that the interaction is tied up with the curriculum and the activities necessary to gauge progress through it, and not to the frequency or rates of interaction defined according to categories of learning.

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In this paper, I have presented a perspective on instruction based on teachers' commitments to cover the curriculum that the central administration has put in place with the active or passive support of the larger community. The impetus for coverage lies in those commitments. The teacher's immediate task is to establish forms of instructional organization suitable for conveying the curriculum--say, in reading and mathematics. The forms of instructional organization are responsive to the amount and kind of student diversity in classes and to what teachers regard as being workable arrangements and workable instructional techniques.

The workability of arrangements and of techniques is tied to

the activities of monitoring student progress in an on-going fashion to determine when students should move ahead. I have argued that reading and mathematics differ in this respect and the difference is related to the fact that monitoring transpires primarily through a written medium in mathematics and an oral medium in reading.

As a final point, one should think about the social organization of instruction not simply as on-going transactions between teachers and students but as a phenomenon defined by events transpiring at several different levels of the school system. As indicated above, the curriculum itself and its scheduling exert constraining influences that originate at the central office and school levels of administration. The activities of teachers occur at both the class and the instructional group levels substantially in response to the distribution of abilities. It is the interplay among forces generated in these different places that shapes the nature of instruction.