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ABSTRACT

The adoption of team teaching or team organization in an elementary school causes change in the organization's work system or in the basic structure of its managerial system, or both. Distinguishing between the two kinds of change has been a central feature of the MITT (Management Implications of Team Teaching) research project at the University of Oregon. The study described in this paper selected schools for study according to the presence or absence of change in managerial structure at a given point in time and measured their instructional organization, as well as a number of other school and staff attributes, before and after that time. The paper reports some of the things learned about the coincidence of change in the two. It swells heavily on the measures of instructional organization, first describing the level and nature of task interdependence observed in the "before" data (while the schools were operating under a conventional managerial structure) and then turning to the changes in task interdependence found after some of the schools had installed the multiunit model. (Author/JMF)

March, 1976

WORK SYSTEM CHANGE IN UNITIZED SCHOOLS: SOME THROUGH-TIME FINDINGS*

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When we say that an elementary school has adopted team teaching--or a team organization--two fundamentally different aspects of organization may have been altered. Change may have occurred in the organization's work system or in the basic structure of its managerial system, or, of course, in both. Special pains have to be taken to determine specifically which aspect has changed, since teachers, principals, consultants, and the like are not usually precise in their language.

From the standpoint of the managerial system, the adoption of team teaching typically entails the formation of a new structural level between the school administrator and individual teachers. Members of the teaching staff are formed into units (which, incidentally, are often called "teams"), unit leaders are appointed or elected, and the members begin meeting every week or so ostensibly to plan and coordinate instructional affairs of the unit. By some models, such as the Multiunit School model developed by Wisconsin's Research and Development Center for Cognitive Learning, unit leaders and the

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principal get together periodically to work out educational policies and problems transcending the units, much in the character of an administrative cabinet.

Most American elementary schools, by contrast, have an essentially undifferentiated managerial structure, implicating only the two formal positions of teacher and principal, the latter sometimes augmented by a deputy or assistant principal. While some schools go in heavily for ad hoc committees, it is extremely rare for teachers to be organized into departments or similar operating bodies. Almost invariably the school's only operating unit is the individual teacher. Thus, the creation of a new level, as in the Multiunit School, represents a fundamental morphological change in the managerial system.

Alternatively, team teaching may entail a change in the school's workflow. Ordinarily, it is said, the instructional organization of American schools is simple in the extreme. Pupils are grouped into classes, a single teacher is assigned to the class, and the teacher proceeds to teach all subjects of the curriculum to the class throughout the year. Except where subject specialists of music, art, or physical education take over the class for a period, no other teacher instructs the same pupils, at least during a particular term or year. Each grade-level teacher works independently of the others; no pupils move between them for instructional purposes. This instructional organization is called the self-contained classroom pattern.

The adoption of team teaching in the work system sense involves intimate collaboration among teachers in conducting instruction. At the very least, it implies that two or more grade-level teachers--not just special subject teachers--share in the instruction of a common set of pupils on a week-to-

week if not day-to-day basis, and by some definitions it implies that they share instruction in the same subject areas. A pupilflow arises among them. In the language of organization theory, one teacher's task performance is in some degree contingent on the performance of other teachers, and they become task interdependent.

Distinguishing between the two kinds of change has been a central feature of the MITT research. There is no reason to expect that change in the organization's work system automatically accompanies the formation of managerial units. Indeed, we have seen Multiunit schools in which most instruction was conducted in self-contained classrooms, just as we have seen instances of intimate instructional collaboration in schools with the conventional, undifferentiated managerial system (Charters, 1973). While the two forms of change may be empirically associated, almost certainly they are governed by different processes which can only be understood by examining them separately.

Our research plan was to select schools for study according to the presence or absence of change in managerial structure at a given point in time and to measure their instructional organization (as well as a number of other school and staff attributes) before and after that time. This paper will report some of the things we have learned about the coincidence of change in the two. We will dwell most heavily on our measures of instructional organization, first describing the level and nature of task interdependence we observed in the "before" data--while all the schools were operating under a conventional managerial structure--and then turning to the changes in task interdependence we found after some of the schools had installed the Multiunit model.

The point of change in managerial structure was the beginning of the 1974-75 school year. Sixteen of our schools were structurally undifferentiated in the late spring of 1974 and had changed to a fully unitized managerial system by early fall of 1974, while another 13 were managerially conventional at both times.[1] For convenience we will refer to them as our "experimental" and "control" schools, respectively. Our measures of instructional organization were taken in the spring of 1974, in late fall of 1974, after the 16 experimentals had made the switch, and in the spring of 1975. We have continued taking data in the 29 schools in the fall and spring of the current academic year, but we are not prepared to report on these last two rounds.

The Measure of Instructional Organization

Details of data collection regarding the school's instructional organization are accessible elsewhere and need not be repeated here (Packard, et al., 1976). It is enough to say that we ask teachers to keep a simple record for ten consecutive school days of the particular pupils he or she teaches in each of five core subjects. We take data from grade-level teachers only, excluding such teaching personnel as reading specialists, physical education and music teachers, paraprofessionals, and interns.

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[1] Our classification of schools as experimental or control was based on information obtained in the fall of 1974. We eliminated a number of schools that failed to fit the design requirements unambiguously. We dropped schools that were partially or fully unitized at Time 1, others that had the functional equivalent of units at Time 1, still others that went only part way toward unit organization by Time 2, and a few about which our information was uncertain or contradictory at either time.

This basic information allows us to reconstruct the pupilflows in the school--the movement of pupils from teacher to teacher, if any--and to determine the particular teachers who are connected by a given pupilflow. Specifically, a pair of teachers is connected by our rules if they teach at least two pupils in common on at least two days during the sample two-week period.

We make an important distinction in the nature of the teacher connections. The large majority of the connections we find involve pairs of teachers who instruct their common pupils in different subject areas, much as one would find in a high school program. One teacher will teach a set of pupils math and science, for example, while the other instructs them in the other core subjects. We call this type of connection throughput interdependence. It is distinguished from a potentially more intimate form of exchange in which a pair of teachers instruct the same pupils in the same subject area or areas. Instructional interdependence, as we refer to it, begins to verge on the idea of team teaching, taken in the sense of joint classroom instruction by two or more teachers (Shaplin, 1964). In principle, we could develop a measure of the "jointness" of instruction by counting the number of days and the number of subjects in which a pair of teachers conduct their common instruction, but we have not done so yet. At this stage, we have only identified instances of instructional interdependence between teachers.

The main school-level measure we derive from the basic information, then, is a count of the number of pairs of teachers who are connected by a pupilflow--either in throughput interdependence or in instructional interdependence. The number of instances is strongly affected by school size, so for descriptive purposes, as in this paper, we follow the arbitrary practice of

dividing the number of instances by twice the number of teachers furnishing information (or by approximately twice the school size).[2] Values of the index of throughput interdependence (TPI) range from zero to about .7, while values of the instructional interdependence index (INI) typically range from zero to .4 or .5.

Another concept we employ is system of task interdependence. It allows us to see patterns of instructional organization in a way that pair-wise analysis does not. A system is obtained in the following way. Once we identify a pair of teachers who teach at least a few pupils in common during the two-week time sample, we can proceed to identify other teachers who are similarly linked with one, the other, or both members of the initial pair. About half the time we end with the original pair, and it becomes what we call a two-teacher system, but often we can trace additional teachers who are tied pair-wise, if not more directly, into a system. Members of systems larger than two need not all teach the same pupil or set of pupils, and typically they do not, but all must be linked at least pair-wise to qualify as members. Thus, if teachers A and B trade classes, one teaching the math and the other the social studies for the two classes, and a third teacher C instructs some of A's pupils in reading, all three are said to be linked in a task-interdependent system, even though B and C teach no pupils in common.

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[2] The rationale for the choice of 2N as the denominator of the index is given in Packard, et al. (1976). For formal statistical analyses we employ the raw count rather than the index, correcting for size when necessary by a regression term.

By this definition a system may be highly integrated and intricate or it may be highly tenuous in its teacher-to-teacher connections. In another paper we have described our efforts to characterize the system variations and the bewildering variety of patterns found within them (Charters, 1976). Although systems vary widely in coherence, our definition has the virtue of unambiguously distinguishing them from the self-contained classroom. Teachers of self-contained classrooms instruct no other pupils but their own, and no other grade-level teacher instructs their pupils.

The Pre-Innovation State of Instructional Organization

What was the organization of instruction like in the spring of 1974 when the schools were still managerially conventional? We have supposed that a task interdependent work system can exist in the absence of unit organization of the teaching faculty, but in what degree is this true? Inspection of the pre-innovation state is important in its own right, too, in order to determine the base from which change can occur.

We can briefly summarize several findings regarding the pre-innovation state of the work system that we have reported in another source (Packard, et al., 1976). Consider first the incidence of self-contained classrooms and the reverse side of the coin, task interdependence. Overall, less than half of the 381 teachers in 28 schools[3] taught in self-contained classrooms; over half, conversely, were caught up in systems of task interdependence, of either the

[3]Data returns from one experimental school were too spotty to permit computations. Henceforth, we report on 15 experimental and 13 control schools.

throughput or instructional variety. Figure 1 displays the reciprocal values for each experimental and control school. The figure makes it plain that the proportions varied widely from school to school. In only one school (a control) did all teachers teach independently of their grade-level colleagues, and there were but four more schools in which "most" teachers were self-contained (meaning four out of five). At the other end of the scale, six schools showed 80 per cent or more of their teachers implicated in systems of interdependence before innovation was to begin, and five of the six were experimental schools in our design.

If one of the advantages of such innovations as team teaching or differentiated staffing is to break classroom teachers out of the isolation of the self-contained classroom, as the proponents of these innovations argue, that advantage cannot be realized by many of the teachers in the study. They were already out of isolation.

The figure makes it plain, too, that the experimental schools as a group were further down the road toward task interdependence than the control schools in the spring of 1974. Why the experimentals were further advanced than the controls we cannot say. Perhaps unit organization tends to be installed in schools where teachers are already favorably disposed toward interdependence, or perhaps the teachers in the experimental schools had altered their instructional program in anticipation of the impending innovation. The issue bears further investigation. In any event, a number of the schools that subsequently introduced a unitized managerial structure had very few teachers to "save" from instructional isolation; they had little room to change in this regard.

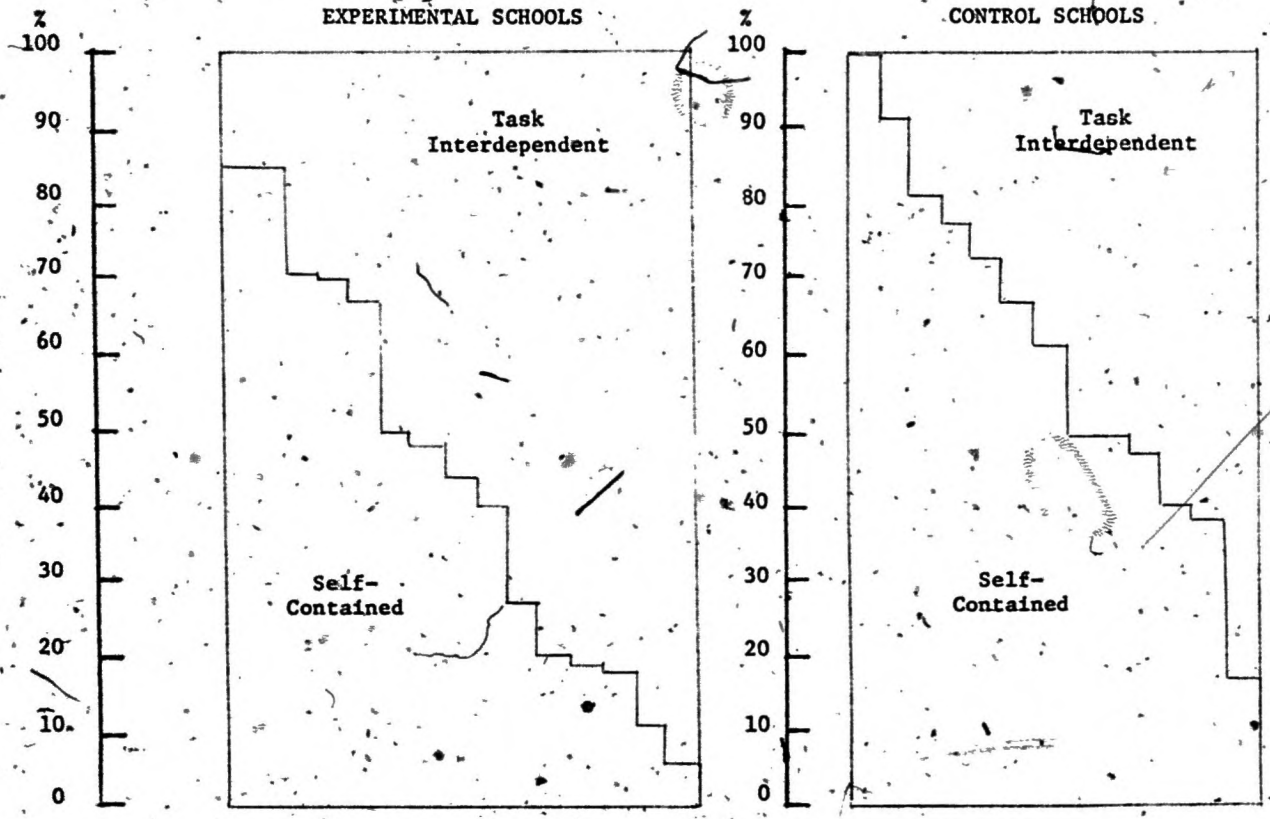

Fig. 1. Per cent of teachers task interdependent or self-contained, 15 experimental schools and 13 control schools at Time 1.

There are several other observations to make about these supposedly conventional schools. Generally speaking, systems of interdependence were most common in the upper grades of the elementary schools. Self-contained classrooms were most prominent in the first and second grades, but as grade level increased, teachers of self-contained classrooms became the exception rather than the rule. This depends, of course, on the particular school, but it appears as though there is a generic force favoring the self-contained classroom that regularly weakens as the age-grade of pupils increases toward the secondary-school level.

Also, systems typically implicated teachers at the same grade level, considerably less often teachers (and pupils) at adjacent grade levels, and rarely the teachers and pupils across two or more grade levels. Again, there seems to be some inherent difficulty, or opposing force, in mixing the instruction of pupils of different grades.

Turning from these general features of task interdependence to the internal workings of the systems, it was apparent that relatively few teacher pairs taught the same pupils in the same subjects--our definition of instructional interdependence. Far more common, by a factor of two to three, were connections that entailed a division of labor by subject area, insofar as a given batch of pupils was concerned. This throughput interdependence did not necessarily, nor even usually, imply teacher specialization, although we found a few instances in which a teacher would teach one and only one subject. Most often the instructional pattern took the form of teachers subdividing their pupils in, say, reading and each teacher instructing one of the groups. They

might regroup the pupils again for math instruction, with each teacher again instructing one of the groups. In Figure 2, the Time 1 values indicate the relative incidence of instructional and throughput interdependence in the control and experimental schools in their pre-innovation state.

Emergent and Embedded Systems

The Time 1 data revealed a remarkably wide array of patterns for organizing instruction. The ways in which systems of two, three, four, or more teachers could subdivide and re-subdivide pupils was seemingly endless, especially when one took account of the fact that a given teacher might "participate" in the subgroup instruction in one subject but not in another. As we pondered the complexity, we began to sense an important difference among the systems in the circumstances that give rise to them and in the forces that hold them together. We have yet to find the touchstone that will make the distinction operational, but many of the systems of work relations appeared to be voluntary and emergent, others seemed firmly embedded in the fabric of the school.

The preponderance of the systems at Time 1 seemed to be spontaneously emergent phenomena--relationships that had been worked out voluntarily among compatible teachers who found a particular pattern of exchange a means of solving instructional problems or of enhancing their common educational goals. The cooperative arrangement could be of a throughput variety--several teachers regrouping their pupils for instruction in reading or science--but often it entailed instructional interdependence. Two teachers would teach reading jointly to the pooled classes or, as a more likely occurrence, they would work together with a smaller group from each of their classrooms who needed special

attention. Our impression is that the numerous two- and three-teacher systems were generally of this emergent character. The originating as well as the sustaining force of emergent systems should be found to lie in the dispositions and outlooks of the particular people who had been brought together in nearby classrooms--in the happenstance of the similarity in their interests, beliefs, and other relevant personal attributes. The work relations gave the appearance of permissiveness; they were not so intricate that they could not readily be altered or abandoned altogether. They seemed capable of absorbing new members or losing them without seriously disrupting the system's organizing principle.

Some other systems, by contrast, appeared to be the product of institutional forces, not the personal proclivities of sundry teachers. Most obvious were the systems showing pupil exchange among subject-matter specialists. The extreme form would be the case in which each of five teachers would specialize in a different subject, between them covering the core subjects for all pupils of, say, the fifth and sixth grades. (In terms of the previous distinction these are exclusively throughput interdependence connections.) We encountered these systems, or minor modifications of them, almost exclusively in the upper elementary grades and especially in the seventh and eighth grades of the schools of our sample in 8-4 districts. The sustaining force of such systems would involve the very composition of the school staff and the staffing practices that bring it about. The instructional pattern hardly seemed a matter of accident or teacher whim but rather the outcome of a firmly entrenched staff allocation plan.

In a few schools--or sectors of schools--the membership of each of several systems was so regular and the particular division of labor so repeti-

tive that one suspects that the instructional organization arose as a matter of school policy. Often the systems were no different in appearance from the emergent systems; it was their regularity within the school that furnished the clue. In one school, for instance, the three teachers of fourth grade comprised a system, as did the three at the fifth-grade level and the three at the sixth-grade level. The three systems had identical instructional patterns: each system member taught language arts, science, and social studies to a subset of the pupils, then they regrouped for reading and once again for math. Specialization was not at stake, since all teachers taught all subjects. Nevertheless, these systems did not appear to be accidental either. If we are right in our surmise about them, the originating and cohering force would lie less in the personal inclinations of teachers and more in the institutional press of a school policy or social norm.

In sum, our investigation of the pre-innovation state of work systems has led us to believe that the problems and prospects of implementing an innovation may be quite different, depending on the character of the instructional organization prevailing in the adopting school. Certainly it is a different matter to induce change in a school where the teachers are predominantly self-contained than where they are predominantly task interdependent. Moreover, emergent systems and embedded systems reflect the operation of different social processes which must be understood more fully with respect to their implications for malleability and teacher responsiveness. In the same way, proponents of change must come to terms with the nature of the forces that make for the greater incidence of systems in the higher grade levels and those that appear to inhibit the formation of cross-grade systems.

Unit Organization and Instructional Change

Following the formation of units in the experimental schools we measured instructional organization in mid-fall and again the next spring. The organization of instruction in these schools as a group was decidedly different from what it had been before unitization. The percentage of teachers in self-contained classrooms dropped from 43 to 25 and then to 22 per cent. Most of the decrease, of course, had to occur in the ten schools in which there had been more than a handful of self-contained teachers to begin with. In one experimental school that had been largely self-contained at Time 1 nothing happened following unit organization: 83 per cent of the teachers were self-contained in the spring of 1974 and 89 per cent were self-contained a year later. It was a clear exception among the experimental schools.

We were surprised to discover, however, that the control schools also showed a regular decline in proportions of self-contained teachers. Starting at 64 per cent self-contained, the figure dropped to 55 and then to 43 per cent. The reduction was not as dramatic as in the experimental schools, but it obviously deserved further study. It turned out that the decrease was due almost entirely to sharp changes in five of the 13 control schools.

The indexes of task interdependence, TPI and INI, based on the number of connected pairs, is a more useful measure than the percentages we have cited, which tend to exaggerate changes in the smaller schools as well as to put ceiling values on schools with few self-contained teachers. Figure 2 displays the TPI and INI means for experimental and control schools before unit organization (Time 1) and a year later (Time 3). The most prominent fact to be observed is the sharp increase in the instructional interdependence in-

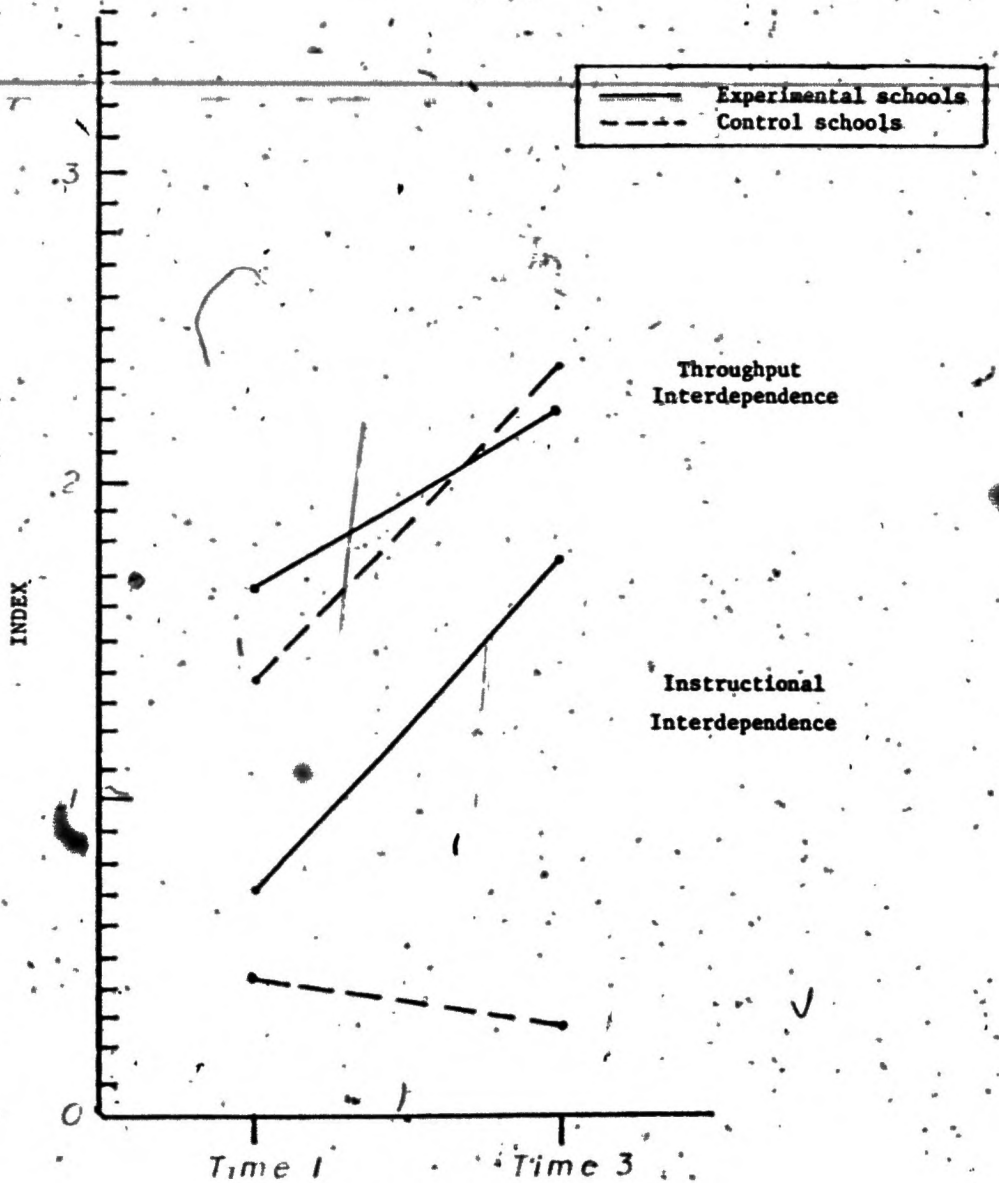

Fig. 2. Change in task interdependence indexes for experimental and control schools.

dex in the experimental schools in comparison with the near-stability of the index in the control schools. This divergence is in keeping with the nature of the innovation promoted in the curricular programs of the experimental schools, featuring the use of Individually Guided Education materials and teacher collaboration in reading and math instruction. The general upward inclination of TPI indexes in both experimental and control schools could be the result of some changes we made in our data-taking procedures or of secular trends in our sample of schools. We should be in a better position to evaluate the trend when our next two rounds of data are analyzed, but in the meantime we are glad that we had the foresight to include a set of control schools against which to evaluate the findings.

In acknowledgement of the wide variability among schools described in connection with the Time 1 data, we show the INI index values on a school-to-school basis in Figure 3. The diagram indicates that the general increase in values among experimental schools is not due to one or two deviant cases; non-trivial increases occurred in two-thirds of the schools which, in the intervening period, had established a unitized managerial structure. At the same time, though, several of the 15 schools remained relatively stable and two showed an actual decline in instructional interdependence in spite of the reformation of the managerial system. Clearly, the creation of managerial units, even though they be called "teams," does not guarantee a massive change in the school's work system in the direction of team teaching, at least not within a year's period. The case of the control school whose INI index rose from zero to .17, a level of change characteristic of the experimental schools, also is instructive. This school has moved toward a team form of instructional organi-

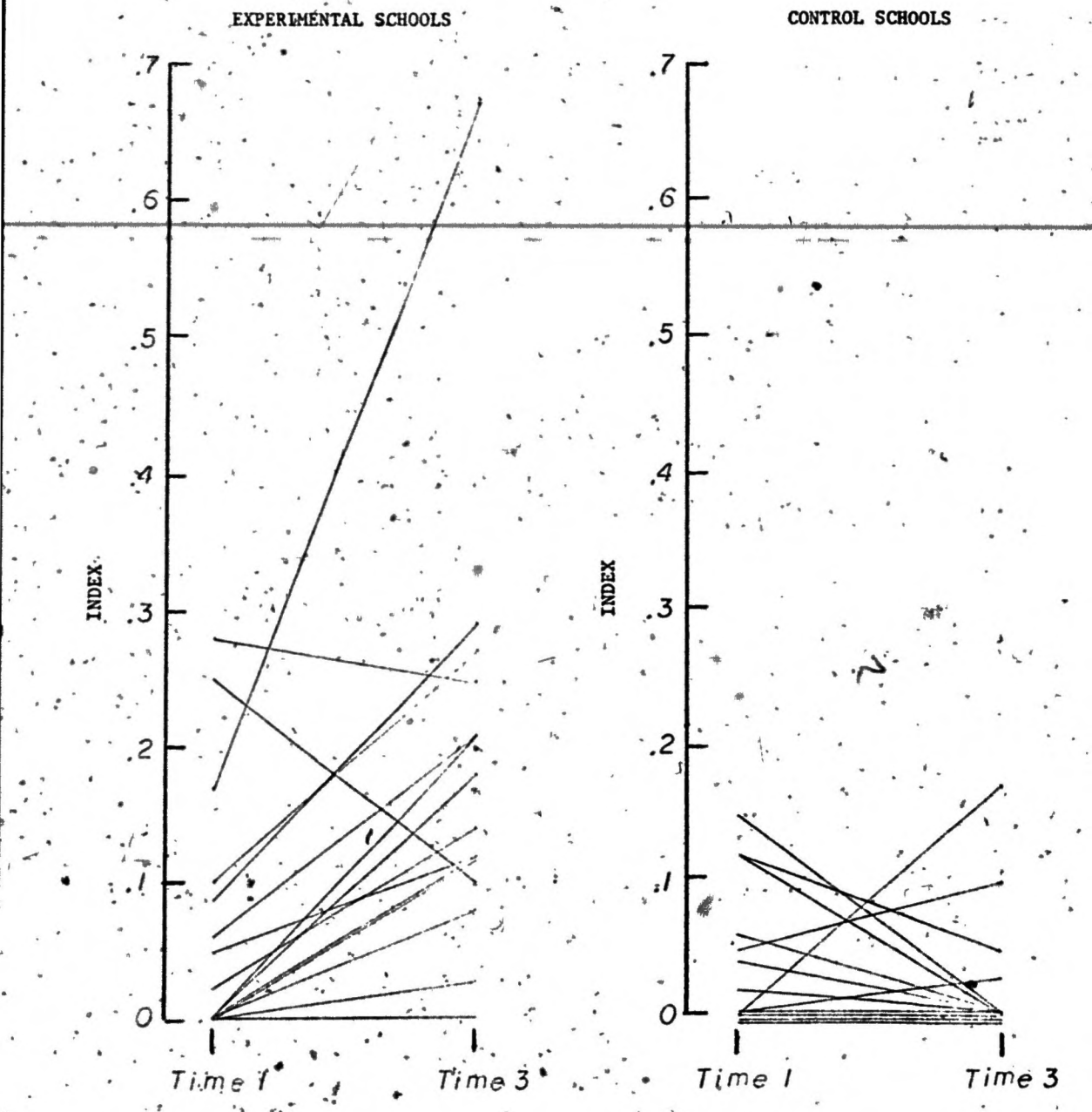

Fig. 3. Change in Instructional Interdependence Index for experimental and control schools.

zation while maintaining the conventional, undifferentiated management structure.

There is much more to the story of work system change than this, of course, but we wanted to emphasize the point that the two aspects of organization are not inextricably coupled.

We took a closer look inside each experimental school to inspect the new systems of task interdependence and to see what happened to the pre-existing ones. The embedded systems comprised of subject-matter specialists generally persisted without important modification through the three measurement periods. The upper grades of a few of the schools had been fully organized according to such a pattern at Time 1, with the consequence that the only place in the school that change could readily occur was among teachers of the lower grades.

In a number of instances the change involved creating systems out of whole cloth, so to speak. That is, teachers who had been self-contained the year before (or their replacements, if there had been personnel turnover) would form a system, typically a small one with a modest pattern of exchange in one or two subjects. A more common form of change, however, was the expansion of pre-existing emergent systems to incorporate additional teachers, sometimes the rest of the teachers at the grade level or in the new managerial unit. In this way the instructional organization had the appearance of the planned systems mentioned earlier, except that rarely were the particular patterns of organization consistent from system to system in the school, at least during the first year.

Our first quick insepction of the Time 2 data led us to believe that the organization of managerial units in the experimental schools had a strong effect on the shape of the systems of task interdependence. It was fairly common for the boundaries of a system to be coterminous with unit membership, and it was quite uncommon for teachers connected in the same system to be members of two different units. Subsequently, we have qualified our belief to a degree. The managerial units themselves tended to follow grade-level lines, especially in the larger schools, and it is possible that the coincidence of system and unit membership was the result of the force toward same-grade pupil exchanges. Where units of mixed-grade membership had been set up, often two (or more) small systems would be found within them, each confined to teachers of the same grade. Also, we observed a few cases where teachers in mixed-member units crossed unit boundaries in order to exchange pupils with other teachers of the same grade. There is no doubt that the force to exchange pupils along grade-level lines is a strong one, although there were enough instantes of cross-grade exchanges to indicate that the force can be overcome.

Our data demonstrate that it would be a serious mistake to assume that schools which have created formal units ipso facto have teachers who are into team teaching, even though the units be called teams and the school referred to as team organized by the local inhabitants. There were numerous cases of unit members who stood apart from the systems of task interdependence arising among their colleagues, and, in a given school, we would find one unit with a fully connected set of interdependence relations and the next unit totally devoid of them. Many of the systems of interdependence, even instructional interdependence, fell considerably short of bona fide team teaching, if

we mean by that the joint instruction of an entire class of pupils in a major share of the curricular areas. With only a few exceptions, instructional interdependence entailed joint instruction of a selected subset of pupils in only a single subject.

Conclusion

Perhaps enough has been said to demonstrate the wisdom of studying the condition of schools before the adoption of an innovation as carefully as one studies the innovation after it has been installed. Apart from the obvious advantage of establishing the base from which change proceeds, investigation of the school's pre-change state can help us shed simplistic stereotypes in favor of realistic views of the variegated nature of schools. It can help us understand the indigenous forces working for and against a particular innovation and in this way prove of diagnostic value to those who would promote and plan change.

We have found it unusually instructive, too, to follow the fate of our control schools through time--schools in which nothing was supposed to be happening. While we have not dwelled on the matter in this paper, we have been struck by the amount of ebb and flow of the schools on a number of our measures. The fact is, of course, that all sorts of things are happening all the time in ordinary schools; they just are not dignified with the label of planned change. A principal nears retirement and an assistant principal assumes the real power in a school; a textbook controversy flares in West Virginia and some teachers in nearby schools cut down or stop teaching anything likely to be called social studies; the high school moves out of an old twelve-grade building into new quarters and the elementary teachers find themselves with space to spare and

a totally different social environment. Few of our control schools are in a state of encapsulation, and it seems important to us to take account of the marked shifts that occur naturally in schools in order better to appreciate the changes that occur under the press of innovation.

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