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ABSTRACT

Research identifying potential influences on teachers' decisions about the content of instruction is described. Selected findings are presented in order to show the value of three approaches to analyzing content variation and its determinants in elementary school mathematics: (1) content analysis of the mathematics presented or advocated by instructional materials, teachers, and other persons: (2) teacher perceptions of how they would choose content in hypothetical situations: and (3) documentation of the mathematical content covered in selected classrooms, together with analysis of the pressures and incentives impinging on these classrooms. (Authors/JD)

Research Series No. 24

# TEACHER AUTONOMY AND THE CONTROL OF CONTENT TAUGHT

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# INSTITUTE FOR RESEARCH ON TEACHING

Teachers' thoughts and decisions are the focus of studies currently under way at Michigan State University's Institute for Research on Teaching (IRT). The IRT was founded in April 1976 with a $3.6 million grant from the National Institute of Education. That grant has since been renewed, extending IRT's work through September 1981. Funding is also received from other agencies and foundations. The Institute has major projects investigating teacher decision-making, including studies of reading diagnosis and remediation, classroom management strategies, instruction in the areas of language arts, reading, and mathematics, teacher education, teacher planning, effects of external pressures on teachers' decisions, socio-cultural factors, and teachers' perceptions of student affect. Researchers from many different disciplines cooperate in IRT research. In addition, public school teachers work at IRT as half-time collaborators in research, helping to design and plan studies, collect data, and analyze results. The Institute publishes research reports, conference proceedings, occasional papers, and a free quarterly newsletter for practitioners. For more information or to be placed on the IRT mailing list please write to : The IRT Editor, 252 Erickson, MSU, East Lansing, Michigan 48824.



(Lee S. Shulman, co-director with Judith E. Lanier from 1976-1978, and director in 1979, is on a one-year leave at the Center for Advanced Study in the Behavioral Sciences, Stanford, California.)

## Abstract

Teachers' decisions about the content of instruction are at least as important determinants of student achievement as are teachers' choices of instructional strategies. Earlier research on teaching recognized this distinction only to the extent that it concentrated on method and neglected content. In identifying potential influences on teachers' decisions about the content of instruction, both dissemination and accountability pressures are taken into account. The former places attention on face-to-face communication and the influence of others' expertise while the latter reflects organizational considerations. A program of research is summarized and selected findings are presented in order to show the value of three approaches to analyzing content variation and its determinants in elementary school mathematics: (1) content analysis of the mathematics presented or advocated by instructional materials, teachers, and other persons,(2) teacher perceptions of how they would chose content in hypothetical situations, and(3) documentation of the mathematical content covered in selected classrooms, together with analysis of the pressures and incentives impinging on these classrooms. This research allows for viewing teachers as rational decision makers who think for themselves about what should be taught, but who also consider external pressures in their calculations of the benefits and costs of content decisions.

Teacher Autonomy and the Control of Content Taught

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Despite increased interest in research on teacher decision making (e.g., Anderson, 1977; Shavelson, 1976; Shavelson, Cadwell, & Isu, 1977; Shulman & Elstein, 1975), none of the published studies in this area deal with factors which influence teacher decisions concerning content to be taught. These influencing factors and subsequent teacher decisions regarding content of instruction are the focus of our research. This research is an effort to bring together three lines of inquiry, heretofore distinct: research on teacher decision making in general, research on the teaching of subject-matter specialties (e.g., mathematics), and research on school governance.

## Variation in Content, Variation in Achievement

Our interest in the content of instruction is based on several beliefs.

First, there are certain subjects which most students learn only if taught. Students who study science extensively in secondary schools, for example, are far more knowledgeable about science than those who do not (Comber & Keeves, 1973).

Second, even within a subject matter area and grade level, students vary in the content to which they are exposed. Recent trends toward individualization of instruction (different objectives for different

[1]The authors of this report are members of IRT's Content Determinants Project with the first author serving as project coordinator. Other members of the project staff are Gabriella Belli, Gordon Robinson, and Suwatana Sookpokakit. The editorial assistance of Linda Shalaway is gratefully acknowledged.

children), out-of-grade-level testing, and the criticism of norm-referenced tests[2] all signify a recognition of variance in instructional content directed at students, even within the same classroom.

Third, we believe that educators--practitioners and researchers alike--have not given sufficient attention to the content of instruction and its potential for explaining achievement. The distinction between content and method is commonly made in teaching practice, but research on teaching has recognized this distinction only to the extent that it has concentrated on method and neglected content. The particular concerns of subject-matter specialists (such as mathematics educators) have been poorly reflected in general research on teaching. Similarly, teacher education has given far more attention to delivery skills and classroom management skills than to methods for selecting the content of instruction appropriate for a particular student. This imbalance, we fear, may result in teachers who are more interested in *how* something should be taught than in *what* should be taught.

The few recent studies that have focused on content of instruction (e.g., Walker & Schaffarzick, 1974) support the notion that selection of content is at least as important as selection of teaching strategies and that when content varies, students learn what they are taught. With evidence that variation in content covered causes variation in achievement, it becomes important to find out what causes content variations in the first place.

## Social and Political Implications of Content

The question of how content is determined at the level of *individual* classrooms or schools should be of major interest to

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[2]Norm-referenced tests are defined as those which assess the individual's performance relative to other individuals or to a group average.

virtually all persons with a stake in schooling. Nevertheless, although various reviews and studies are witness to the number and importance of attempts to change the content of what is taught in schools (e.g., Boyd, 1978; Berman & McLaughlin, Note 1; Cremin, 1964; House, 1974; Kirst & Walker, 1971; Kliebard, Note 2; Krug, 1969; NCTM Yearbook, 1970; and Nelkin, 1976), these same works have little to say about how content is determined, within school districts, at the level of individual classrooms or schools.

Political scientists and sociologists, in particular, should be interested in how variation in curriculum content relates to the distribution of power and authority in society. Thus far, however, political scientists have largely confined their interests in education to general questions of school governance, and sociologists have generally failed to link content to social relations and organization within schools. (The latter criticism is expressed strongly by Young, 1971.)

Understanding what teachers teach and how they decide what to teach will help educators understand more fully why students differ in what they learn. With increased public interest in student achievement, this understanding is crucial. In addition, the question of who or what controls content decisions should be of particular interest to groups (e.g., minorities) who feel that their children are not getting the kind of education they should have.

## Dissemination Versus Accountability in the Control of Content

It is dangerous to think too narrowly about the factors influencing content decisions. In attempting to identify the parties involved in choice of content and the variables by which they exercise influence, we have considered two primary means of influencing teachers: (1) per-

suading them to voluntarily adopt certain content, and (2) regulating and enforcing content through hierarchical controls.

Persuading teachers to adopt content is characteristic of curriculum reform movements which attempt to influence teachers as individuals rather than to persuade large organizations (such as whole districts) to adopt and enforce a reform . In such a case, the choice of curriculum content can be seen as a problem in knowledge dissemination, that is, a process of changing the teacher's knowledge and valuation of a particular subject matter in such a way that the "converted" teacher will be inspired to teach the content in question. The curriculum reform may thus consist largely of inservice education, plus development of instructional materials that place at teachers' disposal the point of view to be disseminated.

In contrast, the accountability movements of the 1970s view teachers not as autonomous decision makers but as agents of public school policy makers, agents subject to hierarchical controls. Curriculum decisions, from this perspective, are a subset of school governance decisions, that is, authoritative decisions made by school officials and carried out in accordance with officially prescribed procedures (see Van Geel, 1976). In the area of mathematics, for example, 83% of the respondents in a recent survey of second- and fifth-grade teachers reported that either state, local district, or both had published instructional objectives for mathematics, while 77% said they were subject to state or local assessment (Price, Kelly, & Kelly, 1977).

Teacher autonomy is one issue at hand here. Within the *dissemination perspective*, teachers are viewed as specialists and authorities, while the *accountability perspective* taken by many administrators views teachers as "employees owing obedience" (Corwin, 1970). The differences between the two perspectives are illustrated in the sociological literature. Bidwell (1965), Lortie (1969), Corwin (1970), and

Dreeben (1970, 1972), among others, have analyzed the tension existing within the role of a teacher who is at once the agent of a formal organization, an aspiring professional who is at least potentially subject to collegial control, and a person with considerable de facto autonomy in the classroom. Corwin (1970), in reporting on a survey of teacher militancy in Ohio and adjacent states, contends that most teachers want more control over their work, whereas administrators call for more accountability. The latter, Corwin writes, "do not subscribe to, nor even comprehend, the pretensions of teachers as specialists and authorities, and therefore do not envisage teachers as anything other than employees owing obedience."[3]

Even though the accountability and dissemination perspectives imply differing perceptions of teacher autonomy, they are inextricably linked. Consider the following example: subject matter associations, universities, and textbook publishers might be viewed as primarily involved in knowledge dissemination, but legal requirements are rarely absent from their concerns. Once a state, or even a large school district, has taken an official position on subject matter content, the subject matter associations, nearby universities, and publishers are more or less obliged to take this position into account. Textbook publishers, for example, adapt their texts to the positions taken by large textbook adoption states, such as Texas. At the same time, persons who propose new schemes of accountability take a large risk when ignoring teachers' dispositions toward the subject matter to

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[3]Dreeben (1970), however, reports that teachers favor certain types of supervision by principals. The control of content is not specifically discussed.

be taught. Teachers may ignore those requirements they think to be unsound.

We make this distinction between dissemination and accountability to broaden our research focus. Accountability makes us sensitive to organizational considerations, that is, to the rules by which content choices are made as well as the rewards and sanctions which determine the extent to which these choices are enforced. The dissemination perspective encourages us to give more attention to face-to-face communication and to the influence of others' expertise in determining choice of content.

## Defining Content

Before we could begin to study the factors influencing content of instruction, we had to develop a valid means for describing content. Content as we define it can include the full range of intended educational outcomes -- cognitive, social, psychomotor, and affective. This definition thus allows for such things as developing a positive attitude toward a subject and for the ability to use a particular heuristic in problem solving.

Also, we wanted to consider variance in content within a particular subject matter. Our goal is to be able to describe content at a level of detail such that the basic unit of content is the most specific, discrete unit that teachers use in allocating time for instruction. We selected fourth-grade mathematics as the initial context for our investigations. There are several reasons for this choice. First, mathematics is generally considered a basic skill that all children in elementary school should study. Second, it seems to be a subject that

is primarily learned in school, and we are interested in studying school learning. Third, mathematics is a subject for which precise and careful descriptions of content variation are possible. The focus of fourth grade allows for substantial variance in what might be taught, both because of the range of topics which might be offered to students who are progressing at an average rate and because of the need to vary topics in response to differences in student readiness. We recognize that our findings may be subject and grade level specific, and we will explore the nature of differences among subjects and grades if the initial results warrant futher work.

Our definition of content distinguishes between content covered and content emphasized. Content covered is conceived of as a series of dichotomous variables indicating whether or not a particular topic is included in a given lesson, textbook, or test. Content emphasis, in contrast, is thought of as a measure of content coverage; for example, the amount of time in a given lesson, the number of pages in a textbook, or the number of items on a test that focus on a given topic. Content emphasis is roughly equivalent to Wiley and Harnischfeger's (1974) concept of allocated time or Buchanan and Milazzo's (Note 3) concept of content density.

We make the distinction between content covered and content emphasized to discriminate between content (what is taught) and instructional strategy (how something is taught). Since differences in content emphasis are correlated with differences in strategy (such as the amount of drill and practice and the dispersion of content across lessons), it is difficult to interpret observed relations between emphasis and achievement (such as Buchanan & Milazzo, Note 3; Grosser, Note 4; Wiley & Harnischfeger, 1974). It cannot be determined from such relationships whether inclusion of a

topic -- independent of strategy -- would be sufficient to promote learning among students of a given ability.

Our definition of content also takes into account the notion that what is taught cannot be inferred from what is learned. Student learning is dependent on many variables in addition to content covered, such as instructional strategy, student motivation, student aptitude, and student knowledge prior to instruction.

Finally, it is necessary to recognize that consensus cannot be assumed in distinguishing content from non-content in classroom instruction and instructional materials. For example, a teacher may conduct a lesson in which the intended outcome is increased skill in single-digit addition. The lesson may have other aspects which could be considered content, such as practice with listening and speaking skills and appropriate behavior toward the peer group. The aspects of the lesson considered to be content depend on the person asked. We must, therefore, identify the parties who make judgments about content and non-content. The teacher has the most direct control over what is taught in the classroom; for this reason, we are mainly concerned with content as defined by the teacher.

## The Study of How Content Decisions Are Made

We are using three approaches to analyze content variation and identify its determinants:

1. Conducting a content analysis of the mathematics presented or advocated by instructional materials, teachers, and other persons;

2. Investigating teacher perceptions of how they would choose content in hypothetical situations; and

3. Observing the pressures and incentives present in naturally occurring school settings, noting the content presented, and inferring how this choice of content has been affected by the observed pressures and incentives.

The content analyses (the first approach) provide descriptions of curricula implied by various instructional materials. In other words, these materials can be thought of as calls for content to which teachers may respond in varying degrees. Since instructional settings include many materials, some mandated and some optional, analyzing similarities and differences in the content of these materials is an important step toward understanding the content decisions that a teacher must make.

A policy-capturing approach (the second approach) to the study of teachers' perceptions, makes it possible to study the effects of pressures independently of each other and to increase the pressures to a level that may not currently exist but which is nonetheless feasible.

The advantage of the natural variation approach (the third approach), in contrast, is that it involves direct observation of behavior rather than reliance on perceptions. The disadvantage is that pressures covary, making it difficult to study their independent effects. The following discussion of our use of the three approaches illustrates their respective advantages and disadvantages.

## Tests, Textbooks, and Teachers as Sources of Variation in Elementary School Mathematics

In anticipation of our proposed studies of natural variation, our work has focused on building measures of the content of instruction. The content of elementary school mathematics is not an entity in itself. Instead it can be defined from each of several different perspectives (e.g., teacher, student, researcher). These perspectives need not be in agreement with each other, and indeed our research to date has already documented numerous differences among them.

Thus far our attempts to measure content have focused on content analysis of tests and textbooks and on interviews with teachers.

Content analysis of tests. An analysis of individual items on four commonly used standardized tests of fourth-grade mathematics resulted in a classification matrix for describing their content. The matrix has since been revised and expanded to facilitate content analysis of elementary school mathematics textbooks as well (Kuhs, Schmidt, Porter, Floden, Freeman, & Schwille, Note 5). There are three dimensions to the matrix: (1) general intent (conceptual understanding, skill development, applications), (2) nature of material (the type of numbers or mathematical terms used and (3) operation (the cognitive process which is required). The ersection of these three dimensions results in a classification matrix of 1,260 cells, where each cell represents a topic that a teacher may elect to cover or not to cover.

To date, four standardized tests have been classified according to the taxonomy: the Stanford Achievement Tests, Iowa Tests of Basic Skills, Comprehensive Tests of Basic Skills, and the Metropolitan Achievement Tests. Analysis of the results of these content analyses suggests that the four tests are not only strikingly different in certain respects, but also surprisingly similar in others (Porter, Schmidt, Floden, & Freeman, 1978). For example, despite the fact that fourth-grade textbooks include numerous exercises that treat the process of division with remainders, no more than 2% of the items on each of these tests assess this important skill. A striking difference among tests is that the Stanford and Metropolitan contain two to three times as many problems involving number and algebraic sentences as do the other tests analyzed. Such differences suggest that the implied curricula of standardized tests of fourth-grade mathematics vary considerably.

Content analysis of textbooks. The same classification matrix has been used to provide content descriptions of three widely-used textbooks of fourth-grade mathematics: Mathematics in Our World (Addison-Wesley, 1978), Mathematics (Houghton-Mifflin, 1978). Mathematics Around Us (Scott-Foresman, 1978). These three textbooks are similar in format and organization. Lessons identified in each book include three distinct components: (1) a stated objective, (2) an instructional activity directed by the teacher, and (3) student exercises. We elected to focus solely on the student exercises since the results of the NACOME survey (Note 6) suggested that the majority of teachers rely primarily on this segment of a textbook.

Some have claimed that, in elementary school mathematics, there is a national curriculum defined by the textbooks. This claim appears true, but only at a fairly high level of generality. All textbooks include material on addition, subtraction, multiplication, division, and measurement. But more fine-grained analyses of textbooks, however, have revealed rather substantial diversity in their content (Porter, Kuhs, & Freeman, Note 7). For the three fourth-grade mathematics textbooks analyzed, it was found that they collectively covered 293 specific topics. Of these topics, 56% were covered by only one textbook, 21% were covered by two of the three, and only 24% were covered in all three textbooks. If a further requirement that the topic be represented by at least as many exercises as are found in a typical lesson is added, the percent of topics common to all three textbooks dropped to 7%.

One of the most striking differences in content was the distribution of exercises across conceptual understanding, skills, and applications. The Scott-Foresman text contained twice as many exercises on conceptual understanding and 15% fewer exercises on skills than did the other two textbooks. Scott-Foresman also contained more application

oriented exercises (13%) than did the other two texts (i.e., Addison-Wesley, 10% and Houghton-Mifflin, 6%). Other notable areas of difference in content coverage among texts were measurement, geometry, and estimation. The texts were most similar in the area of basic computational skills with whole numbers.

Since the classification matrix for all four tests and three textbooks was the same, a comparison of their implied curricula is possible. When each textbook was compared with each test, the textbook that covered the highest percentage of topics on each test was the Scott-Foresman. The percentages of test topics covered by this book ranged from a high of 71% for the Metropolitan to a low of 52% for the Stanford. On the negative side, the worst overall match was between Addison-Wesley and the Stanford (47%).

If a teacher is committed to a textbook and wishes to select the test with the best match, however, the test of choice depends on the textbook used. For Houghton-Mifflin, the Iowa test provides the best match, but the Metropolitan test is a close competitor. For Scott-Foresman, the clear choice is the Metropolitan. If one is using the Addison-Wesley, the Metropolitan is best. Regardless of textbook, the Stanford Achievement Test provides a noticeably poorer match than any of the other four tests. In the sense of our content analyses, there is not a national curriculum for elementary school mathematics and, futher, materials differ in ways that make content a relevent criterion fo selection.

Interviews with teachers. Standardized tests are frequently criticized for not taking into account aspects of mathematics (or other subjects) that one would want children to learn. Similarly, the criticism of teachers for blindly following textbooks implies that

textbooks fail to adequately capture the content of mathematics. Reflection on these criticisms leads us to ask how much and in what ways the conceptions teachers have of content differ from the content of tests and textbooks. How likely are teachers to supplement tests and textbooks with content that critics would consider more adequate?

This question is addressed in a study based on 20 in-depth interviews with teachers in one school district. The interviews ranged from one to four hours, with most lasting about two hours. The main purpose was to obtain as complete a statement about the content of elementary school mathematics as possible. Teachers were asked what they hoped students in their class would learn and then each of the topics and aspects mentioned was probed for clarification and elaboration.

While analyses of the interview data will continue as new research questions are identified, much has been learned already. Even within the single school district studied, teachers varied considerably in how they described the content of mathematics, whether it was the content taught in their classrooms or the content implied by various external sources. Although some of these differences appear to derive from the belief that different content is appropriate to different students, others do not. The following examples serve to illustrate these variations in descriptions of content:

1. Several teachers made even more fine-grained distinctions in content than are reflected by the 1,260 cells of our classification matrix. Most of these distinctions are in the area of computational skills as opposed to conceptual understanding or applications. One such computational distinction is between borrowing from zero and not borrowing from zero in

subtraction.

2. While *concepts* and *understanding* were frequently mentioned as the desired outcome of instruction, teachers evidenced considerable variance in what they mean by these two terms.
3. The same student exercise was sometimes justified in terms of different desired outcomes. For example, some teachers provide instruction on numeration in different bases to promote an understanding of place value while other teachers use this instruction to provide a new kind of practice in computational skills.
4. When asked about district tests and objectives as external sources of content, some teachers provided fairly detailed analyses while others candidly stated that they had but vague notions of the mathematical content of these tests and objectives.

The analyses of these interviews constitute an important step toward categorizing the conceptions teachers have of elementary school mathematics in a way that will be useful for our further research on factors influencing the content of instruction. Eventually, we will not only be able to compare the conceptions of teachers with the content of tests and textbooks, but we will also be able to investigate how the teacher's conception mediates or interacts with the influence of external factors on the content covered in the classroom.

Initial Policy-Capturing Study

Our first comprehensive study of external factors investigated teacher perceptions of the effects of six sources of pressure to alter

the content of fourth-grade mathematics (Floden, Porter, Schmidt, Freeman, & Schwille, Note 8). This study was designed as a model and a pilot for several closely-related studies we plan to conduct in the future.

Method. Our approach, used in other research on human judgment, was to construct written descriptions (vignettes) of hypothetical schools. By systematically varying the presence or absence of six factors (called cues) under investigation, 63 vignettes were created. (No vignette could be written to represent the absence of all pressures.) The cues, or external factors under consideration, included (1) pressure from parents, (2) pressure from upper-grade teachers, (3) pressure from the school principal, (4) district instructional objectives, (5) textbooks supplied to the teacher, and (6) standardized test results reported in the local newspaper by building and grade level.

Each vignette described a particular combination of pressures. In each case, the pressure advocated the addition of five new topics, and provided no support for the teaching of five topics that the teacher had orinarily covered. The pressures were always consistent in a vignette; that is, if a test and the principal each suggested five new topics, the topics suggested were identical. With each hypothetical situation, teachers were asked if they would teach the five new topics and whether or not they would continue to teach the five old topics (i.e., the topics not supported by each of the sources of pressure). The two questions were asked both for topics which are usually covered in fourth-grade mathematics and for topics seldom taught in elementary school. The teacher responded to the questions on a seven-point Likert-type scale, on which "1" was "virtually certain to teach these topics" and "7" was "virtually certain not to teach these topics."

The 66 participating teachers were recruited from five Michigan metropolitan areas. Their number of years of teaching experience ranged from one to 42 with a mean of 12. Teachers were, within location, assigned alternately (by order of seating) to one or the other half of the $2^6$ design. For each half-replicate the vignettes were randomly divided between two sessions, one week apart. Each teacher was presented with the vignettes in a different random order but with the restriction that they all respond to the same vignettes during a given session. Background data (in the form of questionnaires) were also collected from teachers about themselves and their school.

Teacher responses. Perhaps the most striking aspect of the teachers' responses to the vignettes was their reported willingness to change their instructional content, whatever the source of pressure for change. When asked about topics usually covered in fourth grade (core topics), even single pressure vignettes yielded average responses from a low of 1.67 for objectives to a high of 2.73 for parents (where 2 represents "fairly certain to teach these topics"). Teachers reported that they were somewhat less likely to add topics that are seldom taught in elementary school (peripheral topics). Average responses for single pressure vignettes ranged from 2.27 for objectives to 3.73 for the textbook. For both core and peripheral topics the most powerful pressures were tests and objectives, and the weakest pressure was the textbook.

As we expected, the greater the number of pressures, the more teachers reported they would change. More interesting, however, is the fact that increases in pressure produced increases in reported probability of change, even after the press for change was substantial.

That is, rather than reaching a maximum after two or three pressures, the reported likelihood of change increased when the number of pressures shifted from three to five.

Regarding the question about continuing to teach the old topics, the most significant result is that teachers do not seem to consider the new topics as necessarily supplanting the old ones. On the average, teachers were more than "fairly certain" to add five new topics, yet they still indicated that they would continue to teach all that they had been teaching as well. An examination of the main effects for continuing to teach old topics, given different pressures for change, repeats the results observed for questions about adding new topics. That is, tests and objectives were the strongest pressures, and textbooks were the weakest.

## Case Studies of Content and Its Determinants in Seven Classrooms

Our first study of natural variation in how content decisions are made is a pilot study of a few classrooms. This study allows us to make further progress on a number of problems which have emerged during our research. In particular, it includes (1) a methodological study of the best way to document the content of instruction actually covered in the classroom, (2) a measurement study to operationalize the teacher's conceptions of mathematics, (3) a comparison of the actual content of instruction with the implied content of textbooks, tests, and objectives, (4) an analysis of the reasons given for choice of textbooks, tests, and choices within textbooks (Schwille, Porter, & Gant, Note 9), (5) an exploration of the teacher's perception of and response to content messages from outside the classroom, and (6) an investigation of the organizational and interpersonal network through which the content messages are transmitted to the teacher.

Participating classrooms, schools, and districts. Seven classrooms (grades 3-5) in six schools covering three districts are participating in this study. In two of the three districts, the elementary mathematics curriculum is more or less centralized. In the third district, buildings enjoy extensive curricular autonomy. One of the centralized districts is in an urban center while the other two districts each serve a small town plus the surrounding area. The reason for having two small-town districts, one centralized and one decentralized, is to avoid some of the confounding that would otherwise exist between centralization and other district variables.

In each district, two schools were selected in order to provide a contrast between schools in which teachers are somewhat isolated in self-contained classrooms and schools in which they are not. Teacher isolation has been defined in terms of (1) opportunities for teachers to observe or otherwise interact professionally with other teachers in the building (as in team teaching) and (2) opportunities for staff members other than teachers to be present in the classroom. One hypothesis, suggested to us by Elizabeth Cohen (personal communication), is that collaboration among teachers increases resistance to certain pressures.

Data gathering. In a first attempt to measure teacher's conceptions, each of the seven teachers was interviewed before school opened to find out what each planned to teach in mathematics, together with the importance attributed to each topic mentioned. Throughout the year the content of the mathematics instruction in each classroom is being measured, both as perceived by the teacher and as perceived by the research team. Teacher logs and classroom observation are two of the methods being used for this purpose. In addition, the classification

matrix discussed above is to be the basis for an analysis of the textbook, tests, and school (or district) objectives used in each classroom. Finally, a continuing series of interviews is taking place with persons involved in content decisions (e.g., district curriculum directors, principals, teachers in the selected classrooms, and other teachers). All these data will be analyzed to provide a detailed description of each classroom and teacher, delineating the teacher's intended content of instruction, the actual content, the teacher's conception of mathematics, and external factors impinging on the classroom (as perceived by both the teacher and the researchers).

## The Implications of Viewing Teachers as Political Brokers

The classic contrast between the teacher as an autonomous professional and the teacher as the agent of a bureaucracy leads to a dilemma in teacher education. Shall the teacher be prepared to make content decisions on the basis of his or her own expertise, or shall the teacher be trained to follow content decisions made by others? Viewing the teacher as a political broker offers a way of reconciling these two sides of teaching. From this point of view, teachers are thought to have enough discretion about their teaching to be influenced by their own beliefs of what schooling ought to be. This view is consistent with what has come to be called the loosely-coupled nature of schools (Bidwell, 1965; Lortie, 1969; Weick, 1976; March, 1978). But teachers also choose (or are constrained to choose) to follow certain pressures from without. The pressures they follow may be consistent or inconsistent with their own ideas of what schooling ought to be. Viewing the teacher as a political broker is one way to allow for

autonomy *within limits* at the operating level of educational organizations: the teacher is seen as a rational decision maker who allows for external pressures in his or her calculations of benefits and costs.

The aim of our research is to see to what extent this view of teachers is consistent with reality (Schwille, Porter, & Gant, Note 10). Our hope is that the findings of this research will help our audience judge what changes are needed to reconcile control in the public interest with the autonomous exercise of informed teacher judgment.

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