This work is sponsored in part by the Institute for Research on Teaching, College of Education, Michigan State University. The Institute for Research on Teaching is funded primarily by the Office of Educational Research and Improvement, United States Department of Education. The opinions expressed in this publication do not necessarily reflect the position, policy, or endorsement of the Office or the Department. (Contract No. 400-81-0014)
Institute for Research on Teaching

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Co-Directors: Jere E. Brophy and Andrew C. Porter

Associate Directors: Judith E. Lanier and Richard S. Prawat

Editorial Staff
Editor: Sandra Gross
Assistant Editor: Sally B. Pratt
Abstract

Using elementary school mathematics as the context for study, a program of IRT research reveals teachers as political brokers in the process of content determination. Empirical findings and new theoretical constructions from that work are summarized.

The content of instruction is specified by determining (a) how much time to allocate to a subject, (b) what topics to cover, (c) with which students, (d) when and in what order, and (e) to what standards of achievement. These five decisions served as the dependent variables for empirical investigations of how school policies, teachers' content repertoires, and other factors (e.g., students, parents, other teachers, school administrators) interact in the process of determining what is taught.

School policies bearing on the content of elementary school mathematics were found to be weak and fragmented relative to what is possible. Nevertheless these relatively weak policies had surprisingly strong effects upon teacher content practices, gaining their strength through persuasion. Policy compliance was rarely tied to rewards or sanctions. The paradox is explained by a general lack of attention given to content and by teachers' understandable reluctance to take full responsibility for deciding what is the most appropriate content for their students.

The general neglect for content deliberations has resulted in an elementary school curriculum badly out of balance. Heavy emphasis upon computational skills leaves little room for coverage of concepts and applications. Large numbers of topics are just touched on in instruction. Students are rarely, if ever, asked to formulate a problem for themselves. The research points toward policy-oriented solutions to these problems.
CONTENT DETERMINANTS

Andrew C. Porter, Robert E. Floden, Donald J. Freeman,
William H. Schmidt, and John R. Schwille

Teachers determine what is taught in school. They create opportunities for students to learn the knowledge, skills, and dispositions that influence future productivity in school and in the social and vocational worlds beyond school. Teachers influence this effect by deciding what content to teach and by implementing strategies to engage students in that content.

This proposition has served as the central hypothesis for a line of research undertaken at the Institute for Research on Teaching (IRT). This paper summarizes what has been accomplished from those inquiries. New theoretical constructions have evolved to support analyses of school content and the methods used to determine school content. These constructions and their empirical bases have proven to be powerful mechanisms to understand practice and the ways it might be improved. The constructions also serve to elevate the importance of content in research on teaching and research on educational policy.

Starting With Content

Distinguishing between the content (what is taught) and the strategy (how content is taught) of instruction ensures consideration of each (Freeman,

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1Andrew Porter is coordinator of the Content Determinants Project and a professor in the Department of Counseling, Educational Psychology and Special Education at Michigan State University. Robert Floden, Donald Freeman, William Schmidt, and John Schwille are senior researchers with the project. Floden, Freeman, and Schwille are professors in the Department of Teacher Education at MSU and Schmidt is a professor in the Department of Counseling, Educational Psychology and Special Education.

The authors were permanent members of the project whose work is summarized here. The contributions of those who were with the group for shorter periods of time are gratefully acknowledged: Linda Alford, Gabriella Belli, Zane Berge, Michael Gant, Susan Irwin, Frank Jenkins, Lucy Knappen, Therese Kuhs, and Janet Vredevoogd.
1978). Only if instruction centers on important content does it have potential for being worthwhile. Yet, until recently, most researchers have taken content for granted, focusing their attention on methods instead (Schwille, Porter, & Gant, 1979; Schwille et al., 1979). Hesitancy to confront issues of what should be taught is understandable. Value judgments are required that cannot have their justification in empirical fact.

Distinguishing content from strategy elevates the importance of content and raises new questions. A framework which clarifies the distinction between content and strategy has evolved from IRT research. Teachers determine (a) how much time is allocated to a subject, such as mathematics, over the course of a school year, (b) what topics are taught, (c) to which students, (d) when and in what order each topic is taught, and (e) to what standards of achievement (Schwille et al., 1982). Collectively, these five decisions determine student opportunity to learn, a major influence on student achievement (e.g., Barr, Dreeben & Wiratchi, 1983; Carroll, 1963). They specify areas of content decision making for teachers, separate from decisions about strategy. They suggest a series of questions that teachers, policymakers and consumers of education can use to monitor the content of schooling. They form the dependent variables in IRT research on teacher content decision making.

Understanding content also requires operational definitions of topics within a content area. Elementary school mathematics serves as the focus for IRT research on content decision making. Mathematics is a basic skill learned primarily in school. Because of the many important mathematics topics and the limited amount of school time allotted for them, decisions about what content to include in the curriculum are crucial. Nevertheless, elementary school mathematics provides a conservative test of the importance of teachers' content decisions because most people believe the content to be fairly standard (e.g., fourth graders study multiplication).
A three-dimensional taxonomy to describe the content of elementary school mathematics provides definitions of topics that may or may not be studied in elementary school (Kuhs et al., 1979). The three dimensions of the taxonomy describe general intent (e.g., conceptual understanding, skills, applications), the nature of material presented to students (e.g., fractions, decimals), and the operation the students must perform (e.g., estimate, multiply). The terminology and specificity of the taxonomy are based largely on an interview study of content distinctions made by elementary school teachers (Schmidt, Porter, Floden, Freeman, & Schwille, in press). Specific topics are represented by the intersections of these three dimensions (e.g., story problems involving addition of fractions, basic multiplication facts, understanding the relationship between multiplication and division). More general topics are addressed by the marginals of the taxonomy (e.g., emphasis given to conceptual understanding). Because topics can be defined at different levels of specificity, because the taxonomy has a structure which makes clear both what is taught and what is not taught, and because the distinctions made reflect ways in which teachers think and talk about their mathematics instruction, the taxonomy, when coupled with the other four attributes of content decision making, provides a language to support deliberations about content by practitioners, policymakers, and researchers (e.g., Freeman, Kuhs, Knappen, & Porter, 1982; Porter, 1983a).

The results from content analyses of instructional materials illustrate the power of this taxonomy of elementary school mathematics topics. Analyses of four commonly used fourth-grade textbooks and the five most commonly used nationally normed standardized tests of mathematics achievement (at the same grade) reveal that of the 385 topics covered by at least one of these published materials, only six topics are common to all nine. Among the textbooks, 19
topics define a core curriculum on which approximately half of the exercises in each book are focused, but the other parts of the books are idiosyncratic in their topic coverage (Freeman, Kuhs, et al., 1983). The image of a national curriculum in elementary school mathematics begins to fade, and the problems of curricular validity in educational assessment begin to emerge (Floden, Porter, Schmidt, & Freeman, 1980; Porter, Schmidt, Floden, & Freeman, 1978; Schmidt, Porter, Schwille, Floden, & Freeman, 1982; Schmidt, 1983).

The Role of the Teacher: Bounded Rationality

At least in elementary school mathematics, teachers serve as political brokers in the process of content determination (Lipsky, 1980; Schwille et al., 1982). Teachers have some discretion to follow their own convictions but they are subject to a variety of factors that bear on their content decisions. Decisions about academic content, however, are not always primary for teachers. Teachers often plan in terms of activities rather than content outcomes (Clark & Yinger, 1979); for many elementary school teachers, academic content takes second place to other goals of schooling, such as promoting good citizenship among students (Prawat & Nickerson, 1985).

In the absence of other advice, teachers are likely to follow their own repertoire and convictions. They will teach what they have taught before, what they feel comfortable with, and what they deem appropriate for their students. But teaching does not take place in a vacuum. Advice on what to teach comes from a variety of sources and in many different forms. Students and their parents can have direct and indirect effects on what is taught. Other teachers, the school principal, the district curriculum coordinator, a university professor all serve as potential sources of advice, as do materials and position statements from professional organizations. These interpersonal and organizational influences bear directly on teachers and operate in addition to
federal, state, district, and school policies. Mathematics objectives, testing programs, mandated textbooks, promotion policies, and time guidelines all address aspects of content decision making.

The teacher stands between the content messages from these various sources and the students to be taught. The effects of advice or prescription on what to teach are mediated by the teacher's own convictions about what should be taught. To have an effect on a teacher's content decisions, then, an external influence must either change the teacher's conception about what is most desirable (i.e., persuade the teacher) or override the teacher's beliefs, forcing the teacher to comply even though the request is not viewed as appropriate. Effects of both types have been found, although persuasion is clearly the dominant form (Schwille et al., 1986; Floden et al., 1986; Porter, 1983).

Sources of Influence

An Overview of Five Studies

Two early studies of teacher content decision making in elementary school mathematics led to increased attention on school policies (Floden, Porter, & Schwille, 1981; Schwille et al., 1982). In both of those studies school policies appeared to be among the strongest influences on what is taught, after the teacher's own convictions. Policy effects were not uniform, however, and the range of policies considered was limited. Based on that early work and previous analyses of educational policies (particularly Spady & Mitchell, 1979), a fourfold structure was hypothesized for explaining differences in policy strength.

Policies can vary in their prescriptiveness, consistency, authority, and power. Prescriptiveness refers to the extent and specificity of a policy in telling teachers what to do. A mandated textbook is less prescriptive than a
mandated textbook that teachers are instructed to follow closely, starting at
the beginning and carrying through to completion. Consistency refers to links
among policies, describing how policies can contradict or reinforce each
other. For example, a mandated textbook may be tied to mathematics objectives
through a guide that describes pages in the book on which material is found for
each objective. Policies can gain authority through appeal to law, social
norms, expert knowledge, or support from charismatic individuals. Rewards and
sanctions tied to policies give them power. Five studies have been completed,
each of which addresses a different aspect of teacher content decision making
in elementary school mathematics and all of which provide empirical tests of
the four-attribute structure for describing the strength of content policies.

The earliest study (1978) used policy-capturing methodology to investigate
the effects of six possible sources of advice on teachers' topic selection: a
district mandated textbook; objectives published by the district; tests with
results published by grade level and building in the local newspaper; advice
from the principal; advice from upper grade teachers; and advice from parents
(Floden et al., 1980). Sixty-six fourth-grade teachers were asked to imagin
they had transferred to a new school and were to teach a class of fourth
graders capable of fourth-grade work. They were then asked how likely they
would be to add five topics that they had not been teaching and how likely they
would be to drop five topics they had been teaching.

A second study (1979-1980) moved the work from the controlled setting of
simulations to the real world of classrooms. Seven third- through fifth-grade
teachers in six schools across three school districts were studied for a full
school year to determine the mathematics content they taught, the advice they
received concerning what should be taught, and the relationships between the
two. Content was described through daily teacher logs (collected weekly).
Advice was monitored through interviews (weekly), questionnaires, observations, analyses of district and state policies and practices, and by attending meetings with the teachers or district-level meetings at which mathematics content might be discussed. The findings from these first two studies led to the design and completion of a series of three studies focusing on the nature and effects of state- (1981), district- (1982), and school-level policies (1982-1985).

For the study of state policies, seven states were selected to represent variation in types of policies, overall strength of policies, and school populations served: California, Florida, Indiana, Michigan, New York, Ohio, and South Carolina (Schwille et al., 1986). For each state, a complete set of documents on relevant policies and practices was assembled (e.g., objectives, testing, textbooks, allocation of time, school evaluation, teacher qualifications and promotion of specific topics). Documents were identified and additional information collected through interviews with knowledgeable persons in each state (an average of eight persons per state).

In the second of the three studies, district policies, their relationships to state policies, and their perceived effects were studied in five of the seven states (Floden et al., 1986). Questionnaires were used to collect information from district mathematics coordinators, principals, and teachers using a probability-in-proportion-to-student-enrollment design for each state. Questionnaires asking about the nature of policies and their perceived effects were designed along the lines of the four-attribute structure to describe policy strength.

The third and final study once again brought the work back to the classroom. The effects of state-, district-, and school-level policies were examined for 32 fourth- and fifth-grade teachers in six Michigan school
districts (Porter, 1986). Teachers provided descriptions of their daily mathematics instruction during 1982-83, using teacher logs and weekly questionnaires for each of three target students (differing in perceived ability). Districts were selected to contrast types of content relevant policies; schools were selected to contrast student body socioeconomic status; teachers were selected to contrast grouping practices when teaching mathematics. Teachers were interviewed and completed questionnaires over a three-year period to provide information on their content decision making and on their understanding of school, district, and state policies and practices concerning mathematics content. District curriculum coordinators were also interviewed over the same three-year period and documents describing district policies and practices identified in those interviews were obtained so that shifts in district policy formulation over time could be monitored. Principals were interviewed at the time teacher logs were collected to determine school-level policies and practices and to understand how principals promote state and district policies and practices.

Weak Policies, Strong Effects

The five studies provide insight into the nature of content policymaking at the state, district, and school levels and the influences of those policies on teachers' practices. The picture that emerges is one of relatively weak and fragmented policies when judged against the attributes of prescriptiveness, consistency, authority, and power but also one of increasing policy activity over time. States, districts, and schools differ sharply in their approaches to content policy formulation. New York, South Carolina, Florida, and California have policies similar to the centralized national school systems of Europe; the policies specify what to teach and to what standards, although even
these states differ in the extent to which their policies appear to challenge
teacher practice. The policies of other states, such as Indiana and Ohio,
operate indirectly, imposing requirements on school districts without directly
telling teachers what to do. For example, Ohio has no state testing program,
but the state requires school districts to have their own testing programs.
Some states, such as Michigan, place great trust in local school districts and
the individual classroom teachers, avoiding prescriptions about what should be
taught and to what standards of achievement (although even Michigan has a
minimum objectives testing program that districts and teachers may look to for
guidance, Schwille et al., 1986).

Like states, districts also differ in the breadth and strength of their
content policies. A relationship, however, exists between state and district
policy practices; district policy formulation is more active in states which
are also active in content policy formulation. Districts tend to extend and
elaborate state policies rather than fill in areas in which states have not
been active (Freeman, 1983; Cohen, 1982).

At least in elementary school mathematics, policies tend to be only mildly
prescriptive; nor are they carefully constructed to be mutually reinforcing
(although neither do they contradict each other). Little evidence exists which
ties teacher compliance to rewards and sanctions, nor do teachers view this to
be the case. Rather, policies attempt to persuade and gain their strength
through appeals to authority. Involving experts (both teachers and mathematics
education experts) in the formulation of policies is the most common method for
giving authority to policies. Considerable attention is also given to building
policy strength through appeals to legal authority, consistency with social
norms, and support from charismatic individuals (Floden et al., 1986).
Because policies rely on authority more than on power, teachers’ conceptions of appropriate topics to teach are generally reflected in the policies teachers adopt. Thus, unless there is a push in a new direction, even when policies are discontinued teachers tend to continue their content practices as though the policies were still in effect.

State, district, and school content policies are relatively weak (at least from a theoretical perspective); thus, their influence on teacher content practices is surprising. Virtually every teacher studied has had his or her mathematics instruction influenced in important ways by one or more school policy. Yet the effects of content policies have not standardized teacher practice (e.g., Schmidt et al., in press). Perhaps because the content policies are not as prescriptive as they might be, or strong in other ways, teachers interpret policies differently. For example, in one district with a management-by-objectives system for elementary school mathematics, one teacher used the system to individualize mathematics during one period of the day but also taught mathematics during an additional period using a different textbook and whole group instruction. Another teacher used the system as a template for deciding what to teach, when, and to what standards of achievement to each of his students, allowing students to leave the system only after they completed objectives well beyond their current grade level. Yet a third teacher only referred to the district objectives occasionally when planning instruction (Porter & Kuhs, 1982).

In another district that had recently adopted a new textbook, one teacher followed the book page by page, recognizing that the desired effect of a standardized curriculum in the district would be achieved only by following the book closely. Another teacher, not recognizing the motivation behind the single text adoption, followed her own strong convictions about what content
should be taught and when, using the text only as a resource for student exercises that fit her own internal syllabus (Freeman & Schmidt, 1982).

Textbooks and Tests as Special Cases

One of the myths exposed through work on teacher content decision making is that teachers teach the content in their textbook (Porter, 1985). Elementary school teachers view mathematics textbooks as resources to be drawn from and to be added to as seems appropriate (this belief remains unchallenged even when the textbook is mandated). Further, because textbooks do not address several of the most important content decisions, their influence is limited primarily to topic selection. Textbooks contain few instructions about how much time should be allocated to mathematics or about differences among students concerning what should be taught; they offer ambiguous advice about standards to which students should be held. Even in topic selection, most teachers cover only a fraction of their textbook's content (e.g., Freeman, 1983) and spend 10% to 20% of mathematics instruction time covering topics not in the book.

Another myth exposed as being only a half truth is that teachers teach topics that are tested. Little evidence exists to support the supposition that national norm-referenced, standardized tests administered once a year have any important influence on teachers' content decisions. There are, however, important effects from curriculum-embedded tests (e.g., tests tied to objectives in a management-by-objectives system, chapter tests in a textbook, tests developed by teachers to help make placement decisions). Tests have effects on content decisions only when they have been explicitly tied to the curriculum and when they are readily accessible and easily used by teachers (Kuhs et al., 1985).
Student Effects

Teachers' content decisions are also influenced by students and students' parents. Sometimes the effects are direct, coming in the form of requests to cover specific topics or requests for more homework. More often the effects are indirect, coming in the form of expectations. Student and parent effects are not random; they correlate in important ways to student characteristics such as aptitude, gender, and ethnicity.

When mathematics is taught to ability groups or to individuals, within-class content differences are dramatic. Primarily these differences concern the topics of study, rather than the total amount of time spent or the standards to which students are held. Low-ability students spend far more time learning facts and computational skills whereas students of higher ability spend more time understanding mathematical concepts and applications. High-ability students cover more topics and spend less time per topic than do low-ability students (Irwin et al., 1985).

Individualized instruction shows some evidence of gender effects. Girls encounter a larger number of topics whereas boys study fewer topics for more time. Boys study topics that involve more conceptual understanding, more applications and more work with pictures. Some evidence suggests an interaction between perceived ability and ethnicity. Regardless of beginning achievement scores, black girls study fewer topics than do other students, including fewer topics related to conceptual understanding and applications (Irwin et al., 1986a).

Whole-group instruction, however, is the primary method used to teach elementary school mathematics, minimizing differences in content among students within classrooms. Further, for a given teacher, the effects of differences among groups of students across years appear to be minimal. Even when a class
is judged by the teacher to be unusually good or unusually "slow," modifications to accommodate those differences are slight. The large effects of students on teacher content decision making take place at the aggregate level. The socioeconomic status (SES) of the school student body correlates with the degree of parental influence on content, the instructional resources available to teachers, the amount of time spent on mathematics, and the topics covered (Irwin et al., 1986b). In affluent neighborhoods, parents are seen as a legitimate source of advice, generally concerned with what their children are taught. In schools that serve working class or unemployed families, parents are viewed as uninterested in particular content, even lacking the understanding required to help their children. Lower SES schools have fewer resources available for mathematics instruction. Lack of rulers and protractors affects work in measurement and geometry, and limited textbook availability affects the frequency of homework assignments. High SES schools spend less time on mathematics but cover more topics than do lower SES schools. Lower SES schools emphasize more computation and less application and concept instruction.

The correlations between the content of instruction and student characteristics are problematic. There is a tension between the amount of time students need to master content and the range of content they can cover. If understanding mathematical concepts and applications is important, however, then all students deserve an opportunity to study that content. Schools and teachers must be attentive to and must manage the dilemma to provide time for mastery as they assure access to useful content.

The Case of the Missing Principal

In this summary of content determinants research, policies are featured because of their surprisingly strong effects and because the number and strength of content policies is increasing at both state and district levels.
Principals are featured for the opposite reasons. Despite literature emphasizing the importance of principals in school leadership and the adoption of innovations, principals are not a major influence on teachers' decisions about what to teach in elementary school mathematics.

The literature on principal leadership and this conclusion about content decision making are not necessarily contradictory. On the rare occasions when principals have attempted to exert influences on content, teachers have accepted the attempts as legitimate and the influence of those attempts was felt in classroom practices. But most principals remain silent on content preferences, leaving content decision making to their teachers at the classroom level and to policymakers at higher levels. Even more surprising, principals show little interest in ensuring that teachers carry out district policies. Many principals have little knowledge of district policies, devoting their efforts instead to such noncontent areas as student discipline and attendance (Floden et al., 1984).

**Teacher Convictions**

Differences among teachers in the content of their elementary school mathematics instruction are more substantial than can be attributed wholly to differences in policies, students, principals, or other external factors. For example, teachers at the same grade level have been found to differ in their allocation of time to mathematics by a factor of 1.5 (9000 minutes versus 6000 minutes across a full school year). Of similar magnitude, differences among teachers exist concerning the average amount of time per topic. Teachers agree in their emphasis on computational skills over concepts or applications, but within that emphasis, percentage of time devoted to computational skills ranges from a low of 55% to a high of 80%. At the level of specific topics, the differences among teachers are too many to summarize. Some of these
differences may even out over years for students, but students with a teacher who fails to cover geometry or who gives little attention to estimation or measurement applications are unlikely to have those omissions compensated for by other teachers in later grades.

Differences among teachers in the content of their elementary school mathematics instruction are partially a function of differences in convictions about mathematics. Teachers differ in their knowledge of mathematics, in their interest and enjoyment in teaching mathematics, in their beliefs about the importance of mathematics and the most important topics within mathematics, and in their expectations for what students can accomplish. But just as content policies have been judged to be relatively weak, elementary school teachers' convictions about mathematics are also weak. Elementary school teachers are reluctant to take responsibility for content decisions and often appear unaware that they do indeed make mathematics content decisions. During interviews, teachers often said that no one had ever asked about their mathematics content before. When asked to keep content logs, many teachers expressed keen interest in the results and some planned to monitor their own instruction in future years. Clearly, most elementary school teachers do not spend much time analyzing the appropriateness of the content of their mathematics instruction. Their positions on content remain largely unexamined, by them or by anybody else.

A few elementary school teachers do hold strong convictions about mathematics, looking primarily to their own beliefs to decide the content of their instruction. But these teachers are in a distinct minority. Curiously, they are not necessarily the teachers who possess the greatest subject matter knowledge (Freeman, 1986).

Generally, elementary school teachers are willing to change their mathematics content if (a) they view the change as being not too difficult,
(b) what they are asked to do is within their range of knowledge, and (c) the request adds new content and does not give up content they have been teaching (a point given more attention later). In the case of textbook adoptions, teachers' willingness to try new content takes an unusual twist. Teachers tend to follow a textbook most closely during the initial year of use. Once they have become familiar with a textbook and know what it has to offer, teachers feel greater freedom to make adjustments and introduce some of their own preferences. The inclination to drift away from the book over time might be offset by policies that specify how teachers are to use their texts, but such policies rarely exist.

**Some Thoughts on the Curriculum**

Research on teacher content decision making in elementary school mathematics has not sought to evaluate the quality of the curriculum. Nevertheless, certain features stand out, virtually demanding comment. A ubiquitous and pronounced lack of balance exists across concepts, skills and applications. Teachers spend a large amount of their mathematics time teaching computational skills—approximately 75%. The remaining time is distributed between teaching for conceptual understanding and applications in ways that vary from teacher to teacher. Most textbooks and minimum competency or basic skills objectives emphasize computation; however, nationally normed standardized achievement tests have balance across conceptual understanding, applications, and computational skills (Freeman, Belli, et al., 1983). The lack of balance in teacher attention to conceptual understanding, skills, and applications is problematic and should be addressed. Applications are both more important and more difficult to learn than are skills. Conceptual understanding is probably of more lasting value than either skills or applications. By formulating policies that
are prescriptive, consistent, and carefully tied to sources of authority, it should be possible to create a more balanced curriculum.

A second feature of the elementary school mathematics curriculum is related to the first. Just as teachers devote a great deal of time to a relatively few computational skills, they tend to cover a large number of topics in the small amount of remaining time. Seventy to eighty percent of the topics taught during a school year receive 30 minutes or less of instruction. Many of these topics are "touched on" or "taught for exposure," receiving only 5 or 10 minutes of attention during the year. In part, this phenomenon may be explained by a similar pattern of topic coverage in textbook exercises. The practice of covering many topics, each for a little time, also may be a function of teachers' greater willingness to take on new topics in their instruction than to give up topics they have been teaching. Whatever the reasons, the elementary school mathematics curriculum is thin and appears to be getting thinner. The practice of teaching for exposure raises questions about how much instructional time on a topic is enough. Are students learning that mathematics includes a wealth of interesting topics or are they learning that superficial knowledge (knowing just a little about a lot of different things) is somehow valuable?

A third feature of the elementary school mathematics curriculum concerns what is missing. Students are rarely, if ever, asked to formulate a problem for themselves. Instead they are given problems to solve. Mathematics receives little attention as a discipline worth knowing in its own right in addition to being a basic skill with utilitarian value. Even the utilitarian aspects of mathematics receive too little serious attention. For example, young women's and minorities' lack of valuing of mathematics is not sufficiently challenged by information about the mathematics prerequisite to qualify for later study and for many job possibilities.
Finally, although the elementary school mathematics curriculum is second in importance only to reading and language arts, it is treated as a distant second. Only a small amount of time is allocated to mathematics instruction. A few classrooms spend an hour or so a day on mathematics, but most classrooms average much less; some average as little as 20 minutes. Teacher choice seems to be an important determinant of the amount of classroom time spent on mathematics and low averages may reflect teachers' dislike of math (e.g., Buchmann & Schmidt, 1981).

**Summary**

Until recently, educational research has focused attention on the strategies of instruction. Content received little attention. By distinguishing between strategy and content and by focusing on content, a great deal has been learned about teaching practices and about the interaction between educational policies (and other external factors) and teachers' convictions. The following commonly held beliefs have been challenged:

- There is a national curriculum in elementary school mathematics.
- From the perspective of content covered, materials are interchangeable.
- What is taught in one classroom closely resembles what is taught in another classroom at the same grade level.
- Textbooks determine the content of instruction.
- Teachers are resistant to top-down calls for change in matters of content.
- Policies have their effect through the manipulation of rewards and sanctions.
- Teacher autonomy is better than central control.
- Individualized instruction is better than group instruction.
- Instruction is better when teachers make substantial deviations from commercially prepared materials.
Partly as a result of research on content determinants, publishers of instructional materials are now much more aware of and concerned about curricular validity. Similarly, schools are more concerned about issues of curriculum alignment. Those responsible for monitoring education are more aware of the need to monitor the content of instruction as well as other aspects of educational inputs, processes, and outputs (e.g., the framework for describing elementary school mathematics has served as input to the National Research Council's Committee on Indicators of Precollege Science and Mathematics Education and is under consideration by the Center for Educational Assessment of the Council of Chief State School Officers). Teacher education programs are beginning to address the teacher's role in content decision making, an aspect of the teacher education curriculum that was largely missing. Educational research, especially research on teaching, now recognizes the importance of differences among teachers in their emphases on academic content. Increasingly, research studies focus on content decision making and the ways teachers make use of instructional materials.

Work on content policies and their effect is more recent and less visible. Nevertheless, the work points to a middle ground between two developments which seem on a collision course. On the one hand, centralized control of the curriculum is increasing. States and districts are developing policies which specify what is to be taught, to whom, and to what standards of achievement. On the other hand, there is increasing concern for the status of the teaching profession. Recommendations are for greater teacher autonomy and greater teacher participation in school policy formulation. But central control versus teacher autonomy may be a false dichotomy. Content policies will be persuasive to teachers if teachers are meaningfully involved in establishing those policies. Under those conditions, compliance and professional autonomy become two sides of the same coin.
References


Research Series No. 179

CONTENT DETERMINANTS
(with Research Instrumentation Appendices)

Andrew C. Porter, Robert E. Floden,
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Published By

The Institute for Research on Teaching
252 Erickson Hall
Michigan State University
East Lansing, Michigan 48824-1034

Printed and Distributed
by the
College of Education
Michigan State University

September 1986

This work is sponsored in part by the Institute for Research on Teaching, College of Education, Michigan State University. The Institute for Research on Teaching is funded primarily by the Office of Educational Research and Improvement, United States Department of Education. The opinions expressed in this publication do not necessarily reflect the position, policy, or endorsement of the Office or the Department. (Contract No. 400-81-0014)
Institute for Research on Teaching

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Research Series No. 179

CONTENT DETERMINANTS

Andrew C. Porter, Robert E. Floden, Donald J. Freeman, William H. Schmidt, and John R. Schwille

Published By

The Institute for Research on Teaching
252 Erickson Hall
Michigan State University
East Lansing, Michigan 48824-1034

Printed and Distributed by the
College of Education
Michigan State University

September 1986

This work is sponsored in part by the Institute for Research on Teaching, College of Education, Michigan State University. The Institute for Research on Teaching is funded primarily by the Office of Educational Research and Improvement, United States Department of Education. The opinions expressed in this publication do not necessarily reflect the position, policy, or endorsement of the Office or the Department. (Contract No. 400-81-0014)
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Abstract

Using elementary school mathematics as the context for study, a program of IRT research reveals teachers as political brokers in the process of content determination. Empirical findings and new theoretical constructions from that work are summarized.

The content of instruction is specified by determining (a) how much time to allocate to a subject, (b) what topics to cover, (c) with which students, (d) when and in what order, and (e) to what standards of achievement. These five decisions served as the dependent variables for empirical investigations of how school policies, teachers' content repertoires, and other factors (e.g., students, parents, other teachers, school administrators) interact in the process of determining what is taught. Appendices provide the research instrumentation.

School policies bearing on the content of elementary school mathematics were found to be weak and fragmented relative to what is possible. Nevertheless these relatively weak policies had surprisingly strong effects upon teacher content practices, gaining their strength through persuasion. Policy compliance was rarely tied to rewards or sanctions. The paradox is explained by a general lack of attention given to content and by teachers' understandable reluctance to take full responsibility for deciding what is the most appropriate content for their students.

The general neglect for content deliberations has resulted in an elementary school curriculum badly out of balance. Heavy emphasis upon computational skills leaves little room for coverage of concepts and applications. Large numbers of topics are just touched on in instruction. Students are rarely, if ever, asked to formulate a problem for themselves. The research points toward policy-oriented solutions to these problems.
CONTENT DETERMINANTS

Andrew C. Porter, Robert E. Floden, Donald J. Freeman,
William H. Schmidt, and John R. Schwille

Teachers determine what is taught in school. They create opportunities for students to learn the knowledge, skills, and dispositions that influence future productivity in school and in the social and vocational worlds beyond school. Teachers influence this effect by deciding what content to teach and by implementing strategies to engage students in that content.

This proposition has served as the central hypothesis for a line of research undertaken at the Institute for Research on Teaching (IRT). This paper summarizes what has been accomplished from those inquiries. New theoretical constructions have evolved to support analyses of school content and the methods used to determine school content. These constructions and their empirical bases have proven to be powerful mechanisms to understand practice and the ways it might be improved. The constructions also serve to elevate the importance of content in research on teaching and research on educational policy.

Starting With Content

Distinguishing between the content (what is taught) and the strategy (how content is taught) of instruction ensures consideration of each (Freeman, 1

Andrew Porter is coordinator of the Content Determinants Project and a professor in the Department of Counseling, Educational Psychology and Special Education at Michigan State University. Robert Floden, Donald Freeman, William Schmidt, and John Schwille are senior researchers with the project. Floden, Freeman, and Schwille are professors in the Department of Teacher Education at MSU and Schmidt is a professor in the Department of Counseling, Educational Psychology and Special Education.

The authors were permanent members of the project whose work is summarized here. The contributions of those who were with the group for shorter periods of time are gratefully acknowledged: Linda Alford, Gabriella Belli, Zane Berge, Michael Gant, Susan Irwin, Frank Jenkins, Lucy Knappen, Therese Kuhs, and Janet Vredevoogd.
A three-dimensional taxonomy to describe the content of elementary school mathematics provides definitions of topics that may or may not be studied in elementary school (Kuhs et al., 1979). The three dimensions of the taxonomy describe general intent (e.g., conceptual understanding, skills, applications), the nature of material presented to students (e.g., fractions, decimals), and the operation the students must perform (e.g., estimate, multiply). The terminology and specificity of the taxonomy are based largely on an interview study of content distinctions made by elementary school teachers (Schmidt, Porter, Floden, Freeman, & Schwille, in press; see also Appendix A for the interview). Specific topics are represented by the intersections of these three dimensions (e.g., story problems involving addition of fractions, basic multiplication facts, understanding the relationship between multiplication and division). More general topics are addressed by the marginals of the taxonomy (e.g., emphasis given to conceptual understanding). Because topics can be defined at different levels of specificity, because the taxonomy has a structure which makes clear both what is taught and what is not taught, and because the distinctions made reflect ways in which teachers think and talk about their mathematics instruction, the taxonomy, when coupled with the other four attributes of content decision making, provides a language to support deliberations about content by practitioners, policymakers, and researchers (e.g., Freeman, Kuhs, Knappen, & Porter, 1982; Porter, 1983a).

The results from content analyses of instructional materials illustrate the power of this taxonomy of elementary school mathematics topics. Analyses of four commonly used fourth-grade textbooks and the five most commonly used nationally normed standardized tests of mathematics achievement (at the same grade) reveal that of the 385 topics covered by at least one of these published materials, only six topics are common to all nine. Among the textbooks, 19
federal, state, district, and school policies. Mathematics objectives, testing programs, mandated textbooks, promotion policies, and time guidelines all address aspects of content decision making.

The teacher stands between the content messages from these various sources and the students to be taught. The effects of advice or prescription on what to teach are mediated by the teacher's own convictions about what should be taught. To have an effect on a teacher's content decisions, then, an external influence must either change the teacher's conception about what is most desirable (i.e., persuade the teacher) or override the teacher's beliefs, forcing the teacher to comply even though the request is not viewed as appropriate. Effects of both types have been found, although persuasion is clearly the dominant form (Schwille et al., 1986; Floden et al., 1986; Porter, 1983).

Sources of Influence

An Overview of Five Studies

Two early studies of teacher content decision making in elementary school mathematics led to increased attention on school policies (Floden, Porter, & Schwille, 1981; Schwille et al., 1982). In both of those studies school policies appeared to be among the strongest influences on what is taught, after the teacher's own convictions. Policy effects were not uniform, however, and the range of policies considered was limited. Based on that early work and previous analyses of educational policies (particularly Spady & Mitchell, 1979), a fourfold structure was hypothesized for explaining differences in policy strength.

Policies can vary in their prescriptiveness, consistency, authority, and power. Prescriptiveness refers to the extent and specificity of a policy in telling teachers what to do. A mandated textbook is less prescriptive than a
received concerning what should be taught, and the relationships between the two. Content was described through daily teacher logs (collected weekly). Advice was monitored through interviews (weekly), questionnaires, observations, analyses of district and state policies and practices, and by attending meetings with the teachers or district-level meetings at which mathematics content might be discussed. The findings from these first two studies led to the design and completion of a series of three studies focusing on the nature and effects of state- (1981), district- (1982), and school-level policies (1982-1985).

For the study of state policies, seven states were selected to represent variation in types of policies, overall strength of policies, and school populations served: California, Florida, Indiana, Michigan, New York, Ohio, and South Carolina (Schwille et al., 1986). For each state, a complete set of documents on relevant policies and practices was assembled (e.g., objectives, testing, textbooks, allocation of time, school evaluation, teacher qualifications and promotion of specific topics). Documents were identified and additional information collected through interviews with knowledgeable persons in each state (an average of eight persons per state).

In the second of the three studies, district policies, their relationships to state policies, and their perceived effects were studied in five of the seven states (Floden et al., 1986). Questionnaires were used to collect information from district mathematics coordinators, principals, and teachers using a probability-in-proportion-to-student-enrollment design for each state. Questionnaires asking about the nature of policies and their perceived effects were designed along the lines of the four-attribute structure to describe policy strength (see Appendix C for survey questionnaires).

The third and final study once again brought the work back to the classroom. The effects of state-, district-, and school-level policies were
California have policies similar to the centralized national school systems of Europe; the policies specify what to teach and to what standards, although even these states differ in the extent to which their policies appear to challenge teacher practice. The policies of other states, such as Indiana and Ohio, operate indirectly, imposing requirements on school districts without directly telling teachers what to do. For example, Ohio has no state testing program, but the state requires school districts to have their own testing programs. Some states, such as Michigan, place great trust in local school districts and the individual classroom teachers, avoiding prescriptions about what should be taught and to what standards of achievement (although even Michigan has a minimum objectives testing program that districts and teachers may look to for guidance, Schwille et al., 1986).

Like states, districts also differ in the breadth and strength of their content policies. A relationship, however, exists between state and district policy practices; district policy formulation is more active in states which are also active in content policy formulation. Districts tend to extend and elaborate state policies rather than fill in areas in which states have not been active (Freeman, 1983; Cohen, 1982).

At least in elementary school mathematics, policies tend to be only mildly prescriptive; nor are they carefully constructed to be mutually reinforcing (although neither do they contradict each other). Little evidence exists which ties teacher compliance to rewards and sanctions, nor do teachers view this to be the case. Rather, policies attempt to persuade and gain their strength through appeals to authority. Involving experts (both teachers and mathematics education experts) in the formulation of policies is the most common method for giving authority to policies. Considerable attention is also given to building policy strength through appeals to legal authority, consistency with social norms, and support from charismatic individuals (Floden et al., 1986).
should be taught and when, using the text only as a resource for student exercises that fit her own internal syllabus (Freeman & Schmidt, 1982).

**Textbooks and Tests as Special Cases**

One of the myths exposed through work on teacher content decision making is that teachers teach the content in their textbook (Porter, 1985). Elementary school teachers view mathematics textbooks as resources to be drawn from and to be added to as seems appropriate (this belief remains unchallenged even when the textbook is mandated). Further, because textbooks do not address several of the most important content decisions, their influence is limited primarily to topic selection. Textbooks contain few instructions about how much time should be allocated to mathematics or about differences among students concerning what should be taught; they offer ambiguous advice about standards to which students should be held. Even in topic selection, most teachers cover only a fraction of their textbook’s content (e.g., Freeman, 1983) and spend 10% to 20% of mathematics instruction time covering topics not in the book.

Another myth exposed as being only a half truth is that teachers teach topics that are tested. Little evidence exists to support the supposition that national norm-referenced, standardized tests administered once a year have any important influence on teachers' content decisions. There are, however, important effects from curriculum-embedded tests (e.g., tests tied to objectives in a management-by-objectives system, chapter tests in a textbook, tests developed by teachers to help make placement decisions). Tests have effects on content decisions only when they have been explicitly tied to the curriculum and when they are readily accessible and easily used by teachers (Kuhs et al., 1985).
is judged by the teacher to be unusually good or unusually "slow," modifications to accommodate those differences are slight. The large effects of students on teacher content decision making take place at the aggregate level. The socioeconomic status (SES) of the school student body correlates with the degree of parental influence on content, the instructional resources available to teachers, the amount of time spent on mathematics, and the topics covered (Irwin et al., 1986b). In affluent neighborhoods, parents are seen as a legitimate source of advice, generally concerned with what their children are taught. In schools that serve working class or unemployed families, parents are viewed as uninterested in particular content, even lacking the understanding required to help their children. Lower SES schools have fewer resources available for mathematics instruction. Lack of rulers and protractors affects work in measurement and geometry, and limited textbook availability affects the frequency of homework assignments. High SES schools spend less time on mathematics but cover more topics than do lower SES schools. Lower SES schools emphasize more computation and less application and concept instruction.

The correlations between the content of instruction and student characteristics are problematic. There is a tension between the amount of time students need to master content and the range of content they can cover. If understanding mathematical concepts and applications is important, however, then all students deserve an opportunity to study that content. Schools and teachers must be attentive to and must manage the dilemma to provide time for mastery as they assure access to useful content.

The Case of the Missing Principal

In this summary of content determinants research, policies are featured because of their surprisingly strong effects and because the number and strength of content policies is increasing at both state and district levels.
differences may even out over years for students, but students with a teacher who fails to cover geometry or who gives little attention to estimation or measurement applications are unlikely to have those omissions compensated for by other teachers in later grades.

Differences among teachers in the content of their elementary school mathematics instruction are partially a function of differences in convictions about mathematics. Teachers differ in their knowledge of mathematics, in their interest and enjoyment in teaching mathematics, in their beliefs about the importance of mathematics and the most important topics within mathematics, and in their expectations for what students can accomplish. But just as content policies have been judged to be relatively weak, elementary school teachers' convictions about mathematics are also weak. Elementary school teachers are reluctant to take responsibility for content decisions and often appear unaware that they do indeed make mathematics content decisions. During interviews, teachers often said that no one had ever asked about their mathematics content before. When asked to keep content logs, many teachers expressed keen interest in the results and some planned to monitor their own instruction in future years. Clearly, most elementary school teachers do not spend much time analyzing the appropriateness of the content of their mathematics instruction. Their positions on content remain largely unexamined, by them or by anybody else.

A few elementary school teachers do hold strong convictions about mathematics, looking primarily to their own beliefs to decide the content of their instruction. But these teachers are in a distinct minority. Curiously, they are not necessarily the teachers who possess the greatest subject matter knowledge (Freeman, 1986).

Generally, elementary school teachers are willing to change their mathematics content if (a) they view the change as being not too difficult,
are prescriptive, consistent, and carefully tied to sources of authority, it
should be possible to create a more balanced curriculum.

A second feature of the elementary school mathematics curriculum is related
to the first. Just as teachers devote a great deal of time to a relatively few
computational skills, they tend to cover a large number of topics in the small
amount of remaining time. Seventy to eighty percent of the topics taught
during a school year receive 30 minutes or less of instruction. Many of these
topics are "touched on" or "taught for exposure," receiving only 5 or 10
minutes of attention during the year. In part, this phenomenon may be ex-
plained by a similar pattern of topic coverage in textbook exercises. The
practice of covering many topics, each for a little time, also may be a func-
tion of teachers' greater willingness to take on new topics in their instruc-
tion than to give up topics they have been teaching. Whatever the reasons, the
elementary school mathematics curriculum is thin and appears to be getting
thinner. The practice of teaching for exposure raises questions about how much
instructional time on a topic is enough. Are students learning that
mathematics includes a wealth of interesting topics or are they learning that
superficial knowledge (knowing just a little about a lot of different things)
is somehow valuable?

A third feature of the elementary school mathematics curriculum concerns
what is missing. Students are rarely, if ever, asked to formulate a problem
for themselves. Instead they are given problems to solve. Mathematics
receives little attention as a discipline worth knowing in its own right in
addition to being a basic skill with utilitarian value. Even the utilitarian
aspects of mathematics receive too little serious attention. For example,
young women's and minorities' lack of valuing of mathematics is not
sufficiently challenged by information about the mathematics prerequisite to
qualify for later study and for many job possibilities.
Partly as a result of research on content determinants, publishers of instructional materials are now much more aware of and concerned about curricular validity. Similarly, schools are more concerned about issues of curriculum alignment. Those responsible for monitoring education are more aware of the need to monitor the content of instruction as well as other aspects of educational inputs, processes, and outputs (e.g., the framework for describing elementary school mathematics has served as input to the National Research Council's Committee on Indicators of Precollege Science and Mathematics Education and is under consideration by the Center for Educational Assessment of the Council of Chief State School Officers). Teacher education programs are beginning to address the teacher's role in content decision making, an aspect of the teacher education curriculum that was largely missing. Educational research, especially research on teaching, now recognizes the importance of differences among teachers in their emphases on academic content. Increasingly, research studies focus on content decision making and the ways teachers make use of instructional materials.

Work on content policies and their effect is more recent and less visible. Nevertheless, the work points to a middle ground between two developments which seem on a collision course. On the one hand, centralized control of the curriculum is increasing. States and districts are developing policies which specify what is to be taught, to whom, and to what standards of achievement. On the other hand, there is increasing concern for the status of the teaching profession. Recommendations are for greater teacher autonomy and greater teacher participation in school policy formulation. But central control versus teacher autonomy may be a false dichotomy. Content policies will be persuasive to teachers if teachers are meaningfully involved in establishing those policies. Under those conditions, compliance and professional autonomy become two sides of the same coin.
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Appendix A

Content Decisions: Teacher Interview (Spring 1979)
General Instructions

The primary purpose of the interview is to obtain a complete statement about the content of elementary school mathematics as seen by the respondents as is possible. Of particular interest are 1) the level of detail (fineness of distinction) made when describing content, 2) content which would not be well described by the current version of the taxonomy, 3) the meaning teachers give to certain key terms, 4) relationships among topics. A secondary interest is to become more knowledgeable about several external factors which might influence teachers' decisions about what to teach. Finally, there are a host of questions about which we hope to become more knowledgeable through these interviews, but which are not given explicit attention in the interview schedule, e.g., the content/strategy distinction, reasons other than external factors that teachers give for making decisions about the content of instruction. In pursuing these multiple ends the interviewer is given some latitude:

1.) All questions in the interview schedule are to be asked and in the order given;

2.) Variation in the wording of these questions is allowed;

3.) All questions are to be asked in reference to the subject's current teaching assignment. When the assignment involves multiple grades, greatest attention should be given to the grade level closest to fourth grade;

4.) From section III on, all statements about content should be probed until the subject can think of nothing further to say;

5.) The interviewer must decide on a case by case basis whether or not to pursue areas other than content and which are not explicit in the interview schedule. The primary concern in these decisions should be centrality to the objectives of the Content Determinants Group and interview time. The following are some general guidelines:

a.) the impact of external factors should not be pursued, although if a subject reports not making decisions consistent with an "external factor", the subject should be asked why;

b.) subjects should not be asked to describe content for grade levels they are not currently teaching;

c.) time permitting, statements relevant to the content/strategy distinction should be pursued;

The interviewer may wish to make note of interesting points which might be pursued at the end of the interview given sufficient time.

At the start of the interview the following should be done:

1.) Have the subject complete the statement of informed consent, complete with social security number and address;

2.) The subject should be told that the session will be audiotaped. Since a transcript of the audio tape is the basic data, the interview should be terminated immediately if the subject objects to the session being taped.

The interview is to last approximately two hours or less. If at the end of two hours the subject is still providing useful data, a second interview should be scheduled, unless the interview can be completed in 15 minutes.
1. Attempt to get as complete and detailed a response to this general question as is possible. The following two probes should be used:

a. Tell me all the different ways that ___ comes up in the content that you teach.

The probe should be used with the four main arithmetic operations and selectively with other general content areas about which you would like the subject to say more, e.g., fractions.

b. What are some other things that you hope students will learn?

2. Keep a list of all areas of content that have been satisfactorily described (this list will be given orally to the subject just prior to the external factors section of the interview).

3. Probe when any of the key words listed earlier are used by the subject;

4. Probe "understanding of ___" whenever it is volunteered. If "understanding of ___" is not volunteered but "understanding" is mentioned, make a note, since questioning at the end of this section is conditioned on past use of "understanding".

5. Probe all areas of content mentioned regardless of whether it is content taught;

6. Be particularly sensitive to any indications of relationships among topics:

a. When a teacher has indicated a relationship among topics or a structure for topics, the teacher should be asked for the logic behind that relationship or structure only once, i.e., the interviewer is to accept the teacher's first response to a probe for the underlying logic to any indicated structure or relationship.

b. When probing the logic behind a relationship the following should be used, "How would you explain why a student would have to ___?"

c. Be alert for indications of topics which are crossed or nested within each other and look for indications of prerequisites. Probe the teacher on the following terms or phrases:

<table>
<thead>
<tr>
<th>common thread</th>
<th>instructional sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>difficulty</td>
<td>concrete to abstract</td>
</tr>
<tr>
<td>easy</td>
<td>basic</td>
</tr>
<tr>
<td>reach a certain point</td>
<td>cuts across</td>
</tr>
<tr>
<td>up through</td>
<td>links</td>
</tr>
<tr>
<td>take them further</td>
<td>tied</td>
</tr>
<tr>
<td>transfer to ___</td>
<td>coupled</td>
</tr>
<tr>
<td>inverse operations</td>
<td></td>
</tr>
</tbody>
</table>

7. What other things could be taught in ___ grade mathematics? (Ask this question once)

The following are a list of optional probes that may be used to encourage teachers to expand their remarks about content:

1. How do you deal with this area in your teaching?

2. How do (would) the children proceed through this area? How is it (would it be) sequenced?

3. What kinds of assignments do (would) the children do and how do (would) these assignments differ in content?

4. What do (would) you hope the students learn?

5. What is it that students find difficult about this area?

6. If you had less time to teach the area, what would you omit?

7. If you had more time to teach this area, what would you add to increase the depth of coverage?

8. Can you tell me what you mean by that (their response)?

9. What kinds of errors do students typically make on ___?

10. Can you give me an example of a problem that illustrates ___? Number the examples given and state number for for tape

C. Bring up any topics mentioned prior to III and that were not adequately described in III.

D. Attempt to summarize content that the teacher has mentioned up to this point and ask -

"Are there any other areas of content of ___ grade mathematics that come to mind?"

E. If "understanding of ___" has not yet been sufficiently explored in the interview,

1. but "understanding" has been mentioned one or more times by the teacher without reference to a particular area of content, say -
iv) are there objectives that you would like to see made more detailed and explicit?

6.) What tests in your school are expected or required to be given?

i) what do you want your students to learn that is not reflected on these tests?

ii) is there mathematics tested which you do not teach?

IV. Teacher's structures of mathematics

A. If you had to divide (up) all the mathematics that you teach into just a few categories, which categories would you choose?

1.) How would you subdivide the content within each of these categories?

2.) Can you think of another set of categories that might be used? If yes, repeat (1) above and follow with (2) again until the respondent is done.

B. Do you see any common threads that run through many of the topics you teach? For each thread identified, ask the respondent to describe and indicate which topics.
Appendix B

Policy-Capturing Study Questionnaires (1978)

1. Curriculum Decision Making
2. Background
3. Current School
1. Curriculum Decision Making

Your principal in Grenfell takes a particular interest in mathematics. Before school begins, Principal Cohen asks you to the office to discuss curriculum matters. In the course of this discussion, you find that Cohen feels you should teach five topics you have not previously taught in fourth grade and at the same time suggests that it is not important to teach fourth graders five topics you have been used to teaching.

Shortly after your arrival in Grenfell, you inspect the set of objectives which the central administration has directed all the teachers to follow. You note that the objectives deal with five topics which you have not in the past taught to fourth graders. They do not include material on five topics which you have usually taught in fourth grade. The topics in each case are the same as those singled out in the discussion with the principal.

A. Assume that, among school systems in general, the five "new" topics are usually covered in fourth grade but, in your former school, they were covered in fifth grade. In light of the description on the opposite page, would you teach the five new topics?

1. Virtually certain
2. Fairly certain
3. More inclined to
4. Uncertain
5. More inclined not to
6. Fairly certain not
7. Virtually certain not

B. Further assume that you judge the five "old" topics to be of equal importance to the five "new" commonly covered topics. Given your response to question A, would you continue to teach the five "old" topics?

1. Virtually certain
2. Fairly certain
3. More inclined to
4. Uncertain
5. More inclined not to
6. Fairly certain not
7. Virtually certain not

C. You assume that, among school systems in general, although a few fourth grade teachers teach the five "new" topics, these "new" topics are not commonly taught at the elementary school level. In light of the description on the opposite page, would you teach the five "new" topics?

1. Virtually certain
2. Fairly certain
3. More inclined to
4. Uncertain
5. More inclined not to
6. Fairly certain not
7. Virtually certain not

D. Further assume that you judge the five "old" topics to be of equal importance to the five not commonly covered "new" topics. Given your response to question C, would you continue to teach the five "old" topics?

1. Virtually certain
2. Fairly certain
3. More inclined to
4. Uncertain
5. More inclined not to
6. Fairly certain not
7. Virtually certain not

These questions were repeated for each of the following vignettes.

In Junior the central administration has published, for fourth grade mathematics, a set of objectives which all teachers have been directed to follow. At the end of the year, a standardized test in mathematics is administered in each grade. The test results for each school are published, by grade level, in the local newspaper.

Shortly after your arrival, you study the set of objectives and the test which is used. You realize that these materials do not deal with five topics you have been accustomed to teaching in fourth grade. You also note that they do include material on five topics you have never taught to fourth graders.

Also imagine that the teachers in your school express a particular interest in mathematics at staff meetings and in conversations in the teachers' room. During these discussions you find that the fifth and sixth grade teachers feel you should teach five topics you have not taught to fourth graders in the past. They also question the value for fourth graders of five topics you have been used to teaching. The topics mentioned in each case are the same as those you noted in your examination of the test and the objectives.

During your orientation in Alpen Creek you are given a list of fourth grade mathematics objectives, which are published by the central administration and which teachers have been directed to follow. You also receive a copy of the mathematics textbook which is supplied for your class. You examine the list of objectives and the book, finding that each includes material on five topics you have never covered in fourth grade, while neither includes material related to five topics you have been accustomed to teaching in fourth grade.
During your orientation in Whitehall you examine the mathematics textbook which are provided for use in your classroom. You find that the textbooks include five topics you have not previously taught to fourth graders and omit five topics that you have been used to teaching in fourth grade.

Imagines that the parents of students in your classroom are particularly interested in mathematics. The parents raise many questions at the fall open house. In the course of these discussions, you find that the parents think you should teach five topics you have not previously taught in fourth grade and at the same time question the value of teaching fourth graders five topics you have been used to teaching. The topics in each case are the same as those singled out by your examination of the textbooks.

Shortly after your arrival in Artemis you look at the textbooks supplied for your class. Early in the school year you also inspect the set of instructional objectives which the central administration has published and all teachers have been directed to follow. In addition, you carefully read the fourth grade standardized test in mathematics administered at the end of the year. The results of this test are published by school and grade level in the local newspaper. You notice that in all three cases the materials cover five topics which you have never taught to fourth graders and do not deal with five topics which you have ordinarily taught in fourth grade.

During the early weeks of school your colleagues in fifth and sixth grade show a particular interest in mathematics, expressing their concerns both at staff meetings and informally in the lunchroom and teachers' lounge. In the course of these discussions, you find these teachers think you should teach five topics which you have never taught in fourth grade and at the same time question the value of teaching fourth graders five topics you have been used to teaching. The topics in each case are the same as those singled out by your examination of the materials.

In Claremore, the principal of your school and the parents of students in your classroom are particularly interested in mathematics. One day, early in the school year, Principal Plore asks you to the office to discuss curriculum matters. The parents, for their part, raise many questions at the first open house. In pursuing these discussions, you find that both parents and principal think you should teach five topics you have not previously covered in fourth grade and, at the same time, question the value of teaching fourth graders five topics you have been accustomed to teaching.

In this same school a mathematics textbook is supplied for your use. In addition, the Claremore central administration has published, for fourth grade mathematics, a list of objectives which all teachers have been directed to follow. Soon after school begins, you carefully read the set of objectives and the textbooks and find they include five topics you have never covered in fourth grade and omit five topics which you have been used to teaching fourth graders. The topics in each case are the same as those singled out in the course of the above discussions.

In the school system at Danwich, the central administration has published, for fourth grade mathematics, a set of objectives which all teachers have been directed to follow. Shortly after your arrival in this district, you inspect the list of objectives. You find that they include five topics that you have not previously taught to fourth graders and omit five topics that you have usually covered in fourth grade.

The principal in your new school, the parents of students in your classroom, as well as the teachers at the school, take a particular interest in mathematics. One day early in the school year Principal Katz asks you to the office to discuss curriculum matters. At the fall open house the parents raise many questions while at staff meetings and informally in the teachers' lounge the fifth and sixth grade teachers express their concerns about mathematics. In pursuing these discussions, you find that all these parties think you should teach five topics you have not previously taught in fourth grade and at the same time question the value of teaching fourth graders five topics you have been used to teaching. The topics in each case are the same as those singled out by your examination of the objectives.
The teachers and principal in your new school at Penrow are particularly interested in mathematics. During the early weeks of school, concern about the mathematics curriculum is shown by your colleagues in fifth and sixth grade, both at staff meetings and informally in the lunchroom and teachers’ lounge. Also, during these weeks Principal Green asks you to the office to discuss curriculum matters. During these discussions, you interpret both the teachers and principal as calling for you to give more emphasis to five topics you have usually covered lightly and less emphasis to five other topics that you have ordinarily stressed.

### A. Would you put more emphasis on the five topics you have usually covered lightly?

<table>
<thead>
<tr>
<th>Column 9</th>
<th>Column 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Virtually certain</td>
</tr>
<tr>
<td>2</td>
<td>Fairly certain</td>
</tr>
<tr>
<td>3</td>
<td>More inclined to</td>
</tr>
<tr>
<td>4</td>
<td>Uncertain</td>
</tr>
<tr>
<td>5</td>
<td>More inclined not to</td>
</tr>
<tr>
<td>6</td>
<td>Fairly certain not</td>
</tr>
<tr>
<td>7</td>
<td>Virtually certain not</td>
</tr>
</tbody>
</table>

### B. Would you continue to put as much stress on the other five topics as you have before?

<table>
<thead>
<tr>
<th>Column 9</th>
<th>Column 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>Uncertain</td>
</tr>
<tr>
<td>5</td>
<td>More inclined not to</td>
</tr>
<tr>
<td>6</td>
<td>Fairly certain not</td>
</tr>
<tr>
<td>7</td>
<td>Virtually certain not</td>
</tr>
</tbody>
</table>

In the Olcott school district at the end of the year, a standardized test in mathematics is administered in each grade. The test results for each school are published, by grade level, in the local newspaper.

Shortly after your arrival, you examine the fourth grade test. You also look at the mathematics textbooks provided for your use. You interpret both the test and textbooks as calling for you to give more emphasis to five topics you have usually covered lightly and less emphasis to five other topics that you have ordinarily stressed.

### A. Would you put more emphasis on the five topics you have usually covered lightly?

<table>
<thead>
<tr>
<th>Column 9</th>
<th>Column 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>2</td>
<td>Fairly certain</td>
</tr>
<tr>
<td>3</td>
<td>More inclined to</td>
</tr>
<tr>
<td>4</td>
<td>Uncertain</td>
</tr>
<tr>
<td>5</td>
<td>More inclined not to</td>
</tr>
<tr>
<td>6</td>
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</tr>
<tr>
<td>7</td>
<td>Virtually certain not</td>
</tr>
</tbody>
</table>

### B. Would you continue to put as much stress on the other five topics as you have before?

<table>
<thead>
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<td>More inclined to</td>
</tr>
<tr>
<td>4</td>
<td>Uncertain</td>
</tr>
<tr>
<td>5</td>
<td>More inclined not to</td>
</tr>
<tr>
<td>6</td>
<td>Fairly certain not</td>
</tr>
<tr>
<td>7</td>
<td>Virtually certain not</td>
</tr>
</tbody>
</table>
3. Current School

Textbook
Did you use a textbook last year (1976-77) for fourth grade mathematics?

(Col. 7)
1 Yes (please specify publisher of each text) ________________________________
2 No

(Skip Cols. 8-9)
How much responsibility did you have for the choice of the textbooks used?

(Col. 10)
1 No responsibility
2 A little responsibility
3 Considerable responsibility although I did not make the choice by myself
4 I was completely responsible for the choice
5 I used no textbook

Did you agree or disagree with the text as far as topic coverage was concerned (coverage here refers to presence or absence of topics, not to the way in which they were presented)?

(Col. 11)
1 I completely agreed with the topic coverage
2 I disagreed on a few topics
3 I disagreed on many topics
4 I used no textbook

Objectives
Last year (1976-77), did you have a set of objectives in mathematics that was to be used by all fourth grade teachers in your district?

(Col. 12)
1 Yes
2 No
6 Don't know

How much responsibility did you have for the choice of these objectives?

(Col. 11)
1 No responsibility
2 A little responsibility
3 Considerable responsibility
7 We have no such set of objectives

Did you agree or disagree with these objectives as far as topic coverage in fourth grade mathematics was concerned?

(Col. 14)
1 I completely agreed with the topic coverage
2 I disagreed on a few topics
3 I disagreed on many topics
6 I am too unfamiliar with the objectives to answer
7 We had no such set of objectives

Examinations
Please list those examinations partly or wholly devoted to mathematics which were given to all fourth graders in your district last year, 1976-77 (give whatever identifying information you remember)

(Skip Cols. 15-16)

Last year were the results of any of these district-wide examinations published, by school and grade level, in a local newspaper?

(Col. 17)
1 Yes
2 No
6 Don't know

How much responsibility did you have for the choice of these district-wide exam(s) (excluding the MEAP Michigan Assessment Test)?

(Col. 18)
1 No responsibility
2 A little responsibility
3 Considerable responsibility
7 The MEAP was the only district-wide exam we used in fourth grade last year

Did you agree or disagree with these district-wide exam(s) as far as topic coverage in fourth grade mathematics was concerned?

(Col. 19)
1 I completely agreed with the topic coverage
2 I disagreed on a few topics
3 I disagreed on many topics
6 I am too unfamiliar with the content of the exam(s) to answer
Appendix C

Five-State Survey of School District Policy Questionnaires

1. Mathematics Coordinators
2. Principals
3. Teachers
1. Mathematics Coordinators

Institute for Research on Teaching
DISTRICT POLICIES AND PRACTICES IN ELEMENTARY SCHOOL MATHEMATICS
Questionnaire for Mathematics Coordinators/curriculum Directors

INSTRUCTIONS

This questionnaire is designed to take a minimum of your time.
- All answers are to be provided on the questionnaire itself.
- No long answers are required. Nearly all questions are multiple choice. The rest are short answer.
- There are whole sections that can be skipped if they do not apply to your district.
- We do not want you to look up any answers. Answer each question as best as you already know.
- Where appropriate, check "Don't know."

Please circle the numbers or check the spaces corresponding to your responses and enclose the completed questionnaire in the postage paid envelope. If you skip a question (other than when directed to do so), we encourage you to jot down as briefly as possible your reason for skipping. If possible, please return the form within the next week.

INSTRUCTIONAL OBJECTIVES

1. Has your district written a curriculum guide, scope and sequence chart, or some other document that provides a list of instructional objectives for elementary school mathematics? (Circle the number opposite your answer.)
   - Yes
   - No
   - Virtually none
   - Some
   - Most
   - Virtually all

2. How many of the district's elementary schools have developed their own objectives?
   - Virtually none
   - Some
   - Most
   - Virtually all

3. Which of the following best characterizes the intent of the district's math objectives? (Circle only one.)
   - To specify minimum competencies in elementary school mathematics.
   - To provide a comprehensive list of desired learning outcomes in elementary school mathematics.

4. To what extent do district objectives emphasize the following? (Circle your answers.)
   - Conceptual understanding (understanding the "why" of math such as why 3 x 4 = 12, etc.)
   - Computational skills (knowing "how to" perform mathematical operations such as multiplying 16 x 8, reading a thermometer, etc.)
   - Story problems and other forms of applications

5. Are there separate tests for each objective?
   - Yes
   - No

6. Does the district require that records be maintained on the objectives each student has mastered?
   - Yes
   - No
   - Virtually none
   - Some

7. Once a year
   - More often than once a year

8. In your opinion, have district objectives had any of the following consequences for the elementary school mathematics curriculum in your district? (Circle your answers.)
   - More time devoted to topics for which there are objectives
   - Less time devoted to topics not included in the district objectives
   - Greater uniformity in what is taught across all schools in the district
   - Decrease in teacher's opportunity to present advanced topics to gifted students

9. Are students supposed to master all K-3 mathematics objectives before working on any fourth-grade objectives? (Circle one.)
   - Yes
   - No

10. Are objectives not identified by grade level?

11. Are there separate tests for each objective?

12. Does the district require that records be maintained on the objectives each student has mastered?

13. Once a year

14. More often than once a year

15. In your opinion, have district objectives had any of the following consequences for the elementary school mathematics curriculum in your district? (Circle your answers.)

   a) More time devoted to topics for which there are objectives
   - Definitely Yes
   - Probably Yes
   - Probably No
   - Definitely No

   b) Less time devoted to topics not included in the district objectives
   - Definitely Yes
   - Probably Yes
   - Probably No
   - Definitely No

   c) Greater uniformity in what is taught across all schools in the district
   - Definitely Yes
   - Probably Yes
   - Probably No
   - Definitely No

   d) Decrease in teacher's opportunity to present advanced topics to gifted students
   - Definitely Yes
   - Probably Yes
   - Probably No
   - Definitely No
16. In your opinion, do the district-wide tests provide a good measure of student performance on district mathematics objectives?

- Yes
- No
- No district objectives

17. In your opinion, have state and district testing programs had any of the following consequences for your district? (If there is no district testing, answer the question for state testing only.)

<table>
<thead>
<tr>
<th>Test Type</th>
<th>District Testing</th>
<th>Yes</th>
<th>No</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) More time devoted to topics on the test</td>
<td>Frequently</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>b) Less time devoted to topics not on the test</td>
<td>Frequently</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>c) Press for more students to master certain topics on the test</td>
<td>Frequently</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>d) More students receive remedial instruction</td>
<td>Frequently</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

18. Which of the following best describes your district's practices in the selection of elementary school mathematics textbooks? (Circle only one.)

1. All elementary school teachers in the district are to use the same mathematics textbook series.
2. All elementary school teachers in the district at the same grade level are to use the same mathematics textbook series; different series are allowed across grade levels.
3. The district has a policy that each elementary school is to adopt a single textbook series for all grades.
4. Different schools may adopt different series. (If you circled this response, SKIP to question 22.)
5. None of the above. (If you circled this response, SKIP to question 22.)

19. How important were each of the following in the selection of the fourth-grade mathematics series currently used in your district? (Circle the appropriate number in each row.)

<table>
<thead>
<tr>
<th>Importance</th>
<th>Don't Know/Not Applicable</th>
<th>Little Importance</th>
<th>Some Importance</th>
<th>Major Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Series was recommended for our district by state mathematics specialist.</td>
<td>8</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>b) Series was recommended by district mathematics specialist.</td>
<td>8</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>c) Series adequately covers topics on state (MEAP) tests.</td>
<td>8</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>d) Series adequately covers topics in district mathematics objectives.</td>
<td>8</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>e) Series emphasizes problem solving and applications.</td>
<td>8</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>f) Series emphasizes probability and statistics.</td>
<td>8</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>g) Series emphasizes metric measurement.</td>
<td>8</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

20. What is your best estimate of the proportion of elementary teachers in your district who make daily use of the adopted textbook as the primary source of guidance in deciding what to teach in mathematics?

1. Almost all
2. Most
3. About half
4. Some
5. Very few

21. In your opinion, has requiring teachers to use a particular mathematics textbook had any of the following consequences for the elementary school mathematics curriculum? (Circle the appropriate number in each row.)

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Definitely Yes</th>
<th>Probably Yes</th>
<th>Probably No</th>
<th>Definitely No</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) More time devoted to topics emphasized in the text.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>b) Less time devoted to topics not in the text.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>c) More topics taught for which teachers have a limited academic background (e.g., geometry, metric measurement).</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>d) Greater uniformity in the order in which mathematics topics are taught.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>e) Improved between-grade continuity of the mathematics curriculum.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
29. In your opinion, how much importance does your district as a whole place on the following topics in elementary school mathematics? (Circle your answers.)

<table>
<thead>
<tr>
<th>Topic</th>
<th>Don't Care</th>
<th>Little</th>
<th>Some</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Computer applications</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>b) Fractions</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>c) Decimals</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>d) Geometry</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>e) Hand held calculators</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>f) Metric measurement</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>g) Probability &amp; statistics</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>h) Problem solving &amp; applications</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>i) Computation with whole numbers</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>j) Conceptual understanding of the four basic operations ((+, -, \times, \div))</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>k) Estimation</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

**District Content Emphasizes**

30. How many full-time equivalent person years are assigned to provide district-wide supervision/coordination of K-8 mathematics? (If persons have multiple responsibilities, include only the proportion of time allocated to K-8 mathematics.)

Write your answer here. ____ FTE

(50-60)

31. Does your district have a standing mathematics committee?
   1) No → SKIP to Question 34.
   2) Yes

32. Which of the following groups are always included in the membership of the committee? (Check any that apply, and if there is a separate mathematics committee for the elementary grades, answer with respect to that.)

- [ ] Elementary school teachers
- [ ] Central office administrators
- [ ] Elementary school building principals
- [ ] Building mathematics specialists
- [ ] Parent/community representatives
- [ ] Students

33. Are there any state policies or practices which make it particularly important for elementary school mathematics that your district have a mathematics committee?
   (60)
   1) No
   2) Yes → In your experience, which of the following state policies or practices have made it important? (Check any that apply.)
   (60)
   (61) State testing program
   (62) State syllabus or curriculum guide
   (63) State interest in promoting support for elementary school mathematics
   (64) State policies concerning textbook adoption
   (65) Other state policies or practices

**Professional Development**

34. Please indicate state and district requirements for in-service education of elementary school classroom teachers.

Number of days required by state

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(76-78)</td>
</tr>
</tbody>
</table>

Number of additional days required by district

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(79-80)</td>
</tr>
</tbody>
</table>

35. To your knowledge, how many elementary school teachers in your district had an opportunity during the last three years to attend workshops on the following topics? (Each time you circle a yes, enter the equivalent number of whole days.)

Three years, 10 attend workshops on the following topics: (You may circle a yes under "opportunity.")

<table>
<thead>
<tr>
<th>Topic</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Computer applications</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2) Fractions</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3) Decimals</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>4) Geometry</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>5) Hand held calculators</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>6) Metric measurement</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>7) Probability &amp; statistics</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>8) Problem solving &amp; applications</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>9) Computation with whole numbers</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>10) Conceptual understanding of the four basic operations ((+, -, \times, \div))</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>11) Estimation</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>12) Other math topics</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Check any of the offerings sponsored or strongly encouraged by the district:

- [ ] Computer applications
- [ ] Fractions
- [ ] Decimals
- [ ] Geometry
- [ ] Hand held calculators
- [ ] Metric measurement
- [ ] Probability & statistics
- [ ] Problem solving & applications
- [ ] Computation with whole numbers
- [ ] Conceptual understanding of the four basic operations \((+, -, \times, \div)\)
- [ ] Estimation
- [ ] Other math topics

(36-38)
InstituteforResearchonTeaching
DISTRICTPOLICIESANDPRACTICESINELEMENTARYSCHOOLMATHEMATICS:
Questionnairefor Principals

INSTRUCTIONS

This questionnaire is designed to take a minimum of your time.

- All answers are to be provided on the questionnaire itself.
- No long answers are required. Nearly all questions are multiple choice. The rest are short answer.
- There are whole sections that can be skipped if they do not apply to your district.
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Please indicate the number of students in your elementary school district each year in the elementary grades. (Circle the number opposite your answer.)

1. No → SKIP to question 2.
2. Yes → What kind? (Circle one response.)
   a. Only locally-developed tests
   b. Only commercially published, standardized tests (e.g., Stanford Achievement Test, Iowa Test of Basic Skills)
   c. Both locally-developed and commercially published tests

3. Which of these types do you consider more important to your district?
   1. Locally-developed
   2. Commercially published

D. NOW, IN ANSWERING QUESTIONS ABOUT DISTRICT TESTS, CONSIDER ONLY THE TEST YOU FEEL IS MORE IMPORTANT.

If anyone in your school received each of the following reports of results from the district-wide tests, check as many as to your knowledge, apply.

- a) Scores for individual students
- b) Classroom summaries
- c) Building summaries
- d) District summaries

4. Last year, was there an analysis of test results in the central focus of one or more of the following meetings? (If there is no district testing, circle your responses for state testing only.)

<table>
<thead>
<tr>
<th>DISTRICT TEST Results</th>
<th>MEAP Test Results</th>
<th>Don't Know</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Administrators' meetings attended by elementary school principals</td>
<td>2</td>
<td>1</td>
<td>8</td>
<td>(40-48)</td>
</tr>
<tr>
<td>b) Staff meetings in most elementary buildings</td>
<td>2</td>
<td>1</td>
<td>8</td>
<td>(42-43)</td>
</tr>
<tr>
<td>c) School board meetings</td>
<td>2</td>
<td>1</td>
<td>8</td>
<td>(44-46)</td>
</tr>
<tr>
<td>d) Group meetings of parents of elementary school children</td>
<td>2</td>
<td>1</td>
<td>8</td>
<td>(46-47)</td>
</tr>
</tbody>
</table>

5. What is the district's policy in the selection of elementary school mathematics textbooks? (Circle one response.)

(22) 1. All elementary school teachers in the district are to use the same mathematics textbook series.
2. All elementary school teachers in the district at the same grade level are to use the same mathematics textbook series, but different series are allowed across grade levels.
3. The district has a policy that each elementary school is to adopt a single textbook series, but different schools may adopt different series.
4. None of the above. (If you checked this response, SKIP to question 7.)

6. How important are each of the following to the selection of the mathematics series currently used in your building? (Circle the appropriate number in each row.)

<table>
<thead>
<tr>
<th>Importance</th>
<th>Little or No</th>
<th>Some Importance</th>
<th>Major Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Series was recommended for our district by state mathematics specialists.</td>
<td>8</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>b) Series was recommended by district mathematics specialists.</td>
<td>8</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>c) Series adequately covers topics on state tests.</td>
<td>8</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>d) Series adequately covers topics in the mathematics objectives.</td>
<td>8</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>e) Series emphasizes problem solving and applications.</td>
<td>8</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>f) Series emphasizes probability and statistics.</td>
<td>8</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>g) Series emphasizes metric measurement.</td>
<td>8</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
14. Do you have specialists assigned to your building who work primarily on mathematics with classroom teachers and/or students? (Circle your answer.)

1. No
2. Yes → a) Estimate the number of full-time equivalents. _______ (Write your answer here.)
   (39-43)
   b) Check any of the statements below that apply to these specialists.
   (44)
   ______ Specialists work with teachers to improve instruction.
   (45)
   ______ Specialists work with students on enrichment.
   (46)
   ______ Specialists work with students on remediation.

15. In your district, what individuals or groups have been MOST INFLUENTIAL in each of the following activities? (Check all that apply in each row.)

<table>
<thead>
<tr>
<th>Does not apply</th>
<th>___</th>
<th>___</th>
<th>___</th>
<th>___</th>
<th>___</th>
<th>___</th>
<th>___</th>
<th>___</th>
<th>___</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Planning or initiating mathematics workshops for elementary school teachers</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>b) Initiating or revisiting district objectives in elementary school mathematics</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>c) Selecting standardized tests of elementary school mathematics for district-wide use</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>d) Designing or developing tests that focus on the district's elementary school mathematics curriculum</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>e) Initiating building-level review of achievement test results</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>f) Initiating or planning building-level review of teaching practices in elementary school mathematics</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>g) Recommending textbooks &amp; other materials to be used in elementary school mathematics</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>h) Creating teacher guides which link textbooks &amp; other published materials to district or state objectives</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Definitively</th>
<th>Yes</th>
<th>Probably</th>
<th>Yes</th>
<th>Probably</th>
<th>Definitively</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Teachers spend more time on mathematics</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>(66)</td>
</tr>
<tr>
<td>b) Teachers offer instruction on a greater variety of mathematics topics</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>(64)</td>
</tr>
<tr>
<td>c) Teachers hold students to higher standards of achievement in mathematics</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>(65)</td>
</tr>
</tbody>
</table>

TEACHER QUALIFICATIONS

As a condition of employment, does your district require prospective elementary teachers to present evidence of more competence in mathematics than is required for state certification?

1. No
2. Don't know

Yes → What evidence is required? (Check any that apply.)

______ Mathematics course(s) in addition to those required for certification
______ Satisfactory performance on a state-required teacher certification exam (e.g., the National Teacher Examination)
______ Satisfactory performance on a district-administered test of mathematics competence
______ Other (please specify):

Keypunch: Duplicate 5-12, 4(13)

In your opinion, have these hiring practices had any of the following consequences for elementary school teachers? (Consider only teachers hired under these practices.)

<table>
<thead>
<tr>
<th>Definitely</th>
<th>Yes</th>
<th>Probably</th>
<th>Yes</th>
<th>Probably</th>
<th>Definitively</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Teachers spend more time on mathematics</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>(66)</td>
</tr>
<tr>
<td>b) Teachers offer instruction on a greater variety of mathematics topics</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>(64)</td>
</tr>
<tr>
<td>c) Teachers hold students to higher standards of achievement in mathematics</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>(65)</td>
</tr>
</tbody>
</table>

BACKGROUND

How many years have you worked as a teacher?

[ ]

How many years have you worked as a principal in this district (including this year)?

[ ]

You. We sincerely appreciate your cooperation in completing the questionnaire.
10. For each of the following statements, indicate your degree of agreement by circling the appropriate number.

- Strongly Agree, Agree, Opinion, Disagree, Strongly Disagree

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Teachers were adequately involved in the development of the district elementary school mathematics objectives.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (32)</td>
</tr>
<tr>
<td>b) The opinions of persons with expertise in mathematics education were adequately taken into account in the development of these objectives.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (33)</td>
</tr>
<tr>
<td>c) These objectives have had advocates with the kind of personality needed to get them accepted by teachers.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (34)</td>
</tr>
<tr>
<td>d) These objectives adequately cover the topics that teachers in your school think ought to be taught.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (35)</td>
</tr>
<tr>
<td>e) These objectives were written to match what teachers were already doing.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (36)</td>
</tr>
<tr>
<td>f) Parents/community leaders are pleased with these objectives.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (37)</td>
</tr>
<tr>
<td>g) District teachers have a legal obligation to follow these objectives.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (38)</td>
</tr>
<tr>
<td>h) Teachers who diligently follow these objectives are likely to receive some recognition or reward for their efforts.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (39)</td>
</tr>
<tr>
<td>i) Teachers who ignore these objectives are likely to be penalized.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (40)</td>
</tr>
<tr>
<td>j) District teachers have been kept well-informed about the elementary school mathematics objectives.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (41)</td>
</tr>
</tbody>
</table>

12. In your opinion, do the district-wide tests provide a good measure of student performance on district mathematics objectives?

- Yes
- No
- No district objectives

<table>
<thead>
<tr>
<th>Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

13. For each of the following statements, indicate your degree of agreement by circling the appropriate number.

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Teachers were adequately involved in the selection/distribution of district-wide tests for elementary school mathematics.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (42)</td>
</tr>
<tr>
<td>b) The opinions of persons with expertise in mathematics education were adequately taken into account in the selection/distribution of these tests.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (43)</td>
</tr>
<tr>
<td>c) This testing program has had advocates with the kind of personality needed to get the program accepted by teachers.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (44)</td>
</tr>
<tr>
<td>d) These tests adequately cover the topics that teachers in your school think ought to be taught.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (45)</td>
</tr>
<tr>
<td>e) These tests were selected (or developed) to match what teachers were already doing.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (46)</td>
</tr>
<tr>
<td>f) Parents/community leaders are pleased with the district testing program.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (47)</td>
</tr>
<tr>
<td>g) District teachers have a legal obligation to teach the content of these district-wide tests.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (48)</td>
</tr>
<tr>
<td>h) Teachers who diligently teach the content of these tests are likely to receive some recognition or reward for their efforts.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (49)</td>
</tr>
<tr>
<td>i) Teachers who do not teach all the content on these tests are likely to be penalized.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (50)</td>
</tr>
<tr>
<td>j) Principals are rewarded for high student scores on these tests.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (51)</td>
</tr>
<tr>
<td>k) Students will score higher on district-wide tests if the textbook is closely followed.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5 (52)</td>
</tr>
</tbody>
</table>

11. Apart from state MAEP tests, are any district-wide achievement tests which include mathematics administered once or twice a year in the elementary grades?

- Yes  →  SKIP to question 14.
- No   →  What tests (Circle one response.)

- Only locally-developed tests
- Only commercially published, standardized tests (e.g., Stanford Achievement Test, Iowa Test of Basic Skills)
- Both locally-developed and commercially published tests

- Which of these types do you consider more important to your district?
  - Locally-developed
  - Commercially published

- NOW, IN ANSWERING QUESTIONS ABOUT DISTRICT TESTS, CONSIDER ONLY THE TEST YOU FEEL IS MORE IMPORTANT.
For each of the following practices, circle the number corresponding to the one column which best describes expectations for elementary schools in your district.

<table>
<thead>
<tr>
<th>Practices</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Create small ability groups for mathematics instruction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) At the beginning of the year, assign students to classrooms so that the classrooms differ in ability or achievement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Provide individualized mathematics instruction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Retain some students in grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*E.g., tracking.*

If you circled one of these three numbers, skip to question 22.

In your opinion, have district retention practices had any of the following consequences for the elementary school mathematics curriculum in your district? (Circle your answers.)

<table>
<thead>
<tr>
<th>Effect</th>
<th>Definitely</th>
<th>Probably</th>
<th>Probably</th>
<th>Definitely</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Teachers spend more time on mathematics</td>
<td>1 2 3 4</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) There is greater uniformity in what is taught across all schools in the district</td>
<td>1 2 3 4</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Teachers have less opportunity to present advanced topics to gifted students</td>
<td>1 2 3 4</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For each of the following statements, indicate your degree of agreement by circling the appropriate number.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>No Opinion</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Teachers were adequately involved in the establishment of</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>the district's preferred retention practice</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) The district's preferred retention practice reflects what district</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>teachers have long been doing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Parents/community leaders are pleased with this practice.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Teachers who deviate from this practice are likely to be penalized.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Are guidelines set by the district for the minimum amount of time to be spent on mathematics instruction in your grade?

| 1 No                                                                     |               |       |            |          |                  |
| 2 Yes                                                                  |               |       |            |          |                  |

What is your best estimate of the proportion of your colleagues who use the recommended minimum amount of time as a guide in planning mathematics instruction?

<table>
<thead>
<tr>
<th>Estimate</th>
<th>1 Almost all</th>
<th>2 Most</th>
<th>3 About half</th>
<th>4 Some</th>
<th>5 very few</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Appendix D

District Policy Study: Daily Logs and Weekly Questionnaire (1982-83)
### Whole Group Instruction

<table>
<thead>
<tr>
<th>Topic(s)</th>
<th>Example(s)</th>
<th>Catalogue Code(s)</th>
<th>Emphasis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>(please circle)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 2 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 2 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 2 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 2 3</td>
</tr>
</tbody>
</table>

More than 5 topics taught?  [ ] No  [ ] Yes

1. Please provide examples of problems that...
   (a) were difficult to classify and/or
   (b) dealt with topics covered for the first time this school year

2. Emphasis scale:
   1 = only topic emphasized in lesson (emphasis = 20% or more of lesson)
   2 = one of two or three topics emphasized in lesson
   3 = in the lesson, but not emphasized

---

**Note:**
- Please circle the appropriate codes for each topic.
- Ensure all necessary information is provided in the given fields.
### DAILY MATHEMATICS LOG

#### GRID #1: Content catalog topics taught or assigned to $S1$: Student at 80th Percentile (either individually or as a member of a group).

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>EXAMPLES (one or two per topic)</th>
<th>CATALOG CODE</th>
<th>EMPHASIS (Please circle)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(18-22)</td>
<td>1 2 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(23)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(25-29)</td>
<td>1 2 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(30)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(32-36)</td>
<td>1 2 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(37)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(39-43)</td>
<td>1 2 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(44)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(46-50)</td>
<td>1 2 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(51)</td>
<td></td>
</tr>
</tbody>
</table>

**Emphasis scale**
1 = ONLY topic emphasized in lesson (emphasized = 20% or more of lesson)
2 = one of 1-3 topics emphasized in lesson
3 = an important topic for this lesson even though not emphasized in the lesson

2. Check any of the following statements that describe the lesson portrayed in GRID #1.

- (55) Lesson included teacher-directed group instruction
- (56) Lesson included content-catalog topics not covered in your primary textbook
- (53) A test was given (same or type) [ ]

3. Which of the following materials, if any, were used in this lesson? (check all that apply)

- (59) Textbook exercises, or ditto that accompany textbook series
- (58) Other commercially prepared ditto/supplementary materials
- (40) Teacher-prepared exercises/materials (e.g., ditto or problems on board)
- (41) Math games/puzzles

4. Among students who studied the topics in Grid #1, did a majority work on written math assignments?

- (42) During the math lesson? [ ] Yes [ ] No
- (43) During other periods of the school day? [ ] Yes [ ] No
- (44) At home? [ ] Yes [ ] No

5. Were all three targeted students taught exactly the same content-catalog topics (i.e., these you have described in Grid #1)?

- (50) Yes → STOP HERE
- (51) No → CONTINUE ON THE BACK OF THIS PAGE

---

### GRID #2: Content catalog topics taught or assigned to $S1$: Best Match Student (either individually or as a member of a group).

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>EXAMPLES (one or two per topic)</th>
<th>CATALOG CODE</th>
<th>EMPHASIS (Please circle)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(18-22)</td>
<td>1 2 3</td>
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<td></td>
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<td>(23)</td>
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<tr>
<td></td>
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<td>(25-29)</td>
<td>1 2 3</td>
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<td></td>
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<td>(30)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(32-36)</td>
<td>1 2 3</td>
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<td>(37)</td>
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<td></td>
<td>(39-43)</td>
<td>1 2 3</td>
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<td></td>
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<td>(44)</td>
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<td></td>
<td></td>
<td>(46-50)</td>
<td>1 2 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(51)</td>
<td></td>
</tr>
</tbody>
</table>

**Emphasis scale**
1 = ONLY topic emphasized in lesson (emphasized = 20% or more of lesson)
2 = one of 1-3 topics emphasized in lesson
3 = an important topic for this lesson even though not emphasized in the lesson

---

### GRID #3: Content catalog topics taught or assigned to $S3$: Student at 20th Percentile (either individually or as a member of a group).

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>EXAMPLES (one or two per topic)</th>
<th>CATALOG CODE</th>
<th>EMPHASIS (Please circle)</th>
</tr>
</thead>
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<td></td>
<td></td>
<td>(18-22)</td>
<td>1 2 3</td>
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<tr>
<td></td>
<td></td>
<td>(23)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(25-29)</td>
<td>1 2 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(30)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>(32-36)</td>
<td>1 2 3</td>
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<td>(37)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>(39-43)</td>
<td>1 2 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(44)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(46-50)</td>
<td>1 2 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(51)</td>
<td></td>
</tr>
</tbody>
</table>

**Emphasis scale**
1 = ONLY topic emphasized in lesson (emphasized = 20% or more of lesson)
2 = one of 1-3 topics emphasized in lesson
3 = an important topic for this lesson even though not emphasized in the lesson
WEEKLY QUESTIONNAIRE

1. Did you attend any workshops/conferences on mathematics this past week?
   □ No
   □ Yes—Please indicate the workshop/conference sponsor and content below.
   a. Who sponsored the workshop/conference? (Check all that apply.)
      □ School
      □ Local District
      □ Intermediate School District
      □ Professional organization (write in name): __________________________
   b. Content of workshop/conference

2. Indicate below any conversations you have had about the teaching of mathematics during the past week (check all that apply):
   □ No conversations about mathematics
   □ Regularly scheduled parent conference
   □ School building staff meeting
   □ Other Conversations → □ Other teachers in your school
   □ Other teachers not in your school
   □ Your school’s principal
   □ Other district administrators
   □ Parent
   □ Other

3. Did you teach mathematics to target students this past week that was articulated by persons or materials that are not a common day-to-day source of ideas for your mathematics instruction?
   □ No
   □ Yes—Please list below the person(s) or materials and the mathematics topics taught.
      a. Person/materials
      b. Mathematics Topics

4th Grade

3rd Grade

Keypunch: (1) = 1

Please do not write in this space.

NAME

DATES OF WEEK
FROM / / / (9-11)
TO / / / (15-18)

NAME

DATES OF WEEK
FROM / / / (9-11)
TO / / / (15-18)
Appendix E

District Policy Study: Teacher Interviews

(Fall 1982, Spring 1983, Spring 1985)
Fall 1982

Q U E S T I O N S  F O R  P R E Y E A R  I N T E R V I E W :  N O 36  S T U D Y

1. Classroom Organization

   A. Time spent on math

      1. (Interviewer: Look at time question on questionnaire. Ask about anything that looks unclear.)

      2. Do students work on math at other times during the day?
         ___ Yes. ___ Probe for times and number of students involved.
         ___ No.

      3. Typically, do any of your students receive math instruction from any specialist teacher (Title I, Resource, etc.)?
         ___ Yes. ___ Probe for typical number of students involved and whether content differs from that provided to the rest of the class.
         ___ No.

      4. Do you have a classroom aide?
         ___ Yes. ___ Does the aide ever work with kids in math?
         ___ Yes. ___ How do you use the aide in math?
         ___ No.
         ___ No.

   5. How frequently do you deviate from your schedule for mathematics instruction?
      ___ Often or sometimes (record teacher's exact response).
      ___ What leads to change your schedule?
      ___ Never.

   B. Curriculum materials used.

      1. What textbook or textbooks will fourth-graders in your class use this year? (record additional books on back.)
         Publisher: ___ Copyright date: ___ Grade level ___
         a. ___
         b. ___

      2. How much use do you make of supplementary materials?
         ___ None ___ Skip to question 4.
         ___ Some or much ___

      3. Are there some topics you supplement heavily?
         ___ Yes ___ Topics Information to identify materials ___
         ___ No ___

      4. Do you use other materials or classroom aides, for example, Cuisenaire rods, hand-held calculators, or math games?
         ___ Yes ___ How do you use them?
         ___ No ___

   C. Grouping practices.

      1. Do you use a small-group or individualized approach at all in teaching fourth-grade math?
         ___ No ___ Skip to section II.
         ___ Yes, both. ___
         ___ Yes, individualized only ___ Skip to question 3.
         ___ Yes, small-group only ___ Answer question 2 then skip to section II.

      2. Tell me about your math groups.

         ___ Probe for: basis of assignment to groups; whether group membership is likely to change during the year; why teacher uses small groups.
2. Is there a press to use small ability groups in math?
   - No ⇒ Skip to question 3.
   - Yes
   a. From whom?
   b. How?
   c. How strong is the push?

3. How are students assigned to classes at the beginning of the year (e.g., heterogeneous classrooms by ability or achievement)?

4. Do teachers in your school agree on how retention decisions should be made?
   - Yes ⇒ How is this currently decided in your school?
   - No

E. Grade-to-grade coordination

1. Is mathematics coordinated from grade to grade in your school?
   - Yes ⇒ How?
   - No

F. How I'd like to know about school-related meetings you attend, and whether mathematics is discussed at these meetings. I will name several types of meetings. For each type you attend, please tell me how often the meetings are held and whether any math discussions were a big deal at the meetings.

<table>
<thead>
<tr>
<th>Type</th>
<th>Attend?</th>
<th>How often?</th>
<th>Big deal math discussions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building staff meetings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curriculum committees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other teacher meetings (e.g., grade-level)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

III. Teacher's understanding of curriculum policies

A. What changes do you foresee in mathematics in this district in the next few years? What will the district do to accomplish these changes?
   - Probe: Do you think the district will push increased attention to student achievement? A change in importance given to individualization? Particular topics to be taught? More time (or courses) in mathematics required of students?

B. What national trends do you see in public school mathematics?
   - Probe: Do you think achievement standards will get increased attention? Particular topics? Grouping practices or other instructional strategies?

IV. Past influences on teacher's content decisions

A. (For teachers indicating a change in grouping practices on the little survey.)
   1. You indicated that you have changed the amount you use a (whole group, small group, or individualized) approach to mathematics instruction. Tell me about this change.
   2. About when did you make the change?
   3. Any particular reason for the change?
   4. Have you made substantial changes in grouping in preceding years? (Probe for approximate date and reason for change)

   A1 (For teachers indicating no change in grouping practices on the little survey.)
   1. Have you ever made a substantial change in your use of small groups or individualized instruction in mathematics?
      - No ⇒ Skip to question B.
      - Yes
   2. About when did you make the change?
   3. Any particular reason for the change?
4. Do you talk to parents outside of the regularly scheduled conferences?
   ___ No
   ___ Yes--Has mathematics come up in those conversations?
   ___ Yes--Do you remember what was said?
   ___ No

C. Did you have any significant conversations about mathematics in the past year that we haven't talked about yet?
   ___ Yes--Tell me about them.
   ___ No

VI. Individuals in the district influential in mathematics.

(Ask these questions only if you have time left at this point. Otherwise these questions can be asked in a phone interview early in the school year.)

A. Can you name any individuals in the district who have a large influence on elementary school mathematics? (Get name and title. If responses are all within district hierarchy, indicate that we are interested in people outside the hierarchy as well.)

B. Are there people in your building, in the district, or elsewhere, whose advice you particularly value when it comes to mathematics? (Probe as in preceding question.)
GROUPING

1. At the beginning of the year, you described your usual grouping practice as follows (insert summary of grouping practice from preyear interview).

   a. Did your actual practice this year differ from what I just described? Check specifically for:

   - Small Group/Individualized
     - number of groups
     - size of groups
     - stability of groups
     - individualized instruction
     - tracking

   - Whole Group
     - Did students ever work on different assignments?
     - tracking
     - pooling

   b. (Optional) SUMMARIZE what teacher has just said about above details.

   ASK IF SUMMARY IS ACCURATE.

2. Summarize your understanding of how the target students fit into the grouping just described—or ask, if you are unsure. ASK THE TEACHER IF YOUR UNDERSTANDING IS ACCURATE.

CHANGE IN TARGET STUDENTS (omit for whole group teachers)

1. Do you still think that target student 1 is among the highest students in the class in terms of aptitude for mathematics?

   _______yes _________no—where does he/she fall?

2. Do you still think that target student 2 ranks about __th or __th from the top in aptitude for mathematics?

   _______yes _________no—where does he/she fall?

3. Do you still think target student 3 ranks about __th or __th from the bottom in aptitude for mathematics?

   _______yes _________no—where does he/she fall?
MORR IN TIME

1. For days when you did not check homework, do you think the typical student spent any time working on math at home? (Ask for amount in minutes)

2. Think about the total amount of time students spent working on math assignments during other periods of the school day and at home. How does out-of-class time spent on math assignments for this year compare with that for last year's class?

   ____ more — Why?
   ____ less — Why?
   ____ about the same

STUDENT CHARACTERISTICS

A. When compared with last year's class, was this year's class
   ____ more able
   ____ less able
   ____ about the same in mathematics

B. Are there other important ways in which this year's class differs from your class last year?

C. Did these differences cause you to alter
   a) your grouping? ____ No
      ____ Yes—In what way?
   b) choice of topics? ____ No
      ____ Yes—Explain
   c) time spent on certain topics? ____ Yes—Explain
      ____ No
   d) your standards for student achievement? ____ Yes—Explain
      ____ No
11. (FOR B-SELECTIVE OMISSION STYLE)
   A. How far (did/will) you get in the book this year?
   B. Why do you choose to teach some topics while omitting others?
   C. (Using the chapter headings in a copy of the textbook's table of contents as a guide) Ask--What chapters do you omit? (If necessary, describe as chapters where they skip all, or almost all, of the lessons.)
   D. Do you typically use all of the textbook lessons that deal with a topic you've decided to teach?
      — yes
      — no — Why not?
   E. Each lesson in the Teacher's Edition of most textbooks has several distinct sections. As I name each of these, I would like for you to tell me if you typically teach that part of the lesson.
      1. Teacher-directed introductory material
         — yes
         — no — Why not?
      2. Problem sets for student practice
         — yes
         — no — Why not?
      3. Enrichment activities or challenge exercises such as starred problems or brain teasers
         — yes
         — no — Why not?
      4. Story problems at the end of a lesson
         — yes
         — no — Why not?
SUPPLEMENTARY MATERIALS

1. Do you use supplementary materials in your math class?
   _____ no
   _____ yes — Can you briefly describe why you use them?
   (Probe to determine if teacher uses these materials to:
   _____ present new topics not covered in text
   _____ provide additional practice for topics presented in
   the text)

TEXTBOOK USAGE

1. Including this year, how long have you used your present math text?
   _____ 3 or more years — Has your use of the text changed from last
   _____ no
   _____ yes — Explain
   _____ 1 year
   _____ 2 years — Did the change in books affect:
   a. topics you teach? _____ no _____ yes — Explain
   b. grouping of students? _____ no _____ yes — Explain
   c. total time devoted to math? _____ no _____ yes — Explain
   d. time on selected topics? _____ no _____ yes — Explain

STANDARDS

1. A. Of all the math topics you covered this year, what are the two or
   three topics you consider most important for (fourth grade/fifth grade)
   students to learn?
   B. Pick a topic at about the level of our catalog (other than facts or
   story problems) and ask.....
      → How did you decide when to move from (name the topic) to the
      next topic you covered?
      (Probe for level of student achievement and percent of students)

2. A. (Fourth grade) I assume you covered multiplication this year. How
   did you decide when to shift from lessons on one-digit multipliers
   to lessons on two-digit multipliers?
   (Probe for level of student achievement and percent of students)
   B. (Fifth grade) I assume you covered division this year. How did you
   decide when to shift from lessons on one-digit divisors to lessons on
   two-digit divisors?
   (Probe for level of student achievement and percent of students)

3. Are there any topics you teach for "exposure" only?
   (If asked to explain "exposure," respond, "topics taught for exposure are
   those where you are not concerned about the number of students who master
   the topics.")
   _____ no
   _____ yes — please name two or three of these
   How did you decide when to move from (name any topic mentioned) to the
   next topic you covered?
   (If appropriate, probe for levels of achievement and percent of students.)
PERCEPTIONS OF DISTRICT AND SCHOOL POLICY

I am now going to ask you several questions in an attempt to identify areas where your school or district has active policies. In areas where there are no policies, the questioning should go quickly.

1. MATHEMATICS OBJECTIVES
   A. Are you aware of any special efforts by your district to promote policies in the area of mathematics objectives?
      _____ no
      _____ yes -- briefly describe
   B. Is your school making any (special/additional) efforts to promote either the district's policy or its own policy in this area?
      _____ no
      _____ yes -- briefly describe. (Clarify whether these reflect school initiatives regarding district policy, or the school's own policy.)
   C. How has (this policy/these policies) affected your teaching?

2. MEAP (MICHIGAN ASSESSMENT) TESTING
   A. Are you aware of any special efforts by your district to promote policies in the area of MEAP testing?
      _____ no
      _____ yes -- briefly describe
   B. Is your school making any (special/additional) efforts to promote either the district's policy or its own policy in this area?
      _____ no
      _____ yes -- briefly describe. (Clarify whether these reflect school initiatives regarding district policy, or the school's own policy.)
   C. How has (this policy/these policies) affected your teaching?

3. STANDARDIZED OR DISTRICT-GENERATED TESTS OF MATHEMATICS ACHIEVEMENT
   NAME: _______________________
   A. Are you aware of any special efforts by your district to promote policies in the area of standardized or district-generated tests of mathematics achievement?
      _____ no
      _____ yes -- briefly describe
   B. Is your school making any (special/additional) efforts to promote either the district's policy or its own policy in this area?
      _____ no
      _____ yes -- briefly describe. (Clarify whether these reflect school initiatives regarding district policy, or the school's own policy.)
   C. How has (this policy/these policies) affected your teaching?

4. TEXTBOOKS AND OTHER MATERIALS FOR MATHEMATICS
   A. Are you aware of any special efforts by your district to promote policies in the area of textbooks and other materials for math?
      _____ no
      _____ yes -- briefly describe
   B. Is your school making any (special/additional) efforts to promote either the district's policy or its own policy in this area?
      _____ no
      _____ yes -- briefly describe. (Clarify whether these reflect school initiatives regarding district policy, or the school's own policy.)
   C. How has (this policy/these policies) affected your teaching?
9. POLICIES PROMOTING SPECIAL TOPICS IN MATHEMATICS (SUCH AS THE PRESS TO TEACH METRIC MEASUREMENT)

A. Are you aware of any special efforts by your district to promote the teaching of special topics in mathematics?
   ___ no
   ___ yes -- briefly describe

B. Is your school making any (special/additional) efforts to promote either the district's policy or its own policy in this area?
   ___ no
   ___ yes -- briefly describe. (Clarify whether these reflect school initiatives regarding district policy, or the school's own policy.)

C. How has (this policy/these policies) affected your teaching?

SPECIAL PROGRAMS

1. Does your school or district have special math projects or pullout programs in mathematics that affect one or more students in your classroom?
   ___ No — skip to REACTIVITY
   ___ Yes — briefly describe

2. How has this program affected your teaching?

REACTIVITY

1. In what ways has working with our project affected your math instruction this year?
   (Probe to clarify vague references to any of our types of content decisions:
   - topic selection
   - pacing
   - sequencing
   - standards
   - total time on mathematics)

A. Porter
5/25/83

ADDITION TO THE N-34 END-OF-YEAR TEACHER INTERVIEW

Please insert the following two questions on p. 23 of the 5/23/83 end-of-year teacher interview.

1. During the year, you indicated having had conversations with other teachers about mathematics instruction. What sorts of things were covered in those conversations?

2. You also indicated having had conversations with your principal concerning math instruction. What sorts of things were covered in those conversations?
II. Topics

We have collected a great deal of information on the topics you and other teachers in your district have covered in math. I am going to identify just a few of the changes you and other teachers in your district made between the 1981/82 school year and last year. In each case, I am interested in whether the change is consistent with what you remember and what reasons you can give for the change.

NOTE TO INTERVIEWERS: The retrospective questionnaire data for each district is to be analyzed to identify changes in topic coverage a) that appear typical for teachers in the district, either by grade level or across grades and b) changes that are unique to a teacher but bring them into line with others. There should be a balance in asking about topics added and topics dropped. Ideally, there would be questions about conceptual understanding, skills and applications. Since what can be asked is in large part dependent upon the data for the district, compromises will likely be necessary.

III. Closing Questions on Topics

The topics I have just identified represent only some of the several changes you made in your coverage of math. Do any other changes you have made, either topics added or dropped from instruction, stand out in your mind as especially important?

[If yes, for each topic identified, ask]

Why did you make this change in your content coverage?

[Here as elsewhere, probe for reasons, especially reasons relating to changes in school policies and practices.]
Appendix F

District Policy Study: Teacher Questionnaires (1982-85)

1. General Topics
2. Subtopic Experience and Belief
3. Topic Coverage, Intentions, and Experience
I. General Topics

GENERAL TOPICS QUESTIONNAIRE

THE SAME FIVE QUESTIONS WERE ASKED ABOUT EACH OF THE FOLLOWING TOPICS:

1. ADDITION OF WHOLE NUMBERS
2. SUBTRACTION OF WHOLE NUMBERS
3. MULTIPLICATION OF WHOLE NUMBERS
4. DIVISION OF WHOLE NUMBERS
5. NUMERATION
6. FRACTIONS/MIXED NUMBERS
7. DECIMALS
8. MONEY
9. PERCENTS
10. RATIOS/PROPORTIONS
11. EQUATIONS INVOLVING UNKNOWNS OR MORE THAN ONE OPERATION
12. MEASUREMENT
13. GEOMETRY
14. PROBABILITY AND STATISTICS
15. USE OF INTERPRET GRAPHS, FIGURES OR TABLES
16. STORY PROBLEMS
17. PROBLEMS INVOLVING LOGICAL REASONING
18. COMPUTER APPLICATIONS

1. Are you likely to give any attention to this general topic in teaching fourth graders during the coming year?
   1 Yes
   2 No → SKIP TO THE NEXT PAGE

2. Do you particularly enjoy teaching this general topic to fourth graders?
   1 Yes
   2 No

3. Which of the following is the single most important influence on what you decide to cover within this general topic? (Circle one number only.)
   1 Textbook
   2 Official curriculum guide/objectives
   3 Tests
   4 My own beliefs
   5 Advice from another teacher at my grade level
   6 Advice from the principal
   7 Advice from another person in the district
   8 Other

4. What is your best guess for the average period of time your fourth graders will spend on this general topic during the coming year?
   1 Less than one day → SKIP TO THE NEXT PAGE
   2 One to two days
   3 Three to five days
   4 Six to ten days
   5 Eleven to twenty days
   6 More than twenty school days

5. In which of the following months are you likely to devote more than one day to this general topic? In cases of individualized or small group instruction, answer in terms of the months in which more than half of the fourth graders in your class will be covering this subtopic. If you are uncertain, give your best guess. (Circle as many as apply.)
   1 Sept
   2 Oct
   3 Nov
   4 Dec
   5 Jan
   6 Feb
   7 Mar
   8 Apr
   9 May
   10 June
   11 Impossible to predict
THE SAME SEVEN QUESTIONS WERE REPEATED ABOUT THE FOLLOWING 15 SUBTOPICS:

1. Write whole numbers in expanded notation
2. Estimate products (in whole number multiplication)
3. Solve for missing factors where the missing factor is a whole number
4. Recognize relationship between division and subtraction
5. Division with two digit divisors, no remainders
6. Identify equivalent fractions and decimals
7. Add unlike fractions
8. Find percents of whole numbers
9. Estimate measurement values in metric system
10. Compute perimeter or area of rectangles
11. Use knowledge of geometric properties or characteristics to identify missing parts of geometric figures
12. Compute averages or means
13. Make graphs, figures or tables
14. Solve story problems that require use of two or more operations/steps
15. Demonstrate knowledge and skills in computer applications
<table>
<thead>
<tr>
<th>DIVISION OF WHOLE NUMBERS</th>
<th>FRACTIONS/MIXED NUMBERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognize relationship between division and subtraction</td>
<td>Identify pictorial or concrete representations of equivalent fractions</td>
</tr>
<tr>
<td>Recall division facts</td>
<td>Identify equivalent mixed numbers/improper fractions (e.g., 8/3 * 13/3)</td>
</tr>
<tr>
<td>Division with single digit divisors and remainders</td>
<td>Identify equivalent fractions and decimals (e.g., .25 * .34)</td>
</tr>
<tr>
<td>Division with two digit divisors and no remainders</td>
<td>Order or complete number sentences using &gt;, &lt;, or = for two or more fractions (e.g., which is largest: 5/8, 3/16 or 1/32; or 5/9, 5/16)</td>
</tr>
<tr>
<td>Estimate quotients</td>
<td>Add like fractions - same denominators</td>
</tr>
<tr>
<td>Check answers to division problems using multiplication</td>
<td>Add unlike fractions - different denominators</td>
</tr>
<tr>
<td>Identify factors/common factors</td>
<td>Divide fractions or mixed numbers by other fractions or mixed numbers (e.g., 1/3 * 1/4 = ?)</td>
</tr>
<tr>
<td>Solve story problems that focus on division of two whole numbers</td>
<td>Determine fractional parts of a whole number (e.g., 1/3 of 21 = ?)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EQUATIONS INVOLVING UNKNOWNS OR MORE THAN ONE OPERATION</th>
<th>MONEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solve problems that require more than one operation and include parentheses/grouping symbols (e.g., (8 + 3) * 3 = 7 or 519 - (16 x 27) = ?)</td>
<td>Make change</td>
</tr>
<tr>
<td>Solve for missing factors where the missing factor is a fraction, mixed number or decimal (e.g., 15n = 5)</td>
<td>Compute prices with discounts expressed as fractions or percents</td>
</tr>
<tr>
<td>Solve for the unknown in proportional equations (e.g., 5/8 = n/16)</td>
<td>DECIMALS</td>
</tr>
<tr>
<td>1 2 3</td>
<td>1 2 3</td>
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<td>1 2 3</td>
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<td>1 2 3</td>
<td>1 2 3</td>
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<tr>
<td>1 2 3</td>
<td>1 2 3</td>
</tr>
</tbody>
</table>
### Time on Mathematics

1. Use the following table to record a typical week's schedule for the mathematics you taught to fourth graders last year.

   On the blanks, write the time scheduled for mathematics each day (e.g., 10:00 - 10:45 am). If no time was scheduled on a given day, write none.

   SPECIAL INSTRUCTIONS FOR TEACHERS TEACHING TWO OR MORE PERIODS OF MATH TO FOURTH GRADERS
   If (a) you taught more than one period of math per day to fourth graders and (b) you had the same students for each of these periods, answer under Math Class 1 only. If (a) you taught more than one period of math per day to fourth graders and (b) you had different students for each of these periods, answer separately for each class.

<table>
<thead>
<tr>
<th></th>
<th>Math Class 1</th>
<th>Math Class 2</th>
<th>Math Class 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuesday</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wednesday</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friday</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. During the coming year, about how many minutes per week do you expect your fourth graders to spend in mathematics class (or regularly scheduled time for working in school on mathematics assignments).

<table>
<thead>
<tr>
<th>Math Class 1</th>
<th>Math Class 2</th>
<th>Math Class 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minutes per week:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. During the coming year, if you were free to do whatever you want in fourth grade mathematics, how likely would you be to change your present plans in each of the following areas? (Circle the appropriate number in each row.)

<table>
<thead>
<tr>
<th></th>
<th>Definitely would change</th>
<th>Probably would not change</th>
<th>Definitely would not change (I am already free to choose)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>b</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>c</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>d</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>e</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>f</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Knowledge of Incoming Class

3. Which of the following statements best characterizes the knowledge you have of the fourth graders who will be in your mathematics class during the coming year?

1. I know many of the students personally; I have some knowledge of their past performance in mathematics
2. I know many of the students personally, but I have little or no knowledge of their past performance in mathematics
3. I do not know many of the students personally; I do know generally what type of student to expect as far as past performance in mathematics is concerned
4. I do not know many of the students personally, nor do I know what type of student to expect as far as past performance in mathematics is concerned

Comparing last year's class with the year before

2. Think of the students you had for fourth grade mathematics last year (1983-84) as compared with the year before (1982-83). How did the two classes compare in level of mathematics ability?

<table>
<thead>
<tr>
<th></th>
<th>1983-84 was much higher ability</th>
<th>5 1983-84 was much higher ability</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1982-84 was somewhat higher</td>
<td>4 1982-84 was somewhat higher</td>
</tr>
<tr>
<td>3</td>
<td>1982-84 was about the same as 1982-83</td>
<td>3 1982-84 was about the same as 1982-83</td>
</tr>
<tr>
<td>2</td>
<td>1983-84 was somewhat lower</td>
<td>2 1983-84 was somewhat lower</td>
</tr>
<tr>
<td>1</td>
<td>1983-84 was much lower</td>
<td>1 1983-84 was much lower</td>
</tr>
<tr>
<td>0</td>
<td>I did not teach fourth grade mathematics both years</td>
<td>0 I did not teach fourth grade mathematics both years</td>
</tr>
</tbody>
</table>
Teaching Experience

6. Please fill in the following table of teaching experience. (Convert part-time experience to full-time equivalent and round to nearest year.) If you have taught split classrooms with children from more than one grade, identify the grades included in the split (e.g., 3rd/4th) as well as the number of years taught.

<table>
<thead>
<tr>
<th>Total years taught in this school</th>
<th>Total years taught in this district</th>
<th>Total years taught in other districts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kindergarten</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grades 7 or 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grades 9, 10, 11 or 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Split classes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. Check to see if the last two columns above sum to your overall total years of teaching experience. Enter this overall total below.

______ years

8. In how many of your overall total years of teaching experience have you not taught mathematics?

______ years

and, CCE
Appendix G

District Policy Study: Curriculum Coordinator Interview (1982-85)
INTRODUCTION

Hello, this is ________ calling from Michigan State University's Institute for Research on Teaching. You may recall that last year we were working with teachers at _______ and _______ schools. We are currently analyzing that year's work and getting ready for the follow-up study.

I am calling today to ask about changes in district curriculum policy during this past year. You and I have talked before about district policy; knowing that people's responsibilities change, I guess I should begin by asking if you are still the best person to give me information about district policies and consistent practices concerning elementary school mathematics—such policies as instructional objectives, testing, promotion and retention, textbooks, etc.? (If not, then who?)

Would this be a convenient time for us to talk? My questions will probably take 30 to 40 minutes.

First, I'd like to check my understanding of district policy or consistent practice in each area; then I'd like to know if there have been any changes this year (1983-84). We'll begin with curriculum guides/instructional objectives.
TESTING

Again, first I'll verify my understanding of the testing programs you had in place a year ago, then I'll ask you for changes. [INTERVIEWER, REFER AGAIN TO LIST OF POLICY DOCUMENTS RECEIVED FROM THIS DISTRICT, AND CHECK FOR POSSIBLE OTHERS.]

*13-17 One year ago, my notes indicate that your district had:

- Locally developed district-wide tests, given in grades ________

- ____________________________ (name of commercial standardized test) given in grades ________

- All the children in each of these grades are expected to take the tests, and none are excused.

- Building-level summaries of test results go to:

  - Central administrators
  - School board
  - Principals
  - Teachers
  - Parents
  - Local newspaper

21. Within this last year, has the district made any changes in the testing program? [IF YES, DESCRIBE, AND SOLICIT DOCUMENTS.]

- ________

18. During the past year, were the results of MEAP and/or district-wide tests discussed at length at any of the following sorts of meetings? (MARK YES OR NO FOR EACH.)

- Administrators' meetings attended by elementary school principals?
- Staff meetings in most elementary buildings?
- School board meetings?
- Group meetings of parents of elementary school children?
- Any other meetings? [DESCRIBE ]

[IF YES TO ANY OF THE ABOVE, ASK:] Do minutes or other written records of any of these meetings exist? How might we obtain them?

22. Is it likely that changes will be made in this testing program within the next year or so? [PROBE FOR NATURE OF THE CHANGE; DO DOCUMENTS ALREADY EXIST?]

(new) [IF WE DO NOT HAVE THESE ALREADY, ASK:] We'd like to have a copy of the ________ (standardized test) you gave in grades 4 and/or 5 in 1982-83, the year we were working in your district. Who would be the best person to ask for this/these copy(s)? We would of course be happy to pay.

(new) Do you have reports containing longitudinal data on MEAP and/or standardized test results for your district? How may we obtain a copy of such longitudinal results?

*63. In our conversation last year, I asked you some questions about possible uses of district-wide tests. As I verify my understanding of your past practices, please tell me if anything has changed in your district in the past year. [PROBE TO UNDERSTAND ANY CHANGES THAT ARE MENTIONED, AND SOLICIT DOCUMENTS WHERE THEY EXIST.]

In the past, district test results...

- were/were not used to place students, either in ability groups or in classrooms which differ in ability. Has this changed?
- were/were not used to decide whether to promote individual students. Has this changed?
- were/were not used to evaluate teachers. Has this changed?
- were/were not used to identify schools where students are performing better or less well than might be expected. Has this changed?
- were/were not used to determine whether principals should receive a salary increase for high student achievement. Has this changed?
- were/were not used for other allocation of funds. Has this changed?

[IF ANY CHANGES ARE MENTIONED, PROBE TO UNDERSTAND, AND SOLICIT DOCUMENTS.]
**STUDENTS**

(REMEMBER, YOU MAY SUMMARIZE COMMENTS FROM LAST YEAR RATHER THAN RESTATE THE MULTIPLE CHOICE OPTIONS.)

**X**

**#30. In your district a year ago, schools were**

- encouraged to individualize mathematics instruction
- encouraged not to individualize mathematics instruction
- left to themselves in making this decision
- other (interviewer made notes)

**ASK.** Has there been any change in this district practice in the past year?

**[I YES.** (PROBE TO UNDERSTAND NATURE OF CHANGE, AND SOLICIT DOCUMENTS.)

**[THEN ASK.** Have these changes been called to the attention of teachers and/or principals in any special way? (PROBE, AND SOLICIT DOCUMENTS.)

**[I NO.** (ASK.** Have the current practices been called to the attention of teachers and/or principals in any special way? (IF YES, PROBE, AND SOLICIT DOCUMENTS)

**X**

**#31. A year ago, according to my notes, your district's position on retention in the elementary grades was that schools were**

- encouraged to retain some students in grade
- encouraged not to retain students in grade
- left to themselves in making the decision about retaining students
- other (with interviewer notes)

**ASK.** In the past year, have there been any changes in the district position on retention?

**[I YES.** (PROBE TO UNDERSTAND NATURE OF CHANGES, AND ASK FOR DOCUMENTS)

**[THEN ASK.** Have these changes been brought to the attention of teachers and/or principals in any special way? (IF YES, PROBE AND ASK FOR DOCUMENTS)

**[I NO.** (ASK.** Has the existing position been brought to the attention of teachers and/or principals in any special way? (IF YES, PROBE, AND ASK FOR DOCUMENTS)
TIME ALLOCATIONS

**34.** A year ago, according to my notes, you said that your district:

- had guidelines suggesting that the minimum time to be spent in mathematics instruction in the 4th grade was ________.
- had no guidelines suggesting the minimum amount of time to be spent in mathematics instruction in grades K-6.

[ASK] In the past year, have there been any changes in the district guidelines for the minimum amount of time to be spent on mathematics instruction in elementary mathematics classrooms?

(3) YES... (PROBE TO UNDERSTAND NATURE OF CHANGES, AND ASK FOR DOCUMENTS)

[THEN ASK...] Have these changes been brought to the attention of teachers and/or principals in some special way? (IF YES, PROBE AND ASK FOR DOCUMENTS)

(5) NO... [ASK] During this past year, have existing policies been brought to the attention of teachers and/or principals in any special way? (IF YES, PROBE AND ASK FOR DOCUMENTS)

(new) Is it likely that changes will be made within the next year or so in the recommended time to be spent in mathematics instruction in elementary classrooms? (IF YES, PROBE TO UNDERSTAND)

DISTRICT CONTENT EMPHASIS

**36.** A year ago, I read you a list of topics in elementary school mathematics and asked whether your district singled any of these out for special emphasis. I'm going to review your answers and ask about changes. (IN THE LEFT MARGIN, CIRCLE "S" IF THE TOPIC IS CURRENTLY EMPHASIZED. USE THIS CHECKLIST FOR QUESTION 36A.)

[ASK] A year ago, you said that fractions (was/was not) singled out for special emphasis. Is that still the case? (FOR ANY CHANGE, ASK WHY)

(5)

A year ago, you said that decimals (was/was not) singled out for special emphasis. Is that still the case? (FOR ANY CHANGE, PROBE TO FIND OUT WHY)

(5)

A year ago, you said that geometry (was/was not) singled out for special emphasis. Is that still the case? (FOR ANY CHANGE, PROBE TO FIND OUT WHY)

(5)

A year ago, you said that metric measurement (was/was not) singled out for special emphasis. Is that still the case? (FOR ANY CHANGE, PROBE TO FIND OUT WHY)

(5)

36A (FOR EACH TOPIC SINCE SINGLED OUT--I.E., FOR EACH CIRCLED "S" IN THE LEFT MARGIN, ASK...) What has the district done to emphasize the importance of this topic? (PROBE AND ASK FOR DOCUMENTATION.)


**BUILDING AUTONOMY**

-42. The term "building autonomy" has/have not been used to describe your district. Would you still (apply/not apply) that term to your district?

  [ ] YES
  [ ] NO. . . [ASK] How has your district changed? (PROBE FOR NATURE OF THE CHANGE AND ANY DOCUMENTATION)

(new '83) During the past academic year, have you instituted any new requirements for teachers beyond those required by the state for certification?

  [ ] YES. . . [PROBE FOR CHANGE AND ASK FOR DOCUMENTATION]
  [ ] NO

(new '83) Since this time last year, has your district become involved in any sort of school accreditation or evaluation?

  [ ] YES. . . [PROBE FOR THE ROLE OF MATH; REQUEST APPROPRIATE DOCUMENTS]
  [ ] NO

(new) During the past year, have elementary teachers attended a district-sponsored inservice having to do with mathematics? (IF YES, DESCRIBE, AND DOCUMENT IF POSSIBLE.)

(new) Has your district instituted a policy about homework? (IF YES, PROBE AND SOLICIT DOCUMENTS.)
Appendix H

District Policy Study: Principal Interview (Spring 1983)
PRINCIPAL INTERVIEW (R-34)

Hello, my name is ____________ and I'm part of a team at the Institute for Research on Teaching that has been working with ___ (name ___ teachers) ___ in your school this year. I would like to ask you some questions on the phone about your school. It will probably take 15 to 20 minutes to answer these questions. If it turns out that you want to talk about any of the points at length, we can arrange a second telephone call (or possibly meet at your school). Is now a convenient time, or should I call back later?

Introductory Questions

1. How long have you been a principal in this school?
   If only 1 or 2 years, ask:
   Were you a principal before coming to this school? For how long?
2. About how many students are in the school?
3. What grades are included?
4. A. Does your school or district have special math projects or pullout programs in mathematics that affect one or more students in grades 4-6 in your school?
   __ no -- SKIP to question 5
   __ yes -- briefly describe
   In what ways would math instruction change in your school if these programs were discontinued?
5. Does this school differ in important ways from other schools in the district? How?
   (Probe for characteristics of teachers, students, SES)

Perceptions of School and District Policies

As you know, we are interested in school and district policies which are relevant to mathematics instruction. For each of the following policy areas, I am going to ask you what you think we should know about what has been happening in your school or district this year. In other words, what special efforts have been made which are important to understanding the mathematics instruction in your school. We are concerned with district policies, school policies or practices you and your staff have agreed to emphasize. I should add that we are asking about the same policy areas in each of the districts we study, so some of the areas may not apply to you.

Again, the question is what special efforts have been made in your school or district this year which are particularly important to understanding the mathematics instruction in your school?
(Justify, if necessary, emphasis on this year by saying that we already know something about previous years at the district level.)
(Probe to distinguish between school and district efforts.)

1. Let me start with math objectives. What special efforts have been made in your school or district concerning math objectives which are important to understanding the mathematics instruction in your school?
2. How tell me about special efforts concerning Michigan Assessment Testing?
3. Standardized or district generated tests of mathematics achievement (name tests).
4. Textbooks and other materials for mathematics.
5. Policies recommending the amount of time that should be spent on mathematics.
6. Policies on use of small groups or individualized instruction in mathematics.
7. Policies about student retention or grade-to-grade promotion (where relevant to mathematics).
8. Policies on inservice for teachers where these are relevant to math.
9. Policies promoting special topics in mathematics (such as the press to teach metric measurement).

Closing

1. In your view, what school or district policy has had the greatest influence on mathematics instruction offered in your school? Why?
2. Are there any ways that haven't already been mentioned that you personally attempt to promote student achievement in your building?