Coupling and Control in Educational Organizations

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Recent evidence suggests that the policies and practices of school systems are loosely structured and weakly controlled. This paper attempts to discover the mechanisms that coordinate school systems despite their structural looseness. The authors argue that by regulating the flow of resources from the district to the school and classroom, administrators influence the content of instruction as well as student learning. Three resources are examined for their effects on the teaching and learning of reading in first grade: the allocation of time, the provision of curricular materials, and the array of students found in schools and classrooms. The analysis indicates that on the average, reading instruction in small groups is constrained by the regulation of these three resources. For students in high-level ability groups, curricular materials play a particularly important role. Administrative decisions on resource allocations constrain teachers' use of resources, which in turn has an impact on student learning.•

Over the past twenty years it has become common to depict school systems as loosely structured, weakly controlled organizations (Bidwell, 1965; Weick, 1976; March and Olsen, 1976; Meyer and Rowan, 1978). The idea that educational organizations are loosely coupled systems now holds a prominent, though not uncontested, place in educational and organizational thinking (Tyler, 1985). Yet if school systems are indeed organized anarchies, what forces permit them to be organized at all? What are the mechanisms of coupling in a loosely coupled system? Weick (1976) raised this question in his seminal paper, but its answer remains elusive.

This paper addresses the question by examining the connections between hierarchical layers in educational organizations. It focuses on the linkages through which work is coordinated, showing some to be loose and others to be relatively tight. We will argue that despite a decentralized structure and the attenuation of bureaucratic authority, administrative decisions about the allocation of resources constrain teachers' work and provide coordination in school systems.

The Loose-Coupling Model

Bidwell (1965) pointed out that the structural looseness of school systems makes it difficult for managers to control work through bureaucratic procedures. Teachers are expected to produce roughly uniform outcomes in students moving through a sequence of classes, grades, and schools. But their spatial isolation and need for autonomy prevent administrators from introducing bureaucratic controls such as rules for classroom instruction and management.

Others have argued that school systems are characterized by uncertainties that make bureaucratic controls undesirable as well as inoperable (Cohen and March, 1974; March and Olsen, 1976; Weick, 1976; Meyer and Rowan, 1977, 1978; Meyer, 1980; Rowan, 1981). Persons in different roles and interest groups hold varied and often conflicting goals. Little is known about instructional cause and effect, and participants enter and leave rapidly. These uncertainties mean that unlike monocratic bureaucracies, school systems cannot operate by passing on directives for instruction from one hierarchical level to the next.

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Instead, teachers are left to work rather independently of orders from higher levels. Observing the ambiguity of connections between organizational subunits, Weick (1976) characterized educational organizations as loosely coupled systems. In such a system, activities and decisions made at one level do not necessarily reverberate in clearly patterned ways elsewhere. Administrators do not directly govern activities that take place in the technical core. District, school, and classroom staff operate with substantial independence from one another.

Despite its appeal, the loose-coupling metaphor has two limitations, both noted by Weick (1976) but frequently ignored by those adopting the perspective. First, not every connection in school systems is a loose coupling. The degree of coupling cannot be characterized simply as either tight or loose, for the responsiveness of units to one another varies from one context to another. By assigning teachers and students to classrooms, for example, administrators tightly control who teaches whom. Yet they exert less influence over what happens once the classroom door is shut (Weick, 1976; Meyer and Rowan, 1978). Thus there is good reason to explore the variety of connections between organizational subunits in school systems.

Second, the loose-coupling view does not identify the mechanisms that hold school systems together. With few rules and orders, and little supervision, how can school systems bring about the sequential curricular progress and eventual graduation of students? How do teaching and learning occur similarly across classrooms? What forces permit work to be accomplished in the near-absence of bureaucratic authority? These questions, too, prompt us to explore the nature of organizational linkages.

Control in Educational Organizations

Typically, organizational integration is accomplished through the authoritative coordination of work; Weick (1976) observed that the usual mechanisms of coupling are the technical core and the authority of office. What makes school systems so interesting, however, is that neither of these mechanisms appears to be the main operating principle.

Ample evidence documents the weakness of authoritative control over teachers' work. Teachers resent interference from administrators (Becker, 1953; Washburne, 1957; McPherson, 1972), who spend only a small portion of their time on instructional matters anyway (Rowan, 1981). Among teachers, between teachers and a principal, and between principals and a superintendent, little consensus is formed around instructional policies and practices (Meyer et al., 1978; Rowan, 1981; Meyer, Scott, and Deal, 1983). Davis and Stackhouse (1983) showed that school programs and activities failed to increase the efficient production of learning. And Hanson (1981) argued that the negotiated order found in schools consists primarily of teachers' and administrators' spheres of influence loosely joined in a "contested zone" of influence. These studies indicate that some key elements of formal authority — the prevalence of rules, obedience to orders, supervision of work — are highly attenuated in educational organizations.

What, then, fosters the coordination of work in school systems? Bidwell (1965) and Weick (1982) suggested that experi-

ences during the teacher training period socialize educators to common understandings about the way classroom instruction should be carried out. If true, professional norms substitute for bureaucratic controls in coordinating teachers' activities. This argument parallels Stinchcombe's (1959) account of coordination in the decentralized construction industry, in which worker discretion is high because of geographic isolation, variable product mix, and craft training. Similarly, teachers are spatially segregated, face a diverse clientele, and undergo professional training.

Common socialization as a source of cohesion is one element in Meyer, Scott, and Deal's (1983) conception of organizational linkages in school systems. They detected a pattern among the various loose and tight connections existing in educational organizations: loose coupling prevails where the coordination of work is concerned, but school systems are more tightly coupled around "rules institutionalized in their environments" (1983: 49). Schools operate as they do and take the forms they do because they partake of an encompassing cultural world that gives meaning to their major categories of organization — credentials, grades, and curriculum. They argued, moreover, that a school system's main business is conforming to the accepted definition of what a school is rather than accomplishing instructional goals (see also Meyer and Rowan, 1978; Meyer, 1980). Accordingly, state, district, and school administrators pay close attention to matters such as school accreditation, teacher certification, and attendance taking, controls that are bureaucratic but unrelated to work processes. At the same time administrators take only perfunctory notice of how teachers conduct their classes. As a result, the elements of formal structure are disconnected from the technical core. If policies and directives concerning technical activities rarely exist, there is little basis for supervisory control and accountability based on the assessment of technical performance — instructing from the curriculum and measuring its effects.

According to this argument, integration of the system is accomplished, but not through the coordination of work. Managers coordinate the school's symbolic environment instead of its technical core. Capitalizing on the common socialization experiences of school staff, administrators promote key values and themes, leaving technical activities (classroom instruction) to the judgment of teachers (Bidwell, 1965; Meyer and Rowan, 1978; Burlingame, 1981; Weick, 1982).

Recognizing the importance of the institutional sphere does not require, however, that it be treated as the primary source of organizational coupling. The absence of curricular and instructional policies does not mean that technical activity is left uncoordinated. Even with attenuated bureaucratic authority there may still be coupling through a technical core. Because research documenting the lack of coordination over educational policies and instructional techniques never examined what teachers actually teach or what students actually learn, this research cannot be taken as evidence that administrators exert little influence on classroom events. Curriculum and instruction, as components of technology, do not have to be governed by policy to be bases of organizational linkage. They can be governed by custom or practical wisdom or represent constrained responses to situational realities. Despite teachers' autonomy,

their work may be constrained by resources provided by district and school administrators. And if teachers in the same district or school are faced with like constraints, their work may take on similar characteristics.

In suggesting further research on loose coupling, Weick (1976: 17) pointed out that an early step should be to verify "that authority and task are not prominent coupling mechanisms in schools." While evidence on the attenuation of authority is available, researchers have not paid adequate attention to technological linkages. Before the possibility of linkages though a technical core is abandoned, such ties need to be examined.

We will argue that the integration of school systems comes about in good part through the technical core. Indeed, it is difficult to imagine an organization that is as indifferent to its own internal events and their effects as the loose-coupling formulation leads one to believe (Tyler, 1985). We propose that integration occurs through the constraints implicit in the allocation of resources from one hierarchical level of the school system to another. This argument does not deny the importance of institutional categories, and it supports the loose-coupling notion that the core technology of school systems is not governed through bureaucratic relations of authority. It suggests that constraints inherent in the resources needed for teaching substitute for rules, orders, and supervision in allowing administrators — by intention or not — to shape the conditions under which teachers work.

Resource Allocation As a Source of Constraints

School system administrators influence teaching and learning through the progressive allocation of resources from the district to the school and classroom. To support this assertion, we must show that (1) the teacher's use of resources is constrained by what administrators make available and (2) the use of these resources affects student learning. Four kinds of resources are involved: the physical environment, personnel (including students), time, and curricular materials.

Physical environment. The supplies of chairs, desks, blackboards, heating, and lighting in schools are obviously controlled by school and district staff and not by teachers. Of the four resource categories this is the easiest in which to show administrative control; yet its link to teaching and learning is vague. Serious inadequacies in these resources might affect classroom events and outcomes; however, the vast majority of districts and schools probably allocate sufficient resources of this kind, so empirically one is unlikely to find meaningful variation and, then, only in the form of threshold effects.

Personnel. Central-office administrators do not select the population of students in their districts, although they exert some influence on the student composition of schools by drawing the boundary lines of neighborhood schools. The assignment of teachers to schools is a central-office decision, although principals in some districts press their own claims in this matter. More salient for instruction is the fact that the principal typically assigns both teachers and students to classrooms.

Meyer and Rowan (1978) and Weick (1976) noted that assigning personnel is one of the more tightly coupled aspects of school systems, but they viewed this as largely ceremonial,

having little to do with classroom activities. One can argue to the contrary, though, that by assigning students and teachers to schools and classes, administrators shape the character of instruction in each class by establishing the conditions under which it takes place. Determining the distribution of student abilities in a class may set constraints on the teacher's use of curricular materials. For example, teachers may teach more if they are given able, motivated students; they may need to move more slowly if their students are weaker or their classes contain too many difficult or slow students. Thus the administrative allocation of persons to locations in the school system, particularly to classes within schools, has technological as well as ceremonial implications.

Teachers can diminish the constraints generated by the distribution of students by forming small instructional groups within classes, stratified by ability. This technique is particularly common in early elementary-school reading. By creating instructional groups, the teacher redistributes the classroom pool of students and can then vary the instruction provided to each group (Barr and Dreeben, 1983). As a result, the teacher loosens the linkage between administrative decisions and classroom activities; how much is an empirical question.

Time. Time has lately become a key element in models of learning (Carroll, 1963; Wiley and Harnischfeger, 1974; Bloom, 1976). Much evidence supports the link between time for learning and student achievement (Heyns, 1978; Denham and Lieberman, 1980; Brown, 1983), though the strength of that linkage has been questioned by Karweit (1983). How do administrators influence instructional time? Barr and Dreeben (1983, 1985) portrayed time as a resource allocated through the school system's hierarchy. The district office determines the length of the school day and the school year. Extra-classroom activities — physical education, music, recess, and the like — are specified at the district and school levels and reduce the amount of time available for classroom instruction. Teachers submit to their superiors schedules of how they intend to spend classroom time. Since teaching is unsupervised, the principal cannot be certain that teachers follow their schedules. Variation in teachers' adherence to schedules means that coupling mechanisms may be tighter in some subjects than in others.

Deal and Celotti (1980) showed that teachers and principals largely agree on how much time students spend on reading and math. However, instructional activities appeared only weakly coordinated through formal channels. Even though instructional techniques vary between classrooms, teachers' abilities to make curricular progress are limited by the amount of time they are allotted.

Curricular materials. The district office allocates books, workbooks, and supplies — elements of the formal curriculum — directly to teachers, who sometimes supplement them. Curriculum content defines much of what is taught, which in turn influences student learning (Walker and Shaffarzick, 1974; Barr and Dreeben, 1983). Of course, teachers modify the curriculum, in the absence of supervision. The key question becomes how much curricular materials constrain instruction. The loose-coupling approach points out that because teachers exercise

discretion in using materials, administrative influence over instruction is small. But teachers usually instruct students using the materials that administrators select or permit.

A CONCEPTUAL MODEL OF CONTROL IN SCHOOL SYSTEMS

Our model of control and coordination in school systems is displayed in Figure 1. The diagram shows how four types of resources can be allocated from the district to the school, class, instructional group, and individual learner. (Subjects and grades where within-class grouping is not used would skip the group level of organization.) In addition to resources, the model takes into account student characteristics such as aptitude that also affect individual learning.

Of greatest interest are the linkages between district and school allocations, on the one hand, and teacher use of resources and student learning, on the other. The stronger the ties between the administrative levels and classroom conditions, the tighter the coupling through resource allocation. Figure 1 shows these ties to be mainly indirect. For example, the influence of district time allocation on time given to each instructional group is mediated by school and classroom conditions. Paths that culminate in the teacher's use of resources represent constraints on teaching.

This model does not deny the attenuation of bureaucratic authority described in the loose-coupling view, and it does not dispute the salience of symbolic categories as expressed in the institutional argument. It gives a prominent place, however, to the idea that the flow of resources through layers of the school system enables administrators to shape the arena in which the technical work of instruction and its effects take place. The model in Figure 1 does not address the degree to which administrators *intentionally* fashion constraints for teaching and learning. Obviously they provide resources intending them to be used, but they also expect teachers to exercise discretion and do not closely supervise the use of resources.

Sample and Method

The sample includes thirteen first-grade classrooms in seven schools, studied mainly during 1981–1982, from three Chicago-area districts. The districts were purposively selected to vary in the socioeconomic context of their communities. Schools 1, 2, and 7 were located in District I, a large urban district. School 1 was racially integrated. About 40 percent of the students in both its classes were black, as were all students in Schools 2 and 7. School 7 was the only one to be studied in 1982–1983 and the only one that contained one rather than two first-grade classes for observation. Schools 3 and 4 were located in District II, a working-class suburb, and contained an ethnically diverse mix of students. An upper-middle-class suburb somewhat more distant from the city was the site of Schools 5 and 6 in District III.

All thirteen first-grade classrooms were observed twelve times for a full day, at approximately three-week intervals, over the entire school year. Viewed cumulatively, the observations are a representative sampling of the structure and processes found in each class (Dreeben and Barr, 1985). Details of the organiza-

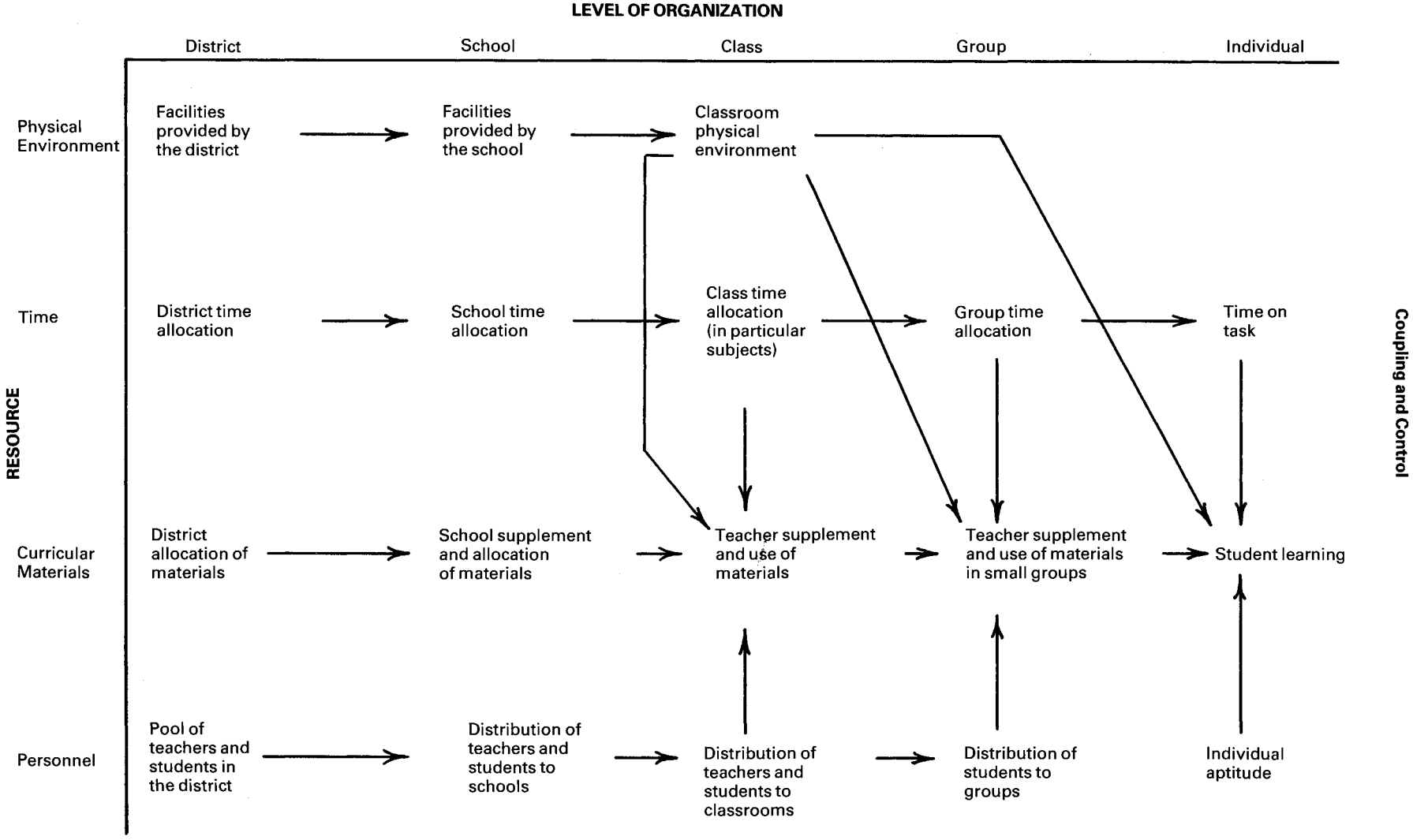

Figure 1. A conceptual model of coupling and control in school systems.

tion of instruction and of the time teachers spent on instructional and noninstructional activities were recorded. Student learning was measured before the winter and spring breaks as well as at the end of the year. Student aptitude was measured at the beginning of the year, and teacher interviews and school records provided additional data on individual student characteristics. Researchers also had access to the curricular materials used and to teachers' weekly schedules.

We base our analyses on first-grade reading instruction data. As the highest priority in the first-grade agenda, reading is an area in which technological linkages are likely to be found. First-grade teachers spend far more time on reading instruction than on any other subject, and principals describe it as the core subject of first grade. Because of its curricular centrality, teachers are most likely to make use of and to be constrained by their resources for reading instruction. Analyses of teaching and learning in other subjects and grades reveal different patterns of resource allocation and use.

Data

Limitations in the data prevent us from representing all the variables in the conceptual model. Lacking information on the physical environment, we examined the coordination of teaching and learning through the allocation and use of personnel, time, and curricular materials.

Personnel. Establishing the aptitude composition of classes appeared to be an important source of administrative influence over teaching and learning. Two tests were used to measure reading aptitude prior to first grade. In the first, the Barr-Kibby Word Learning Tasks (1981), students were taught several words and phonics concepts in small groups and then were tested on their immediate learning and on their retention two days later. Test-retest reliabilities for the WLT range from .91 to .95; concurrent validities with reading at the end of first grade range between .62 and .68, similar to those of other measures. The second, the Wide Range Achievement Test (WRAT), required students to read a series of words aloud. The WRAT was administered individually. Test-retest reliabilities for the reading section of the WRAT range from .88 to .94; validities range from .78 to .88. This test of early word recognition was used in addition to the reading-readiness test (the WLT) because some entering first graders had already begun to read and reached the ceiling of the readiness scale. No student approached the ceiling on the WRAT. The two tests were combined into a single measure and together provided an assessment of the reading aptitude of both pre-readers and early readers at the start of first grade.

While this combination made good sense in substantive terms, it created statistical difficulties in developing a single measure of reading aptitude. The distributions of scores on the two tests had little overlap. Students who did not attain the ceiling on the WLT recognized few or no words on the WRAT, whereas those who succeeded on the WRAT usually scored at the top of the WLT. There was no third test that substantially overlapped the other two from which a common metric could be derived. However, the WRAT allows the first 24 points of its total range to be set aside for a readiness measure, which made it possible to express scores achieved on the WLT within the 24-point

readiness range of the WRAT. We used the WLT instead of the WRAT's readiness section because the WLT is based on instructional activities.

An indicator of student-body composition in districts is the *district mean aptitude* level of students. Because schools in the same district are more likely to serve similar populations than those in different districts, we expect *school mean aptitude* levels to vary by district, though variation between schools within districts is also anticipated in larger, more diverse ones. None of the schools deliberately formed classes according to ability in first grade, so *class mean aptitude* levels should closely reflect the school's composition. However, teachers can modify the distribution of students assigned to them by creating ability groups, and it is the *group mean aptitude* level that we expect to affect group reading instruction directly.

Time. We created six time variables. *Total school day* and *total teaching time* were taken from the formal weekly schedule that teachers prepared at the beginning of the year for their superiors. Total school day was the average daily number of minutes from when students arrived at school to when they left, minus lunchtime. Most schools in the same district were alike in this respect, though District I schools varied somewhat because they allowed different amounts of time for lunch. Classes within schools did not differ. While the total school day is not purely a district condition, it is an administrative one out of the teacher's control.

Total teaching time represents the time remaining for teachers after subtracting recess, physical education, music, and library, subjects for which students leave the class and over which teachers have no discretion. We expected total teaching time not to vary within schools, and it did not in Districts I and II. The teachers in Schools 5 and 6, however, differed in scheduling physical education and recess, and a within-school difference also appeared for music in School 6. District III teachers were given some latitude in scheduling recess and the subjects covered by specialists, as well as the subjects they themselves taught. Administrative control over the allocation of time was thus potentially weaker there. To operationalize the total teaching time in District III, we subtracted from the total school day the time spent out of class as scheduled by the teacher or as recommended by the district, whichever was less. This procedure implies that while the teacher cannot use the whole school day as he or she pleases, he or she can spend more than the district's recommended time on outside activities, time that could have been spent on reading or other academic subjects.

The core issue for control through time allocation is how time available for teaching affects the teacher's use of it. If districts and schools influence the amount of time actually used for reading instruction, then the more time available for teaching, the more will be spent in that subject. Our class measure of instructional time was *reading and language arts time*, the average daily amount each teacher spent on reading, spelling, and handwriting.

First-grade reading instruction centers on teaching students to recognize and read whole words, and it occurs within classes in

small groups stratified by student ability. Teachers allocated part of the time used for reading and language arts to instruct each reading group, which was measured in this study in average daily minutes as *total reading time*. This variable incorporates any teaching time that was provided to the group, including seatwork as well as time spent with the teacher. Groups in a class tend to be alike in this respect, because the time given to one group for working with the teacher is used by the others alone at their desks. Still there was variation within classes (though not within groups), because some groups were allowed to start on new subjects (such as math or handwriting) while others completed their reading. A second group variable, *small group basal time*, indicates the average daily time each group spent with the teacher in the small group on word-learning skills, including oral and silent reading, word-recognition drills, and the discussion of stories.

We expect that district, school, and class influences on small-group instruction will be indirect, because the reading time used for each group must come out of the class's reading and language arts time, which is a portion of total available teaching time, derived from the total school day. Both group variables may affect instructional content directly, because additional seatwork time may cause students to move through the material more quickly, just as additional time spent with the teacher adds to student progress.

Both group time variables also affect individual time, *total basal instructional time*. This represents the average daily minutes students spent in word-reading instruction, at their desks or with the teacher, in small-group or whole-class settings. It refers to students (rather than groups), taking movement between groups into account.[1] This variable is expected to affect learning directly. Because spelling, handwriting, and other whole-class activities that may affect reading skills are included in reading and language arts time but not in the indicators of group or individual time allocations, the class-level variable may also influence word learning directly.

Materials. Instructing from the curriculum so that students can learn lies at the organizational core of schooling, though clearly it does not represent the totality of the educational agenda. Schools, families, and the state all have an interest in students learning what they are taught. For this reason it was important in this study to examine the material presented as well as how much of it was actually learned. It is the nature of schooling that curricular coverage and learning are closely related. Obviously, students are more likely to learn what they have been taught than what they have not. Despite their close association, however, coverage and learning are conceptually and empirically independent (Dreeben and Gamoran, 1986).

First-grade reading instruction is typically guided by basal readers, usually provided by the district, that introduce words to be learned. We measured the availability of curricular resources as *words available*, the number of words contained in the first-grade reading texts. We found uniformity of reading programs within Districts II and III but discovered variation between schools in District I. Words available is thus not purely a district variable. How these materials are used, of course, is up to the teacher and is of central concern here. We did not mea-

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Total basal instructional time refers to the amount of instructional time to which each student was exposed, not the time students spent actually engaged in work. Data on time-on-task, based on observations of individual students at work, were not collected.

sure the use of supplements to the texts such as worksheets each teacher may have provided, because it was minor compared to the central use of basal texts.

We measured how much curricular material teachers covered with each reading group. *Words taught* indicates the number of words, of the total available, teachers taught to each group. In a few cases they went beyond the materials into second-grade texts, and words taught includes that information. Words taught is our measure of instruction, and we expect it to be affected directly by group mean aptitude, words available, and group-time allocations, and indirectly by school and district time and aptitude considerations. The stronger those indirect effects, and the stronger the effect of words available, the more administrative decisions constrain the practice of teaching.

Our indicator of student learning is the number of *words learned* out of the total taught. This variable was created by asking students to read a sample of the words they had been taught during the year. The proportion of words read correctly, multiplied by the total taught, constitutes words learned. Student learning should be affected directly by words taught, total basal instructional time, and reading and language arts time, as well as indirectly by all the district and school variables that influence words taught.

In addition, individual *aptitude*, socioeconomic status (*SES*), *sex,* and *race* are exogenous variables that may influence learning. Sex was coded 0 for boys and 1 for girls, and race was coded 0 for blacks and 1 for non-blacks. SES was measured on a nine-point scale of parental occupation, using the following scale: 9 = professional, technical, kindred; 8 = managers, officials, proprietors — large; 7 = higher level white-collar, clerical, clergy, semiprofessionals; 6 = managers, officials, proprietors — small; 5 = sales; 4 = craftsmen, foremen, kindred, public service, lower white-collar; 3 = operatives, semiskilled; 2 = laborers, unskilled, domestic service; 1 = unemployed, welfare recipients. Intercoder reliability of assigning scores to occupations was calculated at 83 percent. Missing values were assigned the class mean. Because information on parental occupation could not be obtained in School 2, SES was estimated there using census-tract data.

Finally, to test whether instruction (words taught) is governed primarily by prior student performance rather than by forces shaped by the administration, we included a lagged indicator of the group's mastery, *group reading success rate (winter)*. We created this variable by taking the mean for each group's percentage of words read correctly in a test administered in March that was similar to the one given at the end of the year. The more words students learned during a prior period, the more teachers might introduce subsequently, apart from the influence of resources allocated to the group.

To estimate the relations between all the relevant variables in a single model, individual-level data were used even for variables representing higher levels of organization. Of the 374 students who attended the thirteen classrooms, 302 were still there at the end of the year, had been there at least since January, and belonged to reading groups. These 302 students, for whom we have complete data, constitute the sample.

RESULTS

The empirical assessment of our formulation is displayed in Figure 2. It shows the flow of time, material, and personnel from the districts to the schools, classes, groups, and individual students. Only the paths shown here were estimated; as we argued above, district and school time and personnel allocations should only affect teaching and learning indirectly, through their effects on intervening variables. All estimates shown are standardized regression coefficients.

Figure 2 does not portray a conventional path analysis. Its constructs involve logical as well as empirical ties; each variable specifies more precisely the construct that came before it, culminating in variables directly entailed in teaching and learning. There is an unusual element of determinism in our model: if no words were available, none could be taught, and if none was taught, none could be learned. Similarly, teachers must have some time available in order to use it for instruction. But these relations are emphatically *not* tautological. The argument that instruction is a matter of teacher choice rather than administrative influence would predict that resource availability does not affect resource use. To the extent that this is logically untrue (teaching could not take place with no time or materials), no analysis would be required. But such an argument would be empty; it would point out necessary technological connections, but would not evaluate their importance. We wish both to show what these ties are and to test their strength.

The results reveal that resource allocation links district and school conditions with teaching and learning. First, the higher the aptitude level of students in a district, the higher the mean aptitude at the school level and, in turn, at the class level.[2] A key question was whether teachers loosen the connection between instruction and the assignment of students to classrooms through ability grouping. These teachers did loosen the linkage, transforming class aptitude distributions into small groups for reading instruction. However, class aptitude level constrained the aptitude of each group. While the effect of the class mean aptitude on the group mean aptitude is the weakest among the personnel variables, at .68 it is still substantial. The composition of the groups formed by teachers depends on the abilities of the students assigned to classes. Group mean aptitude is the most important predictor of words taught ($B = .66$). Thus the allocation of students to classrooms, an administrative act, has important indirect effects on instruction.

District and school time conditions also affect instruction indirectly. The longer the school day, the more time is available for teaching, and the more time teachers spend on reading instruction. Time allotted to reading groups, and particularly that spent in small-group basal instruction, influences the amount of curricular material groups cover.

With time and the composition of reading groups controlled, words available exerts only a small direct impact on words taught. Ability grouping appears to loosen the linkage between the provision of materials and their use even more than it weakens the impact of pupil assignment. While teachers might complete the texts with their top reading groups, they differ in how far they progress with middle and low groups. Yet there are two other ways, not represented in Figure 2, in which cur-

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The small number of districts, schools, and classes in our sample forces us to regard these coefficients with some caution. These effects are similarly strong and significant when measured with data at the school and class levels of analysis, but their generalizability must await research on larger samples. The same holds for district and school effects on time allocations.

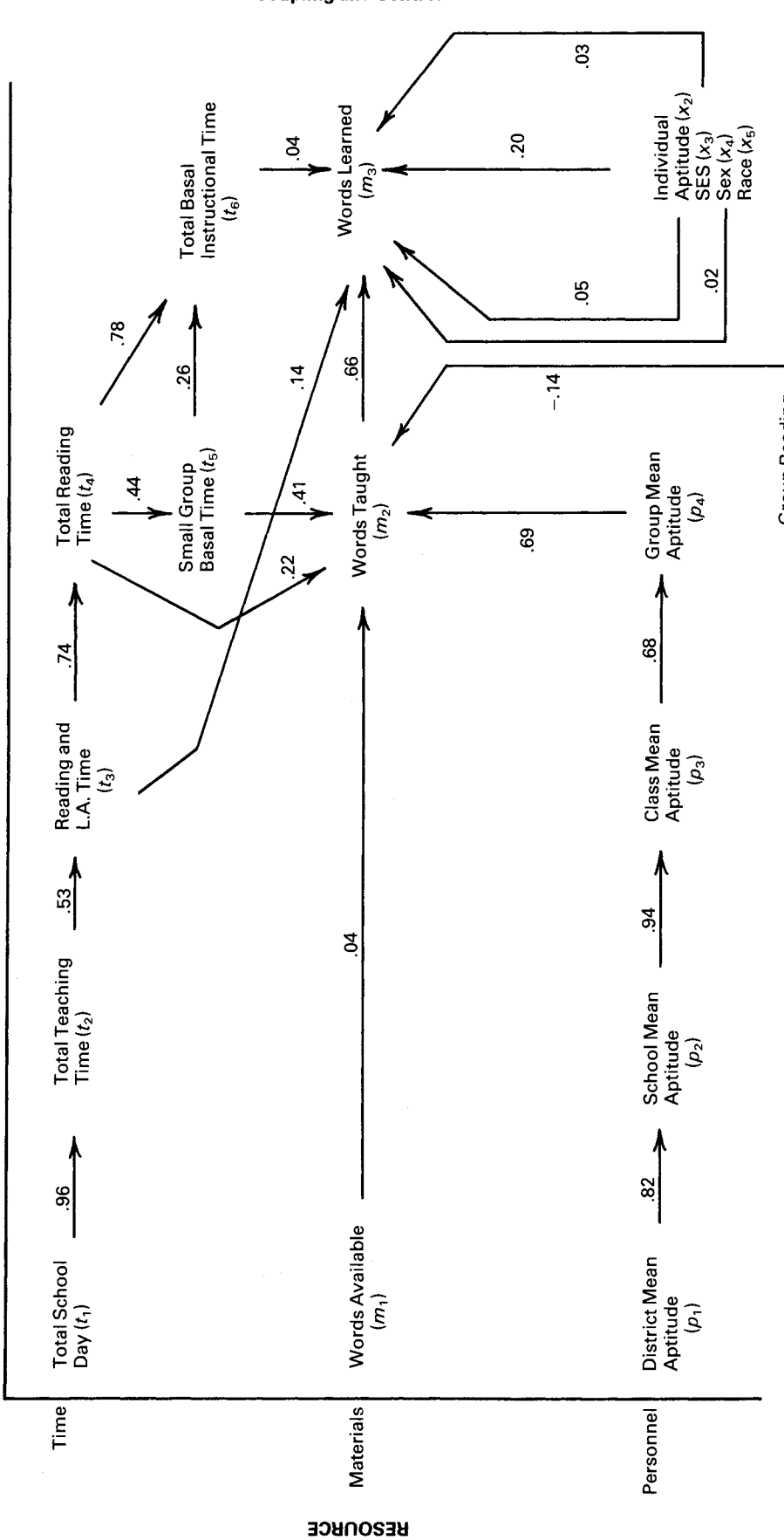

Figure 2. Resource allocation, teaching, and learning in school systems.

Note: Direct paths from district, school, and class resources to teaching and learning that are not drawn are assumed a priori to be 0. For clarity of presentation, error terms and correlations between exogenous variables are not shown.

ricular materials do constrain instruction. First, while the impact of materials on the *number* of words taught is weak, its effect on *which* words are taught is strong. Because instruction relied almost completely on the materials provided, the words and stories to be covered were determined at the district level when books were chosen. Second, the effect of words available may operate through time allocations in a way we have not examined. Teachers given a reading series containing a large number of words may need to spend more time on reading instruction. We did not estimate this potential indirect effect.[3]

The remaining independent variable in the prediction of words taught, prior reading success rate, has an unexpected negative effect. It could be that groups with low percentages of words mastered in the winter were being taught at a fast pace, and their teachers did not slow down, so that the relation to words taught at the end of the year remains negative.

Our conception of coordination through resource allocation required demonstrating not only that district and school conditions influence classroom instruction, but that instruction affects student learning as well. Words taught exerts the most powerful effect on words learned (B = .66). With word coverage controlled, the amount of time used for basal instruction does not add significantly to the prediction of learning. However, reading and language arts (L.A.) time had a significant effect. Because time used for basal instruction is already included in the model, it is likely that the portion of reading and L.A. time devoted to activities other than basal reading (such as spelling) produced the effect on word learning. Among the individual-level exogenous variables, the effect of aptitude is noteworthy at .20; other coefficients are smaller.

The unstandardized regression coefficients are displayed in Table 1. With the dependent variables listed across the top, Table 1 should be read vertically. The last column reveals that the effects on words learned of reading and L.A. time, aptitude, SES, and words taught are statistically significant, while the effects of basal instructional time, sex, and race are not. The unstandardized coefficient of .69 for the effect of words taught on words learned indicates that other factors being equal, students learn about seven words for every ten additional words they are taught. All the predictors of words taught are statistically significant.[4]

Coupling and High Reading-Group Students

The analysis supports our view that administrative influence over teaching and learning is exerted through the allocation of time and students, but it suggests that providing curricular materials is but a weak constraint on how many words are taught to the average student. We explained this result by referring to ability grouping: administrators cannot govern the number of words taught to the average student by providing materials that introduce a large number of words, because teachers cover large portions of the curricular materials with some groups and smaller portions with others. This indicates that while administrative decisions do not affect how far teachers go with average and slow groups, the linkage may be tighter for the high-level reading groups that complete the first-grade materials. Eleven of thirteen teachers completed all the first-grade readers with their highest group, and four went on into the

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A more complete test of our conceptual model would be to examine regressions on words taught and words learned, using equations that included effects from all levels of organization, not only direct effects from the next higher level. Unfortunately, excessive collinearity among the independent variables, particularly among district and school indicators, prevented us from estimating the fully saturated model. In a sense, our analysis provides a conservative assessment of the strength of ties between administrative and technical acts for reading instruction. Adding paths that extend across resources or across more than one organizational level could not show the overall links between administration and instruction to be any weaker, because the paths to be added would begin at the district and school levels. However, it could reveal greater administrative influence, particularly in the case of words available.

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We also examined these relations at different analytic levels: we aggregated the data to the level of the dependent variable for each equation, so that effects on school variables were computed with school-level data, those on class variables with class-level data, and those on group variables with data at the group level. All unstandardized regression coefficients were nearly identical to those in Table 1. Standard errors were larger because of the smaller number of cases, but judgments of statistical significance did not change, with three exceptions: using data aggregated to the group level, the effects of words available, total reading time, and word rate did not reach significance. But these effects appeared substantively minimal in Table 1's individual-level analysis in any case. Because of the similarity of results, we present only the individual-level analysis.

Table 1

The Flow of Resources in School Systems (N = 302)*

Predetermined Variable	Dependent Variable									
	t_2	t_3	t_4	t_5	t_6	p_2	p_3	p_4	m_2	m_3
Total school day (t_1)	.73••• (.01)									
Total teaching time (t_2)		1.14••• (.10)								
Reading & L.A. time (t_3)			.57••• (.03)							1.25••• (.23)
Total reading time (t_4)				.26••• (.02)	.59••• (.02)				1.34••• (.36)	
Small-group basal time (t_5)					.53••• (.05)				12.13••• (.73)	
Basal instructional time (t_6)										.54 (.43)
District mean aptitude (p_1)						.99••• (.04)				
School mean aptitude (p_2)							1.00••• (.02)			
Class mean aptitude (p_3)								1.06••• (.07)		
Group mean aptitude (p_4)									13.67••• (.62)	
Reading success rate, winter (x_1)									−.02••• (.005)	
Individual aptitude (x_2)										3.67••• (.43)
Individual SES (x_3)										4.02• (1.98)
Individual sex (x_4)										11.43 (7.89)
Individual race (x_5)										11.12 (9.98)
Words available (m_1)									.11• (.05)	
Words taught (m_2)										.69••• (.04)
Words learned (m_3)										
R^2	.92	.28	.55	.35	.86	.68	.88	.47	.86	.91

•p<.05; ••p<.01; •••p<.001.
*Unstandardized regression coefficients; standard errors in parentheses.

second-grade program. With these notions in mind, we reanalyzed our original model with a sample that contained only students in the highest reading group in each class.

We found that words available exerts considerable influence on the number of words taught to high groups. Its impact of .39 (standardized coefficient) on words taught is second only to the effect of group mean aptitude (standardized B = .51). Comparisons with the full sample should be made with the unstandardized regression coefficients reported in Table 2. In the prediction of words taught, the effect of group mean aptitude is slightly smaller than in the full sample, and the effects of time are considerably smaller. At .60, the effect of words available is more than five times as large as the .11 we estimated for the full sample. At the same time, the effect of teaching on learning is similar: .76 in the high-group sample and .69 for all students. In fact, all the effects on words learned resemble the earlier estimates, while the estimates for the predictors of words taught differ substantially.

Table 2

The Flow of Resources in School Systems among High Reading-Group Students ($N = 91$)*

Predetermined Variable	Dependent Variable									
	t_2	t_3	t_4	t_5	t_6	p_2	p_3	p_4	m_2	m_3
Total school day (t_1)	.69••• (.02)									
Total teaching time (t_2)		1.53••• (.17)								
Reading & L.A. time (t_3)			.65••• (.04)							.54 (.68)
Total reading time (t_4)				.26••• (.04)	.61••• (.04)				.36 (.70)	
Small-group basal time (t_5)					.50••• (.08)				6.33•• (2.35)	
Basal instructional time (t_6)										.76 (.92)
District mean aptitude (p_1)						.92••• (.06)				
School mean aptitude (p_2)							1.02••• (.03)			
Class mean aptitude (p_3)								1.15••• (.07)		
Group mean aptitude (p_4)									11.20••• (2.35)	
Reading success rate, winter (x_1)									−.02 (.02)	
Individual aptitude (x_2)										2.63••• (.62)
Individual SES (x_3)										7.28• (3.42)
Individual sex (x_4)										12.70 (13.92)
Individual race (x_5)										13.67 (20.12)
Words available (m_1)									.60•• (.18)	
Words taught (m_2)										.76••• (.07)
Words learned (m_3)										
R^2	.92	.48	.72	.34	.89	.74	.93	.77	.77	.91

• $p < .05$; •• $p < .01$; ••• $p < .001$.
*Unstandardized regression coefficients; standard errors in parentheses.

While the strength of particular technological connections differs in the two samples, the overall level of influence is about the same. The R^2 for words taught is .86 in the full sample and .77 in the high-group sample; the R^2 for words learned is .91 in both cases. District and school time and aptitude have smaller indirect effects in the high-group sample because the group-level variables have less impact on words taught, but the effect of words available is considerably greater in the second analysis. These results show that administrative decisions on the allocation of time to schools and classrooms, on which curricular materials to provide, and on how to assign students to classes are linked to the activities and outcomes of classroom life.

CONCLUSIONS

This study indicates that first-grade reading instruction is strongly influenced by resources allocated from the district and

school administration. On the average, the arrangement of student characteristics, the provision of curricular materials, and the allotment of time constrain the content of instruction. With students who belong to high reading groups, the allocation of curricular materials proves to be a particularly important influence on teaching. The indirect influence of district and school forces is mediated by class and group conditions.[5]

Our findings do not indicate that the strength of these technological connections is matched in all areas of school systems. The sensitivity of teaching and learning to resource availability varies by grade and subject matter. Because learning to read is generally regarded as the most important feature of the first-grade curriculum, finding a relatively high correspondence between resources, teaching, and learning there takes on great significance. Note also that the tightness of particular connections may vary across districts. Our descriptive information reveals some of this variation, but we have not made much of it because of the small number of districts in the study.

Despite administrative control over resources, teachers have latitude in using them; they are rarely observed or actively supervised and must respond to the exigencies of classroom events on a continuing basis. Ability grouping is one way teachers decouple their labor from administrative control. Yet even the formation of groups is constrained by the array of pupils assigned to teachers, who are also bound by the time and materials made available to them as part of system-wide allocations.

We offer cautious generalizations. Although effects of variables at group and individual levels are measured in samples of reasonable size (50 groups, 302 individuals), the administrative effects are based on samples of thirteen classrooms, seven schools, and three districts. The districts and schools were selected to represent a variety of environments, but some of our findings could still be sample-specific.

The conceptual aspects of the study, however, are paramount. There has been a growing consensus about school systems that because mechanisms of bureaucratic authority do not appear to govern their internal operation (a position we agree with) and because their integration does not seem to be based on technological linkages (a position we disagree with), they must either be regarded as weakly coordinated or joined only through ceremonial ties. Our perspective and the evidence from this study suggest that the consensus is premature.

The allocation of resources, especially time, personnel, and materials, are clearly technological. The school's main technological activity — classroom instruction — consists precisely of teachers using curricular materials over time with reference to characteristics of student aggregates (reading aptitude, in this case). Our evidence shows how the allocation of these resources is tied together by linkages spanning the hierarchical levels of school systems, linkages that are both tight (time, personnel, and the curricular content of materials) and loose (the quantity of materials). Elements of technology are clearly implicated in the mechanism of coupling. Consistent with the loose-coupling view, we suggest that technological connections do not appear as direct controls from the central office to the classroom. Instead, we have argued for linkages between adja-

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There may also be direct effects of administrative factors that our analyses did not measure (see note 3).

cent levels of the hierarchy, so that district-level decisions are mediated by school-level acts before they affect classroom conditions. We also agree with the loose-coupling notion that bureaucratic controls such as rules and supervision do not shape classroom instruction.

A task for further research might be to assess how much administrators can willfully intervene in the schooling process by manipulating resources. Although the organizational linkages we found do not consist of the command, obedience, and supervisory arrangement of roles and offices so characteristic of bureaucratic authority, one might argue that they still involve relations of power through administrative domination (see Weber, 1968). As others have noted, control over resources is a source of power in organizations (Pfeffer and Salancik, 1978; Pfeffer, 1981). Through the preemptive control of resources to the core technology (classroom instruction), administrators limit teachers' alternatives in making the technology work. In school systems, the mechanism of control can be viewed as the capacity of administrators to impose their will by establishing outward limits on time and materials and by shaping the ability composition of classrooms within the limits imposed by the district population. Given these constraints, the alternative courses of teachers' actions become sharply circumscribed and the number of workable alternatives for carrying on instruction reduced. While the discretion of teachers is hardly eliminated, the power of administrators may lie in their capacity to define the conditions under which teachers work.

It appears to us that coupling in educational organizations is accomplished through the coordination of work, after all. Despite the attenuation of bureaucratic authority, administrators influence technical work by regulating the flow of resources to classrooms on a system-wide basis. We do not dispute the role of administrators in coordinating values and symbols and agree that this contributes to the integration of educational organizations. But to view school systems as organizations in which integration of purpose is not achieved through the coordination of technical activity is to miss important internal linkages that enable teachers to accomplish their tasks.

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APPENDIX

Table A

Means, Standard Deviations, and Correlation Coefficients of Variables — Full Sample (N = 302)

	t_1	t_2	t_3	t_4	t_5	t_6	p_1	p_2	p_3	p_4	x_1	x_2	x_3	x_4	x_5	m_1	m_2	m_3
t_1) Total school day		.96	.60	.66	.62	.80	.82	.63	.59	.37	.36	.32	.40	.09	.43	.69	.68	.68
t_2) Total teaching time			.53	.62	.57	.76	.67	.44	.41	.24	.34	.21	.26	.08	.42	.57	.53	.55
t_3) Reading & L.A. time				.74	.63	.70	.64	.46	.49	.30	.49	.26	.19	−.01	.37	.80	.58	.62
t_4) Total reading time					.59	.90	.51	.51	.53	.41	.60	.35	.38	.05	.41	.47	.61	.62
t_5) Small-group basal time						.72	.41	.36	.29	.21	.33	.18	.25	.12	.65	.50	.67	.62
t_6) Basal instructional time							.59	.59	.56	.44	.56	.37	.44	.11	.54	.52	.73	.72
p_1) District mean aptitude								.83	.77	.53	.27	.45	.47	.01	.17	.88	.69	.69
p_2) School mean aptitude									.94	.64	.32	.55	.73	.05	.35	.66	.76	.72
p_3) Class mean aptitude										.68	.43	.58	.70	.03	.33	.63	.70	.70
p_4) Group mean aptitude											.61	.86	.57	.06	.23	.42	.75	.76
x_1) Group reading success rate, winter												.52	.35	.09	.37	.25	.50	.59
x_2) Individual aptitude													.48	−.01	.22	.35	.64	.70
x_3) Individual SES														.10	.38	.28	.60	.60
x_4) Individual sex															.10	−.04	.11	.11
x_5) Individual race																.28	.50	.49
m_1) Words available																	.60	.61
m_2) Words taught																		.94
m_3) Words learned																		
Mean	310.28	278.31	142.98	76.67	16.86	49.77	22.64	22.83	22.85	22.73	81.71	22.70	5.04	.47	.66	527.96	410.10	346.55
S.d.	15.67	11.84	25.35	19.47	8.53	15.74	5.24	6.26	6.68	10.35	14.24	12.11	2.56	.50	.48	122.36	213.58	224.26

Table B

Means, Standard Deviations, and Correlation Coefficients of Variables — High Reading-Group Sample (N = 91)

	t_1	t_2	t_3	t_4	t_5	t_6	p_1	p_2	p_3	p_4	x_1	x_2	x_3	x_4	x_5	m_1	m_2	m_3
t_1) Total school day		.96	.77	.65	.76	.83	.87	.64	.62	.26	.32	.18	.16	.10	.37	.88	.73	.71
t_2) Total teaching time			.69	.61	.74	.79	.71	.43	.42	.05	.23	.03	.01	.07	.40	.77	.57	.55
t_3) Reading & L.A. time				.85	.72	.87	.74	.57	.56	.25	.29	.18	.13	−.04	.30	.81	.76	.72
t_4) Total reading time					.58	.91	.57	.52	.51	.27	.37	.19	.20	−.02	.30	.59	.55	.55
t_5) Small-group basal time						.72	.56	.31	.26	−.10	.22	−.07	.03	.12	.49	.65	.51	.50
t_6) Basal instructional time							.70	.63	.62	.31	.44	.22	.25	.03	.42	.73	.68	.68
p_1) District mean aptitude								.86	.81	.58	.25	.41	.33	.07	.11	.95	.86	.83
p_2) School mean aptitude									.97	.82	.44	.58	.62	.10	.18	.74	.85	.84
p_3) Class mean aptitude										.88	.59	.62	.64	.10	.24	.69	.85	.86
p_4) Group mean aptitude											.56	.71	.64	.06	−.04	.42	.61	.65
x_1) Group reading success rate, winter												.40	.46	.15	.41	.15	.34	.44
x_2) Individual aptitude													.40	−.10	.01	.30	.43	.53
x_3) Individual SES														.16	.19	.18	.47	.53
x_4) Individual sex															.04	.01	.13	.12
x_5) Individual race																.19	.24	.26
m_1) Words available																	.81	.76
m_2) Words taught																		.94
m_3) Words learned																		
Mean	312.71	279.79	149.06	81.83	20.09	55.36	22.99	23.65	23.61	32.50	91.29	32.40	5.67	.55	.85	543.18	557.12	512.03
S.d.	16.26	11.75	26.02	19.76	9.01	15.97	5.94	6.35	6.70	8.75	8.87	12.59	2.48	.50	.36	125.90	191.32	200.74