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ABSTRACT

SELECTED INFLUENCES ON IMPLEMENTATION OF CURRICULUM CHANGE

By

Steven Alan Gaynor

Many national reports have emerged explaining, critiquing, and proposing changes for U.S. education. One of the many common themes running through them was the interrelationship of factors that affect curriculum implementation in the schools.

Whether this relates to content or methodology, it must be accomplished by classroom teachers. Among the prescriptions in the literature for attaining acceptance are participative decision making, school culture factors, in-service training, leader (principal) behavior, personal characteristics of teachers such as age and experience, and the availability of material and personnel resources. The present researcher studied the extent to which such factors, operating in the context of math and language arts curriculum implementation, led to increased use of the new curricula.

Specifically, 68 elementary classroom teachers in the Holly (Michigan) Area School District were surveyed over a period of one semester, to report the frequency with which they used manipulatives

and calculators (new to the math curriculum) and their frequency of teaching writing in a formalized "process" approach. To illuminate the survey results further, 12 teachers were interviewed.

Most of the organizational variables suggested in the literature failed to produce differences in implementation rates. There were clear distinctions in school culture and leader behavior, but not in implementation. Neither training differences nor participative decision making resulted in such differences. Perhaps the individualistic nature of teaching was too difficult to overcome: Once the classroom door is closed, the taught curriculum predominates, not the written one.

Two variables might have some effect on implementation. First, emerging from the interviews, effective use of consultants and material resources may have some effect. Second, individual teacher characteristics seem to have some influence. Younger teachers with less experience seem more inclined to implement. Also, the nature of that experience may have the same effect. Thus, implementation appeared idiosyncratic; that is, those characteristics led to a predisposition to implement, regardless of other factors.

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CHAPTER I

INTRODUCTION

Background Information

In 1982, the United States Secretary of Education, Terrell Bell, appointed the National Commission on Excellence in Education to study the state of education in this country. Its report, A Nation at Risk: The Imperative for Educational Reform,[1] put educational reform at the top of the national agenda. Since that time, the competition to publish reports explaining, critiquing, and proposing changes for U.S. education has become formidable. One common thread running through many of the reports is the imperative for curriculum reform. The issue of how to achieve that reform locally through needed curriculum change was the focus of this research.

Hechinger and Hechinger explained this critical environment by noting that "the public schools are not peripheral institutions. They are at the center of society."[2] The loss of confidence in public education parallels a decline in society. In addition, the Sputnik/National Defense Education Act surge from the late 1950s was lost to the rebellion of the 1960s and the "me generation" of the 1970s. Although new initiatives such as Head Start and the Elementary and Secondary Education Act were begun, these were also

means of "solving" urban crises, using schools to effect social change.[3]

The causes of the present crisis in education lie primarily with a lack of economic growth that has hurt the family, combined with disappointment over our societal failure to reach the social goals of the 1960s, and the business community's feeling that it is not getting its money's worth from education. Workers evidence low literacy rates and a lack of responsibility and dedication. Education is not viewed as an investment in the future.[4]

Hechinger and Hechinger then cited a decline in the quality of teachers, due to a lack of career opportunities, inadequate teacher training, poor working conditions, conservatism of educational leaders, and a failure to achieve consensus on the goals of education. As a solution, public school leadership must enforce the pursuit of excellence. This includes definition of an essential core of subjects and a rapid expansion of experiments to break the "lock-step" of public schooling.[5]

After 1982, a series of reports from diverse sources flooded the education market. Although their specifics varied, their messages were similar: Curriculum must change to meet the rapidly developing needs of business and society. The climate created by these reports, and others like them, was a sense of urgency to change the breadth and depth of education. These calls for changing curriculum related to both instructional methodology and content.

For example, Adler wrote that there should be a one-track system of schooling, with three objectives: (a) "personal growth or

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For example, Adler wrote that there should be a one-track system of schooling, with three objectives: (a) "personal growth or

self-improvement, (b) the individual's role as an enfranchised citizen of this republic, . . . [and] (c) the adult's need to earn a living in one or another occupation."[6] More specifically, Goodlad advocated greater decentralization of authority and responsibility to the local school, long-range planning by the principal and staff, minimum competencies or knowledge for students, enrichment and remediation, elimination of ability grouping, increasing mastery learning, and restructuring schools with regard to size, age ranges, opportunities for innovation, and collaborative teaching.[7] Similarly, the College Entrance Examination Board noted that "schools will need to devise their own coherent curricular and instructional strategies."[8]

The Education Commission of the States agreed, concluding that each district must develop its own plan. It would include the following: Strengthen curriculum, measure student progress and promote based on mastery, use more effective management techniques, address the gifted, and address the needs of the handicapped.[9] Concurrently, the Twentieth Century Fund Task Force on Federal Elementary and Secondary Education Policy noted that a national commitment to excellence in public schools is needed, and a core curriculum was stipulated: reading, writing, calculating; technical capabilities; and science, foreign language, and civics.[10]

The call to action demonstrated above remained largely confined to professional educators until A Nation at Risk. It called for the "new basics" to make better use of the school, increase the length

of the school day or year or both, and increase the amount of homework.[11] The elementary school equivalent of the foregoing volume was a more personal essay by Bell's successor, U.S. Secretary of Education William J. Bennett, entitled First Lessons. He argued that, to remediate the less critical elementary school problems, we must impart crucial math skills and problem-solving strategies, find more instructional time within the present schedule, use homework and other time-extenders, and employ creative curricular strategies.[12]

As can be seen, these publications varied only in details, not in their thrust. While the common denominator among them all was the call for change, several different change strategies were offered, stratified between all levels of government. There was a new role for the federal government, new tasks for the states ranging from encouragement to coercion, and calls to arms for local boards of education. At bottom in all of these efforts was the call to local schools: Become competitive, educate all to at least these new minimum standards, or face the consequences. These consequences ranged from the state wresting control from local boards, to tuition vouchers, to open enrollments within a district's schools.

Despite these threats, none addressed the issue of why change in educational institutions moves so slowly. However, Cohen proposed three reasons for entrenchment.[13] First is the U.S. instructional inheritance. Traditional learning practices here call for students to listen, read, and absorb knowledge.

Next, he suggested that teaching is a popular, not exclusive, practice. That is, while it is a specialized craft practiced by specially trained people, it is also an unspecialized practice of many adults, especially parents. It is didactic--directive rather than explanatory.

Finally, the structure of U.S. education impedes communication about practice in several ways. The system is too large, sprawling, and diverse. Also, reforms often originate at elite universities, which are remote from the vast majority of schools they seek to influence; do not educate the vast majority of teachers; whose faculties appear neither interested, nor accomplished, in using the practices themselves; and are remote from the hard-working teachers who have no reason but curiosity to read the publications of the "great universities."[14]

Statement of the Problem

Thus, despite these inhibitions to change, a recent eight-year history of criticism has created this problem for educators: What methodology of identifying, planning, and implementing new curriculum will most likely lead to its implementation? Specifically, this researcher identified from the literature several factors predicted to increase the congruence between the written and taught curriculum.

Among these factors are teacher in-service training, teacher participation in decision making, principal's leadership style, personal characteristics of teachers such as age and teaching

experience, grade level taught, material and personnel resources, and school culture. These were then tested on 43 elementary classroom teachers, spread among three schools in one suburban district, to observe their effects on implementation of new curriculum. This latter was defined as frequency of using new "process writing" techniques, mathematics manipulatives, and calculators, all new to the language arts and mathematics curricula, respectively. Surveys to measure such implementation were supplemented by personal interviews of the highest and lowest users of manipulatives in each of the highest and lowest manipulatives-using schools, to illuminate further the statistical results.

Endnotes--Chapter I

[1]National Commission on Excellence in Education, A Nation at Risk: The Imperative for Educational Reform (Washington, D.C.: Government Printing Office, 1983), p. 5.

[2]Fred M. Hechinger and Grace Hechinger, Restoring Confidence in Public Education (New York: Seven Springs, 1982), p. 1.

[3]Ibid., pp. 1-23.

[4]Ibid.

[5]Ibid.

[6]Mortimer J. Adler, The Paideia Proposal: An Educational Manifesto (New York: Macmillan, 1982), pp. 15-49.

[7]John I. Goodlad, A Place Called School: Prospects for the Future (St. Louis: McGraw-Hill, 1983), pp. 318-20.

[8]College Entrance Examination Board, Academic Preparation for College: What Students Need to Know and Be Able to Do (New York: College Entrance Examination Board, 1983), p. 32.

[9]Task Force on Education for Economic Growth, Action for Excellence: A Comprehensive Plan to Improve Our Nation's Schools (Denver: Education Commission of the States, 1983), p. 19.

[10]Twentieth Century Fund, Making the Grade: Report of the Twentieth Century Fund Task Force on Federal Elementary and Secondary Education Policy (New York: Twentieth Century Fund, 1983), pp. 3-4.

[11]National Commission, pp. 24-29.

[12]William J. Bennett, First Lessons: A Report on Elementary Education in America (Washington, D.C.: Government Printing Office, 1986), pp. 22-24.

[13]David K. Cohen, "Educational Technology, Policy, and Practice," Educational Evaluation and Policy Analysis 9 (Summer 1987): 159.

[14]Ibid., pp. 159-67.

CHAPTER II

REVIEW OF RESEARCH

The literature regarding implementation has greatly expanded in the last 20 years. Researchers have sought to explain why some innovations are more readily adopted that others, and why some teachers are earlier implementers than others.

Fullan and Pomfret offered a wide-ranging review of the literature regarding implementation of curriculum change. They began by defining such implementation and the importance of its study. "[I]mplementation is not simply an extension of planning and adoption processes. It is a phenomenon in its own right." It is "the actual use of an innovation. . . . This differs from both intended or planned use and from decision to use."[1]

For the authors, there are four reasons to study implementation. First, one will not know what has changed unless one has conceptualized and measured it. Next, such study helps explain why so many educational changes fail to become established. Third, without examining it, it may be ignored. Finally, without such study, it would be difficult to interpret learning outcomes and their causes.[2]

Based on their review of the research, curriculum implementation has five components. These included changes in (a)

subject matter or material, (b) organizational structure, (c) role/behavior, (d) knowledge and understanding, and (e) value internalization. Of these, both the behavior of teachers and their use of new subject matter are central to the present research.

The studies cited below mentioned at least a dozen reasons for change implementation. They were used to select independent variables for the present research. The independent variables are material and personnel resources; teacher characteristics such as age, experience, and grade level taught; school culture; in-service training; leader (principal) behavior; and teacher participation in decision making.

Effects of Teacher Participation in Decision Making on Curriculum Implementation

The independent variable most often mentioned in the research reviewed here is teacher participation in curricular decision making. What follows is a description, from the literature, of the likelihood that such participation will lead to implementation. Further, different types of participation and their effects are reviewed. In general, it may be said that any participation will probably generate some change. Greater amounts of participation, particularly decisions central to the teaching process, will yield faster or larger quantities of change.

Journals are replete with studies aimed at overcoming employee resistance to change. The ground-breaking investigation was done by Coch and French, conducted in a pajama-making factory.[3] They attempted to answer two main questions: (a) What can be done to

overcome resistance to changing production methods? and (b) How can workers' motivation to learn different production methods be increased?

Coch and French studied both partial (through representation on committees) and full participation (all workers required to change participated on committees). The study also included a control group of nonparticipants. Those who did not participate showed no change in either their resistance to change or rate of learning new production methods. However, much less resistance (i.e., better learning rates) was exhibited by the representative group, and the best performance came with full participation. The authors found rate of learning new methods was directly proportional to the amount of participation. Partial participation, then, was not as effective as total participation, but better than none. While valuable as a starting point, this research was conducted in an industrial setting, with a nonprofessional staff. This is quite different from the teaching environment.

A historical perspective on successful curriculum implementation was presented by Butt.[4] The curriculum reform movement has had three phases. In the first, "experts" (content specialists) designed the curricula outside of educational systems. Subsequently, in-service training was added in the second reform era. It was here that "teacher resistance" was discovered! Finally, regional policy making, including teacher representatives, was used. However, the effect of participation on curriculum

implementation was diluted because of administrative and committee layers, which all passed approval. Therefore, participating teachers must agree to changes suggested by the committee on which they serve, and teachers must, to some degree, initiate change recommendations.

Bridges delineated four ways administrators involved teachers in decision making: announcing decisions (nonparticipation), testing (trial balloon), soliciting, and delegating.[5] Participation becomes "the manner in which the administrator involves teachers in decision making." Bridges went on to suggest that principals share decision making when issues are central to teachers. For marginal ones, authoritarianism may be more appropriate. Inasmuch as curriculum change is central to teaching, this appears as a most suitable area for sharing and provides support for selecting participation as a variable. Further, the authors suggested that small groups facilitate participation.[6]

Another aspect of shared decision making was offered by Schaffarzick in 1976.[7] He asked how people in schools and districts consider whether or not to make elementary-level curriculum changes. Specifically, he studied patterns of participation by teachers and laymen.

Schaffarzick found that teachers' roles in decision making were not as central or meaningful as they would like. Higher authorities still made the final decisions. However, both principals and teachers shared the notion that joint decision making is best. Despite this, teacher approval is asked only perfunctorily. That

is, there is a large discrepancy between theory (what the actors say is best) and practice (what they do). Schaffarzick also mentioned the need for continuous, meaningful involvement.

This latter condition was mentioned by Firestone.[8] He sought to determine the relationship between the independent variables, teacher participation in planning and perceived teacher influence in planning, and the dependent variable, resistance to change. He hypothesized a direct relationship between resistance and participation promised but denied, and an inverse one between resistance and perceived influence. However, it was less clear that resistance increased when participation was promised but denied. Perhaps teachers' feelings of betrayal were mitigated by some other (professional?) characteristics.

A cautionary note was provided in Conway's 1984 review of the literature about participative decision making and implementation.[9] He cited Lowin's review covering 1924 through 1968, concluding that the research has been inconclusive, either because methodology was faulty or data were merely suggestive. This was despite the readily identifiable reasons why such a course should succeed. For example, subordinates are motivated by the ego-needs of achievement, autonomy, power, and self-realization; financial incentives; and meaningfulness of work. Managers hope for improved decisions regarding the system's technical aspects, increased likelihood of worker commitment, and increased productivity. Further, there is pressure for subordinates to consider decisions and their consequences.[10]

Peters emphasized that program development must include teachers in an all-encompassing process: organization, planning, attitude and behavior modification, development, implementation, evaluation, and revision.[11] The critical factor for success is direct involvement of teachers in planning, learning, teaching, and evaluating the new curriculum.[12]

Influence of the decision-making process was Martin and Saif's focus.[13] They advocated a systematic three-year model directed by teachers, and including teacher-administrator curriculum committees; advice from teachers-at-large, community, and professional consultants; pilot testing; evaluation; and a mechanism for sustaining reforms.

The change orientation of teachers was studied by Gardner and Beatty.[14] They investigated whether incentives used in curriculum-development projects to encourage teacher participation affected teacher change orientation. In addition, they compared the difference between subject areas for incentives.

Their results showed that change orientation was definitely affected by incentives. If teachers perceived themselves--and thereby their students--as centrally involved in and affected by the change, they were more willing to participate and implement change. The authors concluded that innovators should be identified and included in curriculum projects. By following the guidelines implied by the preferred incentives, committed teachers will participate and therefore willingly implement change. The focus on

change is different from implementation, and therefore is less strongly related to the present research. And this approach has yet to be verified.

Rhodes and Young stipulated that, although teachers may seem to be reinventing the wheel, they still have to be meaningfully involved in the curriculum-development process.[15] That is, although they may re-do tasks that other teachers have done in other places, they still must write, examine, and select their own materials.

Gaynor studied math curriculum change and implementation in an elementary school.[16] The curriculum under examination was Developing Mathematical Processes (DMP), which focused on mathematical process through the use of manipulatives and induction, not specific computational skills. After five years (1974-1979), DMP was dropped in favor of a textbook series. Despite this, Gaynor found that participation in the adoption process was an important factor in later implementation.

Measurement of the congruence between a planned curriculum and that actually being taught was studied by Kimpston.[17] A large midwestern suburban school district was studied for teachers' adherence to the language arts curriculum. The author confirmed that the written curriculum was taught most faithfully by those who participated in planning it.[18] This was supported by Fullan and Pomfret, who cited participation as a strategy that is frequently mentioned by others as critical to successful implementation.[19]

Finally, Carlson collected data from three western Oregon communities to answer two questions (among several others): (a) In

reality, are teachers actively involved in any decision making and policy formulation? and (b) To what extent should teachers participate in what kinds of decisions?[20] Data were collected using questionnaires distributed to all teachers working in the communities. Results portrayed teachers as "somewhat" influential; their involvement was confined to low levels of decision making. A rather large discrepancy existed between actual and desired participation. Thus, the decision-making levels at which teachers were involved were lower than those involving curriculum, which must be rated quite high.

In sum, then, the literature regarding participation in decision making supports the study of how participation and influence affect change orientation. There appears to be a direct relationship between participation and implementation (Coch and French). More specifically, teachers involved in curriculum planning will effect curriculum changes more readily (Kimpston). However, influence in the process yields more cooperation (Firestone), especially when issues are central to the teachers included (Bridges). Despite these findings, fewer teachers are involved in curriculum decision making than believe they should be (Carlson).

Effects of Leader Behavior on Curriculum Implementation

The theoretical foundations for leadership theory have evolved over decades, from the authoritarian beginnings of Frederick Taylor to the more human-centered approach now current. Generally, writers

presently favor a decentralized leadership style that allows for teacher input but retains some centralized authority for the principal. This appears to many researchers conducive to effecting implementation.

Douglas McGregor viewed leader behavior as a function of one's basic assumptions about human nature. Economic necessity does not demand traditional organization: top-down, centralized decision making and specialized jobs. Rather, this viewpoint reflects "Theory X" thinking; that is, people dislike work and responsibility, and they like being told what to do.[21]

This contrasts with "Theory Y" assumptions about human nature. People derive satisfaction from enjoyment of their work and good working conditions. They are motivated by fulfillment of their needs to affiliate in a positive manner with co-workers and an inherent desire to do a good job.

Based on this latter theory, McGregor proposed that organizations would increase effectiveness by decentralization and delegation of decision-making authority. He suggested that several alternatives would accomplish this, including job enlargement (increasing the variety of tasks for each worker), participative management (letting workers contribute to decision making), and management by objectives (joint goal setting and measurement of their accomplishment).[22] Thus, leader behavior allows for the influence of previously identified determiners of curriculum implementation (such as participation).

Maslow's needs hierarchy recognizes the inherent needs of all workers, from top to bottom[23]. As a lower-level need becomes satisfied, the next higher one becomes the motivator. These categories are as follows: physiological; safety and security; belonging, love, and social activity; esteem; and actualization or self-fulfillment. Again, the principal, by encouraging the fulfillment of higher-level needs, allows the implementation variables to operate.

Enrichment of these theorists was provided by Kurt Lewin.[24] His model for stimulating change in organizations is based on a view of organizations and individuals who are profoundly influenced by their outside environments. Organizations are systems composed of people whose behaviors are functions of their environments. Lewin assumed that organizations are open systems, affected by a dynamic world. People are influenced, and therefore motivated, by a variety of frequently changing factors. An effective supervisor, then, would be one who, while suspecting the need for change, nonetheless considers the psychological components of the workplace when planning a careful approach to such change.[25]

Recent publications, cited below, have supported Lewin's model and the research that underlies it, calling for leaders to decentralize and delegate in order to enrich teachers' jobs and stimulate change. This would presumably lead to increased willingness to accommodate changes identified as important to improving education.

For example, Stiegelbauer asserted that initiator-style principals experienced more success in change facilitation than either managers or "respondents"--those who were governed by circumstances.[26] School climate was better for managers, perhaps owing to more sympathy for teachers, with initiators second. Most important, implementation success was greatest for those who showed characteristics of both Theory X and Theory Y managers, those with both a task orientation and consideration for group maintenance. Thus, for purposes of the present study, one should remember that even Theory Y managers must envision long- and short-term goals. And Theory X managers must take care to involve teachers in decision making, allowing change to rise from lower organizational levels.[27]

Within this context, then, if change must occur at the school level, how can the principal facilitate it? Does he/she recognize a need for change? Can he/she identify (or help to) those areas requiring change? Does he/she have the competencies and personal attributes to effect change? And what are these? Does he/she encourage an atmosphere in which change and risk taking are accepted, even promoted?

Squires, Huitt, and Segars defined the principal's role in effecting change.[28] They asserted that one must instill a positive attitude toward change, obtain a commitment to the change, achieve role clarity for participants, buffer the staff from competing environmental pressures, secure the necessary resources, and provide social support and active participation. Thus, as the change agent, the principal is rightfully the pivotal actor in the drive for more

effective schools, ensuring the presence of the other attributes of successful implementation.

The principal's role in "program improvement" was the focus of Leithwood and Montgomery's 1982 review of research.[29] Their findings provide an appropriate summation of the leader's (i.e., principal's) role in change implementation and were used as a framework for the present research. They noted that much research has supported the elementary principal as possibly critical to the success of improvement efforts, defining change as the "realization of valued outcomes by students."[30]

Three types of studies were included. Among them were some evaluating the principal's role in general, some studying the implementation of educational innovations, and some regarding school effectiveness. The research designs were varied, from surveys to ethnographies. Subjects included either teachers or principals or both.

Effective principals (those who positively affect student learning either directly or through mediating variables) shared several characteristics. For example, they had a "task" orientation greater than their human relations one. While the former did not preclude the latter, interpersonal relationships were sacrificed for program effectiveness. Another descriptor is the amount of attention given instructional objectives. Effective principals establish priorities and emphases that focus instruction. Similarly, they take the next step by influencing instructional

strategies and their relationship to time on task, resources, and so on.

Decision-making authority is delegated to teachers, but within a framework established by the principal. And this input is solicited regarding issues of import, early in the process. During program-improvement efforts, principals clearly and publicly express their support, providing teachers with opportunities for professional development and attending professional-development sessions with them.[31]

In sum, then, principals who successfully effect change have a stronger task than relationship orientation. Simultaneously, they allow teacher input into curriculum decisions, which is especially effective when change is initiated by teachers themselves.

Effects of In-service Training on Implementation

Previously researchers have clearly attributed positive effects of in-service training on implementation of curriculum. For example, Rhodes and Young specified that teachers must become involved in the actual activities.[32] This includes both content and instructional strategies, the latter under study here. Principals and specialists must be trained, also, and training for all must be extensive.

Walberg noted that in-service training has substantial effects.[33] The biggest of these is on teacher knowledge, but classroom behavior and student achievement are also affected.

Effective training combines lectures, modeling, practice, and coaching.

Finally, Fullan identified staff development and successful innovation as being intimately related.[34] In fact, he asserted that the former is the central strategy for improvement. It should be related to the innovation, continue during implementation, and entail a variety of formal (e.g., workshops) and informal (e.g., teacher exchanges) components. These were examined for the present research as parts of training and collegiality, respectively.

Effects of Teacher Characteristics on Curriculum Implementation

Several personal attributes emerge from the literature as important indicators of the potential for successful adoption of curriculum. These include age of the teacher, length of his/her teaching experience, and grade level taught. The first two are quite closely related and would be expected to affect implementation similarly.

Gaynor's study of math-curriculum implementation indicated that the level of use was determined by cross-pressures between characteristics of the innovation and those of the actors in the system (school personnel, students, and parents). In particular, early elementary teachers implemented more frequently than those in later elementary grades. However, because the school studied was in the midst of a desegregation plan and the student population was therefore in transition, there is some question as to the value of this study.[35]

While attempting to quantify the suggestion that an increasingly positive attitude toward curriculum use results from participation in planning it, Langenbach identified useful personal characteristics, as well.[36] The vehicle was membership in a formal, organized committee designed to plan for the educational experiences of children in school. To the extent that this is similar to a curriculum study committee, it resembles the setting under scrutiny in the present research. Teachers were discriminated by level (elementary or secondary), number of years in teaching, and previous experience in planning.

The author found that teacher attitudes were affected by the interaction of level, past planning experience, and teaching experience. One must be cautious about the relationship between teacher attitudes and teacher performance (i.e., actual adoption). However, these three variables together augmented positive attitudes, although they did not alone.

While also studying participation, Kardas and Talmadge expanded the variable list to include 22 teacher characteristics.[37] They studied 100 elementary teachers in nine districts that already had systems for cooperative planning, including teachers, principals, specialists, and outside consultants. The intention was to determine the correlation between variables relating to degrees of participation, as well as an optimum combination of participation variables for enhancing implementation. Briefly, those most likely to implement change were elementary teachers with degrees below M.A.

and with small families, who enjoy curriculum writing and consulting, understand curriculum responsibilities, get professional-growth points, and participate frequently in planning.

These researchers suggested, then, that several characteristics of teachers will encourage curriculum implementation. Elementary teachers tend to do so more than secondary teachers. Having family commitments apparently does not hinder such adoption and will be studied with the qualitative data in this research. Results for age and experience seem unclear. If teachers with small families and only undergraduate degrees are young, then Kardas and Talmadge suggested that these teachers will implement more readily. Langenbach, however, argued that experience augments implementation.

Effects of Resources on Curriculum Implementation

The research is quite clear in predicting the efficacy of resource procurement in securing curriculum implementation. Authors have discriminated between personnel resources (including internal and external consultants, and even the principal) and materials. In either case, their use mediates in favor of teaching the written curriculum.

Ponder looked at the historical development of curriculum implementation in his review of literature.[38] The first type, practiced in the 1950s and 1960s, was "scholar dominated." This was primarily a research and development effort, using scholars, a minimal number of education specialists, and no practitioners.

The second he called "milieu-dominated," in that target populations (e.g., special education students, dropouts, and so on) were identified for special study. The methodology was similar to the scholar-dominated approach, except that the results could be adapted to local circumstances. Finally, Ponder described a "balanced-coordinated" process of local curriculum development. This is done in the setting (district or building) where it would be used. Teachers who will use the curriculum would actively help to develop it.

One of the factors Ponder identified that optimized implementation of new curriculum was resource support of teachers. He wrote specifically of using consultants, both internal and external. The principal, too, could serve this function, but to a more limited extent.

Factors affecting teachers' actual use of curriculum documents were studied by Van den Akker using science curriculum materials developed by the Dutch National Institute for Curriculum Development.[39] He found five factors that affect teachers' actual use of curriculum documents, one of which was the selective use of material and personnel resources. Although not part of the present research, the author also found that, the longer teachers used the new materials, the higher their rate of curriculum implementation.[40]

Katz attempted to determine the relationship of secondary teachers' commitment to change, to both the degree of training and support, and "professional values" (defined as disposition toward or against the new curriculum).[41] Data were collected from three

schools in New York and New Jersey, using observations and interviews. One result was that use of an internal support system (e.g., supportive department chair) was found important to encouraging change commitment.[42]

Implementation of a fifth-grade consumer-education curriculum served as the focus of a report by Smorodin.[43] As part of the overarching variable "amount of contact with program coordinator," the author also studied the effects of in-service training, feedback mechanisms, and participation. Results showed that amount of contact with a resource person did increase the amount of teacher implementation. Further, as such contact increased, so did the speed of adoption.

One of the characteristics that Fullan and Pomfret mentioned was resource support.[44] They categorized this as one of four strategies for implementing an innovation. Consistent with others mentioned above, they included both time with experts and use of materials. Thus, both the use of internal consultants and procurement of adequate materials are included as potentially important to the implementation of curriculum.

Effects of School Culture on Curriculum Implementation

School culture is a rather nebulous concept that might include several components. Here, collegiality and shared values among teachers, along with embracing organizational goals, are examined. The suggestion is that, if these are present, curriculum adoption will more likely succeed. For example, Wasserman identified five

conditions necessary to successful retraining by outsiders: passion and commitment to curriculum; "practice, practice, practice"; diagnostic feedback of teaching; constant self-examination of teachers' beliefs; and autonomous functioning.[45]

Of the three main factors that Ponder found to optimize implementation, two were teacher time and teacher commitment.[46] The first was described as time to develop, use, evaluate, and revise the written curriculum (and could not be studied in the present research). The second involved the teachers' own value systems. Similarly, Van den Akker mentioned collegiality within the school as contributing to the adoption of science materials.[47]

Katz found that teachers' personal and professional values and expectations had a great effect on teacher commitment to change.[48] His "professional values" were defined as disposition toward or against the new curriculum. These were powerful predictors even absent training and support, although these latter two were also important.

Kimpston's research in a midwestern suburban school district reported a lack of congruence between the written and taught curriculum, especially at the secondary level.[49] Those who most closely attended to the planned curriculum were those who believed in its importance and who had participated in planning it. Overall, faculty agreement with the emphasis placed on districtwide goals was low.

Katz and Kahn noted the difficulty of imposing compliance, especially in creative fields.[50] Therefore, employees must

internalize organizational goals, which then also contribute to the fulfillment of personal goals.

Finally, Fullan and Pomfret offered "characteristics of the adopting unit" as a fairly weak predictor of curriculum implementation.[51] Specifically, they mentioned organizational climate, environmental support, and demographic factors as having some research support.

Thus, elements of school culture have been predicted to favorably influence the adoption of curriculum. A high degree of teacher commitment to (belief in) the innovation is one such indicator. So is collegiality among the staff. Finally, a strong sense of professional values encourages such adoption. All of these are examined in the present research through the use of qualitative data from teacher interviews.

Summary

The literature, then, has pointed to several attributes of a system in which curriculum will be successfully implemented. Those relevant to the present research suggest that teacher participation in planning adoptions will facilitate their implementation. Further, in-house consultants and material resources, along with training in use of the innovation, will lead to its use. Teacher commitment to or belief in the adoption will also encourage them to implement it, as will close relationships within the staff. Teacher characteristics such as age, experience, and grade level taught may have some effect. Finally, leaders (principals) who support the new

curriculum, whose orientation is more toward task than relationship, but who encourage teacher participation in curricular decision making, will also have an influence on more frequent use.

Endnotes--Chapter II

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CHAPTER III

THE SETTING AND METHODOLOGY

With this body of research suggesting that participation, leadership, resources, training, teacher characteristics, and school culture all facilitate curriculum implementation, their actual effectiveness in one local school district was explored. As related below, teachers' implementation rates over five curricular innovations were assessed through written surveys administered four times during one school semester. The results were further elucidated by personal interviews with six teachers in each of two schools.

Agency Setting

The Holly Area School District is located midway between Flint and Pontiac in Oakland County, Michigan. Because of its proximity to those two industrial cities and Detroit, it is primarily a commuter-residential area. It serves the largest geographical area of any consolidated school district in Oakland County, covering approximately 120 square miles.

Even though Holly is located close to several urban areas, it retains a rural, small-town atmosphere. There are also many recreational facilities and academic institutions easily accessible

to the community. And, while many residents work either in the urban plants within a 25-mile radius or are middle-level corporate managers, the tax base for finance purposes is relatively low due to the lack of industry and commerce immediately in the area.

The schools have several programs to address the needs of special populations. In its third year, the gifted and talented program employs one full-time consultant serving all five schools. Remedial education is served by full-time reading consultants, aides, tutor-counselors, and a full range of special education programs for eligible students in the elementary schools.

The Holly Schools consist of three elementary schools (grades kindergarten through 6), each enrolling from 600 to 710 students. The middle school (grades 7 through 9) contains about 800 students, as does the high school (grades 10 through 12). There are 210 teachers, 170 support staff (custodians, clerks, aides, central maintenance, transportation), and 14 administrators. The 1988-89 budget approximated $13 million.

There is a history of more than 20 years of curriculum development at the elementary level, covering all subject areas taught. Historically, teachers have dominated the curriculum committees, both chairing and staffing them. One principal serves as administrative coordinator, and various internal and external consultants are also used. During the period 1986 through 1988, for example, three committees operated: language arts, mathematics, and kindergarten. Each consulted, to varying degrees, experts from the Oakland Intermediate School District (ISD).

The Language Arts Committee was composed of teachers representing each grade level, one through six, four reading consultants (one from each elementary building and one from the middle school for vertical curriculum articulation), the district gifted and talented consultant, and a principal. The Mathematics Committee was chaired by a third-grade teacher with special interest and expertise in mathematics instruction, and staffed by a different principal and one teacher for each grade, kindergarten through six. The Kindergarten Committee consisted of one kindergarten teacher from each building, a special education teacher with High/Scope training, and the third principal. By October 1989, their results were presented to the Board of Education for approval. Before that, drafts had been circulated among all certified staff for comment.

During the 1986-87 and 1987-88 school years, all elementary teachers were provided with in-service training in process writing. Each grade level was released for one full day during the first year (kindergarten for one-half day), and most teachers attended two three-hour workshops after school during the second. In fall 1988, all elementary teachers attended two half-day math workshops focusing on use of calculators, manipulatives, and problem solving to implement the new math curriculum. Also, during this period, many individual teachers attended workshops (for example, sponsored by the ISD) in cooperation with their principals.

Methodology

According to the literature cited above, several major factors potentially present in the school setting can create an atmosphere that is conducive both to a climate for change and a quality educational experience. Among these are teacher participation in decision making; school culture, including characteristics such as teachers' shared values regarding curriculum and the organization, and collegial relationships; leader behavior; teacher attributes such as age, experience, and grade level taught; personnel and material resources; and in-service training. The present researcher studied the extent to which such factors, operating in the milieu of mathematics and language arts curriculum change, leads to increased implementation of change.

To accomplish this, four surveys were administered at 22-day intervals to the 68 elementary classroom teachers in the Holly Area School District from January through June 1989. Participants were asked to report the frequency with which they used manipulatives and calculators (both new to the math curriculum) and their frequency of teaching writing in a formalized "process" approach. For, as Fullan and Pomfret suggested, "some implementation will have occurred at the point when certain new characteristics are actually in use in a social system."[1]

Of these 68 teachers, 54 returned at least some surveys, for a return rate of 79%. During data analysis, trends in implementation rates, seemingly related to school calendar, argued for eliminating incomplete responses. For example, during periods of "teacher

refreshment" (after semester change and spring break), rates increased. Before spring vacation and school year end, rates dropped drastically. Thus, the 11 incomplete sets were deleted from the data, resulting in a final return rate of 63%, or 43 surveys. These were distributed as follows:

	Completed Responses	Surveys Issued
Kindergarten	3	7
Grade 1	6	11
Grade 2	5	12
Grade 3	11	11
Grade 4	7	10
Grade 5	6	9
Grade 6	5	8
School A	10	24
School B	17	23
School C	16	21

Dependent variables were measures of the frequency with which teachers implemented instructional strategies from new language arts and mathematics curricula. All of these variables were newly and explicitly included in their respective written curriculum guides. These variables were all expressed as means.

For language arts, these included the number of minutes teachers taught process writing lessons, the number of minutes teachers allowed for process writing, the number of minutes teachers

allowed for journal writing, and a summative measure of the number of minutes allowed for all three process writing activities.

For mathematics, these included the number of minutes teachers used calculators during direct instruction, the number of minutes teachers used manipulatives during direct instruction, and a summative measure of the number of minutes allowed for both calculators and manipulatives. A final summative measure of the minutes allowed for all of the above writing and mathematics activities was also included.

The independent variables selected related directly to those found most prominently in the literature. There were six categories, subdivided as follows:

In-service Training

Days of teacher training in process writing (1-2.4; 2.5+)

Days of teacher training in calculators (0-.5; .6+)

Days of teacher training in manipulatives (0-1; 1.1+)

Total days of teacher training in process writing, calculators, and manipulatives (1-5.99; 6+)

Participation in Decision Making

Language Arts Curriculum Committee service (served; never served)

Mathematics Curriculum Committee service (served; never served)

Any curriculum committee service (served; never served)

Teacher Characteristics

Age

Teaching experience in Holly

Grade level taught

Use of Resources (from interviews)

Consultants

Supplies, mainly manipulatives

School Culture (from interviews)

Collegiality

Values shared within, and with, the organization

Attitude toward the curriculum

Leader Behavior (from interviews)

Teacher perceptions of demonstrated support of the curriculum (through statements, actions, etc.)

The interviews were conducted with the three highest and three lowest manipulatives-implementing teachers from the highest and lowest manipulatives-implementing schools. Implementation was based on the use of manipulatives because this was the only dependent variable that consistently displayed statistically significant differences between schools. Differences within and between buildings were examined. Characteristics of the implementers and the nonimplementers were thus identified.

The interviews (see Appendix), which averaged 30 minutes in length, elaborated on attributes of selected participants to ascertain their contributions to survey responses. The questions were related to attributes identified in the literature that might encourage implementation, as noted above.

The attempt here, then, was to provide a holistic view of the curriculum change process within the elementary schools in Holly. Using the literature concerning participative decision making,

in-service training, teacher characteristics, leader behavior, use of resources, and school culture, differences in teacher behavior (i.e., rates of implementing specific instructional methodologies) will be noted and explained. Further, where such behavior diverges from that predicted in the literature, explication is also provided.

Limiting Factors

The results of this study will not be broadly applied because several factors argue for caution. First, the sample itself necessitates limiting interpretation. The total of 43 complete responses, while a large percentage of elementary classroom teachers, was small for categorizing independent variables. To have sufficient cell sizes, larger groups had to be constructed.

Further, all teachers surveyed were from the Holly School District; many of them had experience only there. Thus, the diversity one could expect from a variety of districts in different locales may have been missing. For example, professional and personal values may be more homogeneous, having been shaped by time in service.

Finally, the writer himself may have been a limiting factor. With a principal from the district reviewing surveys and conducting interviews, responses from teachers (especially from one's own school) may have been guarded. However, comments critical of the district and individual schools were forthcoming; thus, one might speculate that respondents were, for the most part, straightforward.

Endnote--Chapter III

[1]Fullan and Pomfret, "Research on Curriculum," pp. 335-97.

CHAPTER IV

ANALYSIS OF THE DATA

For this research, a statistical significance level of .10 was selected. Although a small sample size might seem to indicate a stricter level, the attempt here was to find indicators of implementation that might be explored further to facilitate change in Holly. Thus, the less stringent standard was selected so as not to overlook any trends. Further, with so much within-group variance, it was necessary to look at raw data for individual, school, and grade differences that supported statistical differences. Finally, the personal interviews served not only to explain, but to verify, the statistical results.

To preview the results, analysis showed small effects on implementation of both age and experience. Participative decision making, at least as practiced in curriculum development in Holly, had little effect of implementation, as did amount of training. However, important school by grade level effects were evident. Interviews suggested that, while factors such as school culture, leadership, and use of resources varied between schools, these were not reflected in consistently different implementation rates between schools. It appears from this research that implementation in Holly

is idiosyncratic in nature, depending more on characteristics of individual teachers.

Effects of Teacher's Age on Implementation Rates

In general, younger teachers were more frequent implementers than older ones (see Table 1). The amount of variance accounted for by age ranged from just under 9% (for Process Writing Taught) to over 25% (for Total Math). The lone exception here was Journal Writing; it was apparent that few teachers used journals to any meaningful extent. Of the 43 teachers included, 14 reported no time in this area. Thus, regardless of age, implementation here was low.

When implementation variables were correlated among themselves (Table 2), it became apparent that teachers who implemented in one area also did so in the others. Therefore, it may be generalized that it is harder to motivate implementation in older teachers than in younger ones. This was supported by study of the high and low manipulatives implementers in the district. All three of the former were younger teachers; two were well under 30, one just over. Of the latter, two were in their mid-forties, whereas the third was just over 50. Further, a common response about curriculum during the interviews was that it was most useful for new teachers.

Table 1.--Correlates of individual factors to implementation.

	Writing				Math			Grand Total
	Taught Process Writing	Time for Process Writing	Time for Journal Writing	Total Writing	Taught Calculators	Taught Manipulatives	Total Math	
Age	-.2943+ (.028)*	-.3037 (.024)	-.0326 (.418)	-.3082 (.022)	-.4214 (.002)	-.5061 (.000)	-.5525 (.000)	-.4955 (.000)
Experience	-.0212 (.086)	-.3342 (.014)	-.1964 (.103)	-.3524 (.010)	-.3069 (.023)	-.4083 (.003)	-.4354 (.002)	-.4696 (.001)
Curriculum Committee Service								
Total (#)	-.0560 (.361)	.0558 (.361)	-.1037 (.254)	-.0434 (.391)	-.0219 (.445)	-.1119 (.238)	-.0998 (.262)	-.0806 (.304)
Language Arts	.0193 (.451)	.1924 (.108)	.2027 (.096)	.1908 (.110)	--	--	--	.1171 (.227)
Mathematics	--	--	--	--	.0220 (.444)	.0762 (.459)	.0204 (.448)	-.1288 (.205)
Any	-.0906 (.282)	-.0275 (.431)	.2031 (.096)	.0281 (.429)	-.1655 (.144)	-.2671 (.042)	-.2738 (.038)	-.1149 (.231)
Process Writing Training	.2250 (.073)	.1928 (.108)	.1525 (.164)	.2700 (.040)	--	--	--	.2611 (.045)
Calculator Training	--	--	--	--	.1263 (.210)	.1136 (.234)	.1340 (.196)	-.0101 (.474)
Manipulatives Training	--	--	--	--	-.0977 (.266)	-.0725 (.322)	-.0909 (.281)	-.0323 (.419)
Total Training	-.0323 (.418)	.0981 (.266)	.2318 (.067)	.1310 (.201)	.0091 (.477)	-.0016 (.496)	.0015 (.496)	.0954 (.271)

Key: + = Pearson correlation coefficient
* = P-value

Table 2.--Correlations among implementation variables (N = 43).

	Writing			Math	
	Taught Process Writing	Time for Process Writing	Time for Journal Writing	Taught Calcu-lators	Taught Manipu-latives
Taught Process Writing	--	.3951+ (.004)*	.0846 (.295)	.2242 (.074)	.3243 (.017)
Time for Process Writing	.3951 (.004)	--	.2621 (.045)	.2941 (.028)	.2601 (.046)
Time for Journal Writing	.0846 (.295)	.2621 (.045)	--	-.1098 (.242)	.0683 (.332)
Taught Calcu-lators	.2242 (.074)	.2941 (.028)	-.1098 (.242)	--	.4064 (.003)
Taught Manipu-latives	.3243 (.017)	.2601 (.046)	.0683 (.332)	.4064 (.003)	--

Key: + = Pearson correlation coefficient
* = P-value

This notion is further supported by expanding this scrutiny to both the high and low manipulatives-implementing buildings. The low implementers in the high building (School A) were all in their mid-forties or later. However, the low building (School B) was slightly anomalous: The high implementers were in the mid-thirties to late forties range. Mitigating the age effect might have been two circumstances: Two of the teachers formerly had taught kindergarten, and so were very familiar with manipulatives. The third had spent most of her career in the high implementing building.

Effects of Teachers' Experience on Implementation Rates

Results for the effect of teachers' experience on the dependent variables were similar to those of age (see Table 1). In this case, to create more of a distinction between the variables (since age and years of teaching experience correlate highly), years of experience in Holly was used. This accounted for some middle-aged teachers with little experience who had recently been hired.

Again, there was an inverse relationship between Holly experience and change rates, except for Journal Writing (the same comments as above hold here regarding the classroom use of journals). Here, amount of variance accounted for ranged from under 4% (for Process Writing Taught) to about 20% (for Grand Total of Writing and Mathematics).

Thus, as teachers gain experience in Holly, they are less likely to implement. This is supported by study of the district's high and low implementers. The frequent adopters had fewer than 10 years of experience (two under five years). The infrequent ones had more than 15 years of experience apiece, with one having more than 30. Looking at both the high and low implementing buildings, the same trends as for age were observed for Holly experience.

A possible explanation lies in the pendulum effect of changes in education over the years. Teachers frequently cite different "fads" in instruction that have come and gone. This makes experienced teachers more cautious in adopting change than their younger peers because they expect to see the pendulum swing back again in a relatively short period.

Effects of Participative Decision Making on Implementation

Participative decision making in curriculum, as practiced in Holly (service on curriculum committees), had little effect on the teachers' willingness to implement (see Table 1). There was no significant correlation between the number of committees served on, and implementation rates for any of the variables. The same was true for service on the mathematics curriculum committee. However, it appears that both Language Arts Committee Service and Any Committee Service may have had some effect. Both had small, positive effects on Journal Writing, with significant Pearson correlation coefficients. Each accounted for only about 4% of variation and are more thoroughly evaluated below.

Any Committee Service also seemed to affect Manipulatives and Total Math, but negatively. That is, committee service worked against implementation of those variables. In each case, about 7% of the variance was accounted for.

To verify the effects of committee service, one-way analyses of variance (ANOVAs) were conducted on all of the participation variables. (Tables for those without significant Pearson correlation coefficients are included in the Appendix as Tables 19 to 29. Tables for those discussed below follow.)

The ANOVA failed to confirm the effect of Language Arts Committee Service on Journal Writing (Table 3). Only 5% of the variance was accounted for, although there was a difference in time spent on journal writing between those who did and did not serve of

about 15 minutes per week. The effect of Any Committee Service was very similar (Table 4).

Table 3.--Total minutes of class time for journal keeping by Language Arts Committee service.

Language Arts Committee Service	n	Mean	F	Signif. of F	Deviation From Mean
Never served	32	362.56			-68.65
Served	11	630.91			199.70
Total	43	431.21	2.122	.153	

r^2 = .049

Table 4.--Total minutes of class time for journal keeping by any committee service.

Any Committee Service	n	Mean	F	Signif. of F	Deviation From Mean
Never served	10	236.50			-194.71
Served	33	190.21			59.00
Total	43	431.21	1.764	.191	

r^2 = .041

The ANOVA did confirm a significant inverse relationship between Any Committee Service and both Manipulatives and Total Mathematics (Tables 5 and 6). In both cases, those without service implemented more often than those with service. However, only 7% to

7.5% of the variance was accounted for by these variables, respectively.

Table 5.--Total minutes taught manipulatives by any committee service.

Any Committee Service	n	Mean	F	Signif. of F	Deviation From Mean
Never served	10	1249.50			344.00
Served	33	801.26			-104.24
Total	43	905.50	3.151	.083	

r^2 = .071

Table 6.--Total math time (in minutes) by any committee service.

Any Committee Service	n	Mean	F	Signif. of F	Deviation From Mean
Never served	10	1663.00			424.39
Served	33	1110.01			-128.60
Total	43	1236.61	3.323	.076	

r^2 = .075

A picture, then, emerges of teachers who view district curriculum as relatively unimportant from a practical point of view. This is understandable: Both new curricula speak to teaching process (methodology) as well as outcomes (expected student learning). The outcomes, for example results of the Michigan

Educational Assessment Program (MEAP), vary little from past expectations when compared to differences in instructional techniques. Teachers are concentrating on the outcomes (e.g., MEAP), these scores remain excellent, so there is no incentive to change methods. Therefore, the book (representative of outcomes) is more important than the curriculum. And if the curriculum is unimportant, then participating in decisions relating to it is also unimportant. Such participation, then, would not motivate the change expected, or hoped for. Indeed, it might be seen as a waste of time, as counterproductive.

A further complication was the structure of the Language Arts Committee. Of the 12 members, only 6 were classroom teachers. The others were four in-district reading consultants, the district gifted consultant, and a principal. Because of the new concepts involved, writing this curriculum was arduous for the teachers. After about one and one-half years, they voluntarily turned over writing to the consultants, simply discussing and approving subsequent drafts. There is some question, then, about the nature of teachers' participation: Did they see themselves as simply rubber stamps, to confirm the work of the "experts"? If so, the conditions stipulated by Schaffarzick and Rhodes and Young were not met: Teachers were not meaningfully involved. Such noninfluential participation would not then be expected to encourage curriculum implementation.

Effects of Training on Implementation

Training effects on the dependent variables also were minimal (see Table 1). There was some indication that process writing training was positively related to Process Writing Taught, Total Writing, and Total Implementation, although the highest amount of variance accounted for was about 7%. Training in the instructional use of calculators and manipulatives did not have a statistically significant effect on the mathematics variables or total implementation.

As with committee service, ANOVAs were performed to further elucidate these findings. Process Writing Taught was significant (Table 7), accounting for nearly 8% of the variance between those with more or less process writing training. However, such training did not produce differences for Total Writing Time (Table 8). The other dependent variables also displayed no significant effect as a result of in-service training (see Appendix, Tables 30 to 41).

Table 7.--Total minutes taught process writing by days of process writing training.

Process Writing Training	n	Mean	F	Signif. of F	Deviation From Mean
0-2.4	22	527.39			-166.04
2.5+	21	867.38			173.95
Total	43	693.43	3.471	.070	

r^2 = .078

Table 8.--Total writing time (in minutes) by days of process writing training.

Process Writing Training	n	Mean	F	Signif. of F	Deviation From Mean
0-2.4	22	2065.20			-197.46
2.5+	21	2464.52			206.86
Total	43	2262.66	1.104	.300	

r^2 = .000

It is fair to say, then, that training in new methods (like participation on curriculum committees) had little discernible effect on teachers' inclinations to implement. During interviews, the adequacy of previous training with manipulatives was assessed fairly uniformly, by high and low manipulatives-implementers alike, at both schools. Most thought their needs had been met, except for special circumstances such as grade change, or for general updating. What was noted was the need for general practice time (i.e., use with children during the school year).

At School B, previous training (either through early childhood degrees or a four-day Math Their Way workshop taken the previous summer) was cited as reason for judging training sufficient by high implementers. However, one low implementer who had attended that workshop did request more in-service, as did her fellow low implementers. A major concern seemed to be time and classroom management while using manipulatives, and the rationale for using them: How did it help children learn better? One caution: At

School A, even the low implementers saw no need for further training. And because they leaned against making change generally, training in specific areas might well be of no use.

In fact, the only mention of training by high implementers related to the principal's and district's commitment to the new curriculum. Principal B was identified as supportive of manipulatives because he had attended a four-day training workshop in their use. Similarly, district support was perceived positively because of the two half-days of training provided.

Effects of Grade Level Taught on Implementation

Each dependent variable was examined for the effect that a teacher's grade level had on it. No statistically significant effects were found (see Appendix, Tables 42 to 45) except the effect of teachers' grade level on manipulatives (Table 9). Here, the early elementary teachers implemented more often than their later elementary counterparts. Approximately 10% of the variance was accounted for by grade level taught.

Table 9.--Total minutes taught manipulatives by grade level.

Grade	n	Mean	F	Signif. of F	Deviation From Mean
K-3	25	1096.60			191.10
4-6	18	640.08			-265.42
Total	43	905.50	4.604	.038	

$r^2 = .101$

Effects of School on Implementation

Each dependent variable was also examined for the effect that a teacher's school had on it. Only the use of Manipulatives and Total Mathematics (Tables 10 and 11) was significant at .10, accounting for 20% and 15% of the variance, respectively. These differences were more pronounced when combined with grade relationships, to be studied next. Of the eight possibilities, the remaining six (see Appendix, Tables 46 to 51) showed no statistical relationship.

Table 10.--Total minutes taught manipulatives by school.

School	n	Mean	F	Signif. of F	Deviation From Mean
A	10	1435.75			530.25
C	16	887.50			-18.00
B	17	610.53			-294.97
Total	43	905.50	4.964	.012	

r^2 = .199

Table 11.--Total math time (in minutes) by school.

School	n	Mean	F	Signif. of F	Deviation From Mean
A	10	1771.13			532.51
C	16	1255.63			17.01
B	17	909.35			-329.26
Total	43	1238.61	3.519	.039	

r^2 = .150

Interaction Effects of Grade Level Taught and School on Implementation

The salient finding when interaction effects of grade level and school on implementation are studied is the consistent, large difference in implementation rates between early and later elementary teachers at School A. Across all six variables that showed statistically significant interactions (Journal Writing, Calculators, Total Writing, Manipulatives, Total Mathematics, and Total Writing and Mathematics), grade K-3 teachers at School A implemented more frequently than grade 4-6 teachers at School A. At the other two schools there were few differences between the two groups. These were in Journal Writing, Calculators, and Total Mathematics at School B, and in Journal Writing, Total Writing, and Mathematics at School C.

Indeed, while Schools B and C had total implementation means that were fairly consistent between grade levels, School A was a school of extremes. The early elementary teachers were, as a group, the highest implementers in the district, whereas the later elementary teachers were the lowest. Of all the analyses, the analysis of interaction between grade and school produced the most explanation of teachers' use of the specified instructional methodologies. It is worth the time to both cite these effects and illuminate them with comments from interviews.

The interaction effect of school and grade on Journal Writing did display statistical significance at .10 (Table 12). At both School A and School B, early elementary teachers allowed far more

time than did those in grades 4 through 6. However, the relationship was reversed in School C. One must also note that later elementary teachers in School A allowed only about one-fourth the time as did their low implementing counterparts in School B, and one-sixteenth that of the later elementary high implementers at School C.

Table 12.--Total minutes of class time for journal writing by school and grade level.

School	Grade Level			
	K-3		4-6	
	n	Mean	n	Mean
A	6	730.10	4	56.25
C	11	92.73	5	826.40
B	8	866.25	9	206.11

	F	Signif. of F
Main Effects	1.219	.316
School	1.210	.310
Grade level	1.912	.175
2-way interaction	11.935	.000
School, grade level	11.935	.000

$r^2 = .057$

Differences were less pronounced, though still significant, for Calculator Usage (Table 13). At School C, implementation rates were comparable for both grade levels. However, Schools A and B had

opposite patterns: Lower elementary implementation was higher than later elementary at School A, while the reverse was true at School B. Thus, although there were important differences, they were not consistent within grade levels across the district.

Table 13.--Total minutes taught calculators by school and grade level.

School	Grade Level			
	K-3		4-6	
	n	Mean	n	Mean
A	6	430.83	4	192.19
C	11	369.09	5	366.00
B	8	156.88	9	425.00

	F	Signif. of F
Main Effects	.333	.802
School	.374	.690
Grade level	.432	.515
2-way interaction	2.931	.066
School, grade level	2.931	.066

$r^2 = .023$

The greatest differences were observed for use of manipulatives in direct instruction (Table 14). Implementation patterns were similar at Schools B and C, where grade levels used manipulatives about equally. However, at School A, the early elementary teachers again implemented most frequently of all--more than twice as much as

the nearest early elementary staff (School C) and more than four times as much as the later elementary teachers in their own school. It is their high rate of use that created both the school and grade differences noted in sections above. These differences accounted for nearly 28% of the variance.

Table 14.--Total minutes taught manipulatives by school and grade level.

School	Grade Level			
	K-3		4-6	
	n	Mean	n	Mean
A	6	2084.17	4	455.63
C	11	935.00	5	783.00
B	8	574.38	9	642.67

	F	Signif. of F
Main Effects	6.858	.001
School	6.553	.004
Grade level	5.865	.020
2-way interaction	8.202	.001
School, grade level	8.202	.001

$r^2 = .278$

Total Writing Time also showed significant differences between grade levels within schools (Table 15). At School A, later elementary teachers allowed about one-third the writing time as their kindergarten through third-grade colleagues. The reverse was

true at School C, where twice as much time was allowed by later elementary teachers. At School B, rates were comparable within the school.

Table 15.--Total writing time (in minutes) by school and grade level.

School	Grade Level			
	K-3		4-6	
	n	Mean	n	Mean
A	6	2886.67	4	948.13
C	11	1895.00	5	3515.40
B	8	2391.25	9	2070.00

	F	Signif. of F
Main Effects	.151	.929
School	.207	.814
Grade level	.015	.903
2-way interaction	7.127	.002
School, grade level	7.127	.002

$r^2 = .009$

School effects were primarily noted for Total Mathematics Time (Table 16). School A implemented far more than either of the other two; however, this difference was again primarily due to high rates exhibited by early elementary teachers. These exceeded School C by almost twice, and School B by three and one-half times. Despite their later elementary colleagues' low implementation rate relative

to the other schools, School A's kindergarten through third-grade teachers made enough impact to create school differences.

Table 16.--Total math time (in minutes) by school and grade level.

School	Grade Level			
	K-3		4-6	
	n	Mean	n	Mean
A	6	2520.00	4	647.81
C	11	1304.04	5	1149.00
B	8	731.25	9	1067.67

	F	Signif. of F
Main Effects	4.174	.012
School	4.365	.020
Grade level	2.700	.109
2-way interaction	8.059	.001
School, grade level	8.059	.001

$r^2 = .191$

Finally, two-way interactions were significant for school by grade level effects on Total Writing and Mathematics (Table 17). Closer examination reveals that grade levels implemented about equally at Schools C and B. However, early elementary teachers had rates in excess of three times more than their grade 4-6 peers at School A. School by grade interaction effects did not significantly affect either Process Writing Taught or Process Writing Time (see Appendix, Tables 52 to 53).

Table 17.--Total minutes of writing and math by school and grade level.

School	Grade Level			
	K-3		4-6	
	n	Mean	n	Mean
A	6	5406.66	4	1595.94
C	11	3199.09	5	4664.40
B	8	3122.50	9	3137.67

	F	Signif. of F
Main Effects	.873	.464
School	.754	.478
Grade level	.733	.397
2-way interaction	9.170	.001
School, grade level	9.170	.001

$r^2 = .045$

It was noted previously that implementation variables correlated positively with one another. This suggests that the teacher who implements in one area can be expected to implement in most others. Using actual implementation means, this relationship can be verified. Based on use of manipulatives, School A's early elementary teachers included six of the district's seven most frequent implementers (Table 18). Based on Total Mathematics and Writing, they included the top six. At both Schools B and C, rates were much more heterogeneous.

Table 18.--Individual implementation by grade and school (in minutes).

	Writing			Math		Grand Total
	Taught Process Writing	Time for Process Writing	Time for Journal Writing	Taught Calcu-lators	Taught Manipu-latives	
School A						
K	620	670	810	10	1870	3980
1*	670	850	565	35	2640	4760
2*	1220	1835	1050	660	2430	7195
3*	1120	2200	565	800	2640	7325
3	870	665	180	810	2370	4895
3	640	1580	1210	270	585	4285
$\bar{X}$ K-3	856.67	1300	730	430.83	2089.17	5406.66
4	380	1110	90	480	770	2830
4*	180	730	0	0	435	1345
4*	60	670	0	110	435	1275
6*	153	285	135	179	183	934
$\bar{X}$ 4-6	193.13	698.75	56.25	192.19	455.63	1545.44
$\bar{X}$ School	591.25	1059.50	460.50	335.37	1435.75	3882.37
School C						
K	2895	1365	0	80	1285	5625
K	650	1360	0	0	1230	3240
1	255	480	0	150	690	1575
1	240	420	0	125	270	1055
2	240	270	40	310	720	1580
2	945	1155	0	665	1165	3930
3	600	1785	75	450	1890	4800
3	615	1305	905	535	1265	4625
3	360	1170	0	950	820	3300
3	1080	1080	0	495	270	2925
3	410	1145	0	300	680	2535
X $\bar{K}$-3	753.64	1048.64	92.73	369.09	935.00	3199.89

Table 18.--Continued.

	Writing			Math		Grand Total
	Taught Process Writing	Time for Process Writing	Time for Journal Writing	Taught Calcu-lators	Taught Manipu-latives	
School C (Cont'd)						
4	560	440	342	80	770	2192
4	435	1695	910	150	385	3575
5	3120	2490	1020	280	900	7810
5	1140	1620	810	900	1380	5850
$\bar{X}$ 4-6	1138	1551	826.4	366	783	4464.4
$\bar{X}$ School	873.75	1205.62	322	368.12	887.50	3,657
School B						
1	265	550	840	260	375	2240
1	450	450	2060	125	865	3950
1	785	1930	1930	160	810	5615
2*	235	370	435	0	990	2030
2*	445	970	1235	115	65	2830
3	750	990	110	225	375	2450
3	560	840	170	330	820	2720
3	165	2445	150	40	245	3045
$\bar{X}$ K-3	456.88	1068.13	866.25	156.88	574.38	3122.50
4	1380	990	345	420	300	3435
4*	1310	1970	0	1035	2200	6515
5*	420	855	0	235	145	1655
5	530	475	0	340	485	1830
5	540	345	330	360	305	1930
5*	740	1110	0	350	1339	3539
6*	840	590	0	465	165	2060
6	180	2160	360	300	330	3330
6	280	2010	820	330	515	3445
$\bar{X}$ 4-6	696.67	1167.22	206.11	425.00	642.67	3137.67
$\bar{X}$ School	583.82	1120.59	516.76	298.82	610.53	3130.53

*Those interviewed.

The interviews conducted at Schools A and B shed light on what appear to be the central questions: What is occurring at School A to motivate such high rates of manipulatives implementation among the early elementary teachers and to discourage such implementation among later elementary teachers? And what is different from School B, where manipulatives implementation seems uniformly to be lower?

School Culture

Positive attitude toward the new curriculum did not distinguish high from low implementers at School A. With the exception of two teachers (including one who was unfamiliar with the old mathematics curriculum), teachers preferred the new mathematics to the old. They saw aspects of them as clearly different and liked the changes. These included increased emphasis on manipulatives and problem solving, and real-world applications. However, this was also the school where one low implementer equated the curriculum with the textbook.

Similarly, at School B, the same differences were noted between the old and new curricula. Again, all but one teacher preferred the new curriculum; she saw no difference because, as a former kindergarten teacher, she had "always used the new methods." Another high implementer had the same background, suggesting that the quality of past experience, not the quantity, may be indicative of change orientation.

A picture, then, emerges of teachers who view district curriculum as relatively unimportant from a practical point of view.

This is understandable: Both new curricula speak to teaching process (methodology) as well as outcomes (expected student learning). The outcomes, for example the MEAP results, vary little from past expectations when compared to differences in instructional techniques. Teachers are concentrating on the outcomes (e.g., MEAP), these scores remain excellent, so there is no incentive to change methods. Therefore, the book (representative of outcomes) is more important than the curriculum.

Questions about collegiality basically sought to find out whether, if others in the surrounding area used manipulatives, that would increase implementation. There was much evidence of close working relationships and professional respect at School A. Five of the six interviewees cited their grade mates as those with whom they worked most closely. Four of them believed these peers to be equally enthusiastic (very, even the low implementers) as themselves. However, one saw enthusiasm decline, resulting from difficulty understanding class and time management with manipulatives, and their usefulness. Children were perceived as progressing more slowly: Manipulatives were seen as play, not learning. This confirms the earlier finding of the lack of effect that training had on change.

There was very limited social interaction among close colleagues, actually more with infrequent implementers. Momentum against change, then, may actually have been building during what were informal, rather than planned, contacts about the new mathematics curriculum. Interestingly, resistance to the new

curriculum was perceived as greater among others by the lower implementers, although both groups cited reasons for it: It is harder and more work than drill and practice, change is hard, and no one likes being told how to teach. This last factor may have been critical for the low implementing (experienced) teachers, who were not used to having teaching process so strongly recommended to them. One high implementer also mentioned the frequency of meetings to encourage change as another burden.

Grade mates were also cited as closest colleagues by those interviewed at School B. The frequent implementers were unsure how close colleagues felt, whereas the infrequent implementers felt their close colleagues were positive. Thus, an "implementation ethic" may not have been building here, even though an opposite one was also apparently not present. Again, consultations about mathematics changes tended to be informal. Some reluctance to use manipulatives was noted by both groups equally, with various reasons cited: laziness, commitment to drill and practice, the difficulty of class management.

It is apparent that collegiality played little role either within schools (between high implementers or low) or between schools (between the high and low implementing ones). This is reinforced by the lack of consistency of implementation means within grade levels (Table 18). Reasons for nonimplementation seemed similar at both schools, as did the lack of close relationships, either in or out of school, that contributed toward a drive to implement.

The study of teachers' professional values posed some problems in definition. These were open-ended questions, so answers were not steered in any one direction. As a result, some faculty mentioned more esoteric philosophical concerns, while others focused on concrete instructional ones.

At School A, all teachers felt their professional values were congruent with district ones. One teacher noted that, if they were not, she would herself change. Interestingly, this was a low implementer. When asked to mention some values they held, there was remarkable congruence. For five of the six teachers, some reference to treating children appropriately came first to mind: "treat children as individuals"; "commitment to kids"; "equal opportunity for all kids to learn, fairness, the value of education"; "self-worth, find the good in each child." Only one teacher commented on instructional changes. Finally, all teachers felt their professional values were similar to ones held generally in their school. Thus, no discrepancy in professional values could be found to explain the differences between high and low implementers.

There was more diversity in the responses from School B. Two teachers--one high and one low implementing--were uncertain whether their values matched the district's. There was a wider variety of values mentioned: curriculum objectives; mutual professional respect; academic, social, and study skills; teaching children honesty, self-respect, discipline, and responsibility. There were like responses when personal and school values were compared. The two who questioned congruence with district values focused on one

area each: teachers who are so "contract oriented" that they are reluctant to work beyond it (from a high implementer); and people complaining about their colleagues (from another high implementer). The former concern was voiced by a teacher who also questioned whether the district trusted him to have professional values. This seemed to stem from obligations imposed on all faculty by the master contract (e.g., two nights of formal parent-teacher conferences, regardless of how many others one might have held). A low implementer noted the lack of pay for after-school activities such as professional development.

Five of six teachers interviewed at School A believed that the district (as embodied primarily by the superintendent and board of education) was philosophically committed to the curriculum. Reasons cited included their formal acceptance of it, and the money committed to materials and in-service. The sixth teacher again felt commitment was superficial "lip service."

Similar results were evident at School B. Only one person (a low implementer, as at School A) thought the board really did not know what was actually happening in the schools, that they accepted the theory but knew little of the practice. One frequent and two infrequent implementers noted inadequate support of instructional materials as their evidence.

The school organization itself (including all staff) was uniformly viewed as supportive of the mathematics curriculum innovations at School A. This was despite several notes that there

was much diversity among the staff and some grumbling about meetings scheduled in addition to regular school hours to facilitate implementation. The high implementers also thought that support could be increased (remember, these were young, less experienced "go-getters"); as one put it, there were some attitudes against change because the old system worked fine.

High implementers at School B saw the immediate environment as highly supportive. There was a feeling that "people are heard and something is done" (an indicator of real participation?). Among their low-implementing counterparts, the principal was cited as supportive and a "good soldier" in carrying out district mandates. Two constraints were noted, however: time in the school day for training (time away from class was a concern for one high implementer), and money (one low implementer thought that pay should accompany training outside school hours).

In summary, there appear to be some real cultural differences that distinguish the two schools. Teachers at School A, regardless of their personal implementation rates, seemed to feel more strongly that their values were congruent with district ones. But this also fails to explain the within-school extremes of implementation at School A. Teachers at this school, in fact, verbalized a homogeneous set of professional values and thought their values were harmonious with both their school's and the district's values. Further, teachers at School A expressed less unhappiness both with their colleagues and with the district's relationship with teachers. However, the only implementation differences between the schools

applied to manipulatives. So these cultural differences did not cause significant differences in the rates at which the two school faculties adopted the new curricula.

Teacher Characteristics

There appeared to be some real distinctions between individual teachers that motivated some toward greater implementation. For example, two high manipulatives implementers at School B (in second and fourth grade) were former kindergarten teachers who transferred skills learned in that previous assignment. One of these teachers noted that she saw no difference between the old and new math curricula because, as a former kindergarten teacher, she had "always used the new methods." This suggests that the quality of past experience, not the quantity, may be indicative of willingness to implement.

Factors outside of school affecting teachers' abilities (time) to implement were also considered. For example, both high and low implementers cited young families as impinging on the time necessary to plan for the new curriculum strategies. One of these people was among the block of lowest implementers at School A. Another in this group noted that teaching was basically a job to him, that he had many outside activities that kept him busy. Neither group of implementers at School B claimed outside factors as problems. Thus, since these factors seemed to affect both high and low implementers equally, they fail to explain the differences between them. Similarly, unusual obstacles such as illness in the extended family

were also mentioned, but these were both temporary and not peculiar to any one group.

Resources

Both personnel and material resources were mentioned briefly during interviews. However, perceptions of their adequacy varied between schools. For example, School A teachers cited the money committed to purchasing materials and outside consultants as evidence of the district's commitment to the math curriculum. But this was true regardless of implementation status.

At School B, however, one frequent and two infrequent implementers noted inadequate support of instructional materials. Although manipulatives were provided for each grade level at each school (and extra manipulatives were purchased through PTO for School B), they thought that borrowing was a cumbersome process, even within the school, and wanted their own classroom sets. By contrast, teachers at School A cited availability of resources as a strength. One additional complaint from School B was that pay did not accompany training provided outside of school hours.

Another personnel resource used at School A was the mathematics curriculum committee chairman, who teaches there. He organized an in-building mathematics committee that met to discuss implementation. While some grumbled about the extra meetings, he was also mentioned specifically as a motivator of change.

Leader Behavior

Teacher perceptions of principal support for the new curricula were also ascertained via interview. At both schools, positive, overt actions were identified that made clear both principals' positive attitudes toward the curricula. Specifically, questions were asked about support of the mathematics curriculum because one indicator of that (use of manipulatives) distinguished the two buildings. And there were some differences in leadership style between the administrators, but none that could conclusively be tied to differences in implementation rates.

Regardless of their implementation rates, five of six teachers at School A perceived their principal as very supportive of the new math curriculum. The sixth (the lowest implementer) thought he had trouble buying into it, although he put on a good appearance. The principal's administrative behaviors were cited as reasons for teachers' perceptions: verbal mandates requiring the mathematics curriculum be kept on teachers' desks, providing materials and training, and chairing a middle school mathematics curriculum committee. More personal reasons were also mentioned: informal conversations and "he likes movement and constructive noise."

The principal's attitude toward the new curriculum was viewed as supportive by both high and low implementers at School B. All cited administrator-type behaviors as reasons for their belief, although these differed from those mentioned at School A. They included attendance at four days of Math Their Way training during

the summer, solicitation of $2,000 from the Parent-Teacher Organization to purchase math manipulatives, the content of teacher evaluation, and personal conversations.

Another reason, not verbalized and perhaps not evident to teachers, may be inclinations of the principals themselves. The high manipulatives-implementing school was led by the principal who led the mathematics curriculum study. The principal led the Language Arts Curriculum Committee and spent much time in encouraging implementation of that curriculum. It would be natural for them to continue to emphasize their areas of most recent study.

Thus, two factors imply that leader behavior was effective in the instance of manipulatives. First, the more directive principal had greater implementation rates for manipulatives at his school. He was more task oriented in his approach than his colleague, who attended to the human relationships by attending extensive staff development with his teachers. Second, the principal who led the mathematics study was the one with higher manipulatives-implementation rates.

Two factors also argue against these effects, however. First, the rate of calculator implementation was not significantly different between the schools. As another measure of mathematics implementation, it should have been if one principal's leadership of the mathematics study had an effect. Second, if leadership of one of the study committees positively affected implementation in that curriculum area, why were there not significant school differences

for the process writing variables (part of the curriculum study led by Principal B)? On balance, then, it must be said that no conclusions may be drawn from the schools' leadership.

Summary

It is apparent from the data that few of the factors predicted to influence curriculum implementation in Holly did so. School by grade differences did exist but could not be explained by other attributes of the system. For example, in-service training had no effect on most of the implementation variables. The same was true of participation in decision making, as represented by service on curriculum committees. There was a suggestion from interview data that material and personnel resources might encourage implementation. However, even here there were not great differences between schools, and this fails to explain the great within-school differences at School A. Differences in school culture, while certainly existing, did not result in consistent differences in adoption of the various curriculum strategies. Similarly, leader behavior was clearly different, but implementation differences could not be attributed to that with any certainty. There is the possibility that the inclination to implement is idiosyncratic to individual teachers and their personal attributes. The nature of previous experience may be one such indicator, along with age and the length of teaching experience (which both relate inversely to implementation).

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

As should now be apparent, resorting to the literature for guidance during curriculum change may be deceptive. Study of an organization's peculiar characteristics may yield more satisfying results if implementation of new instructional strategies is the goal. For it appears from the results of this research that, in the Holly Area Schools at least, such change is idiosyncratic to conditions within the school buildings and district, rather than attributable to such broad variables as "participation" or leadership style.

Participative Decision Making

Perhaps the most widely accepted predictor of successful curriculum implementation is participative decision making. The literature regarding implementation is replete with references to the benefits of involving teachers during curriculum development. Authorities such as Gaynor,[1] Peters,[2] Katz,[3] and Kimpston[4] all cited positive results from such interaction.

Results in Holly belie those recommendations. Teacher involvement in curricular decision making had no significant effect on teachers' inclination to change. Neither did it arise during

personal interviews as either a positive or negative influence. Perhaps a closer look at the participation research yields some answers.

Coch and French, for example, noted that resistance to change decreases as amount of participation increases.[5] Representation on committees (as is done in Holly) has a limited effect. Kardas and Talmadge specified what type of teacher (elementary, with degree below master's, a small family) will most likely be affected by participation.[6] This is clearly not representative of the "typical" Holly teacher.

And others have written of the quality of participation. Firestone wrote that teachers must have real influence in the process.[7] Yet, at least with language arts, there is some question here whether teachers had that perception. So much work was done by the internal consultants (albeit at teachers' request), teachers may have felt overwhelmed by the magnitude of the change and simply rubber-stamped their work. Thus, Schaffarzick's stipulation that involvement must be continuous and meaningful may not have been observed, at least during the language arts study.[8] In that case, the lack of influence would only increase resistance. Finally, Conway's review of the literature casts doubt on the efficacy of participation in making changes to begin with![9]

These results should give pause when considering participation in curriculum studies. If it is to be effective, more care must be given to the structure and workings of curriculum committees. Certainly in Holly, the conditions under which such participation

would succeed should be studied more thoroughly before it is implemented.

Training

Perhaps the next most often cited variable affecting implementation was training. Fullan and Pomfret[10] mentioned its necessity, as did Rhodes and Young.[11] And much training was provided to teachers in Holly, both individually and as a group: School was dismissed for two half-days so all elementary teachers could be trained in manipulatives, problem solving, and calculator use. No statistically significant effect of training was found.

Perhaps this was not enough. Yet ten teachers spent four full days studying the use of manipulatives during the summer prior to curriculum implementation. Of those, one was a high implementer, one a low; both were from the same building and taught in the same grade (second). Other teachers enjoyed individual training at workshops around the county or had had intensive training in college.

Training in process writing had a similar effect. Two evenings (for which teachers were paid a gratuity, and most attended) were spent with a well-known author, practitioner, and college instructor who presented an introduction. More intensive training was provided in subsequent grade-level meetings of one day each. Other teachers pursued additional training on their own. Yet the effect on process writing implementation was negligible.

In all of these cases, Walberg's criteria for effective in-service training (formal presentation by an instructor, a variety of instructional techniques used by that instructor) were implemented.[12] What appears to be missing is Fullan's assertion that assistance must be on-going during the change process.[13] While individual teachers continued their training, this was not done for all elementary teachers in an organized fashion.

Leader Behavior and School Culture

Leader behavior and the organizational environment it helps engender appear significant in the literature and prominent in Holly. Neither extremes of authoritarianism nor of laissez-faire management lead to effective instruction (Stiegelbauer[14]). A combination of task orientation and group maintenance orientation, with an emphasis on the former, seems to predict both change and more effective schools (Leithwood and Montgomery[15]). Certainly, both principals exhibited these behaviors and were so perceived by teachers. At School A, the principal was cited as mandating manipulatives usage, keeping the mathematics curriculum on the teacher's desk, and appreciating "constructive noise and movement." At School B, the principal's mention of manipulatives in an evaluation and attendance with teachers at a four-day workshop were both noted in interviews of high implementers. However, these did not appear to affect implementation rates.

Squires et al. asserted that principals must instill a positive attitude toward change,[16] and several others have noted that such a

group culture (embracing organizational goals) will motivate implementation (Katz and Kahn,[17] Fullan[18]). This appeared more in evidence at School A (the high implementing school), where professional values were much more homogeneous. Again, since implementation rates of most variables were similar across schools, these school culture differences did not appear to have the effect suggested in the literature. Further, it makes the extremes evident in School A's implementation rates between grade levels more difficult to explain.

Factors Affecting Change in Holly

Age, Experience

As Kardas and Talmadge[19] suggested, but contrary to Langenbach,[20] age and experience appear to have an inverse relationship to implementation. As noted earlier, younger, less experienced teachers tended to implement more frequently. This might be due to their unfamiliarity with the "fadism" in education that bedevils older teachers. Or it may be attributable to their increased susceptibility to administrative demands. Having less time in service, they may be less secure (or comfortable) and be more responsive to administrative fiat.

Grade Level, School

The greatest discrepancies for implementation were noted for school by grade level interaction effects. Gaynor cited grade level as a predictor, for example.[21] School effects have been noted by many. Wasserman,[22] Ponder,[23] Katz,[24] Kimpston,[25] and Squires et

al.[26] all specifically mentioned a commitment to change and/or the curriculum as necessary. If one school exhibited these characteristics more than another, it would be expected to implement more. In Holly, both high and low implementers stated they believed in, supported, and favored the new mathematics curriculum. One low implementer, however, noted that he did not understand the necessity for using manipulatives (i.e., moving children from concrete to abstract thinking). A high implementer noted that her colleagues also lacked that understanding and simply felt frustrated by the increased noise and management difficulty. A reasonable suspicion exists, then, that the verbal assurances of support were not matched by action or belief. There may not have been what Squires et al. called a positive attitude toward change. Put another way, teachers may not believe that the beneficiaries of such change will be the children (as Gardner and Beatty[27] might wish).

Resources

Several writers have stipulated that both personnel and material resources must be available to facilitate the change (Ponder,[28] Fullan and Pomfret,[29] Squires et al.[30]). These both seemed present in abundance in Holly. A language arts consultant is available full time at each school to help with process writing. Perhaps this prevented even less implementation but did not seem to encourage it. Mathematics manipulatives (one set per grade level) were purchased when the curriculum was adopted. This was an important factor for implementation at School A, where (during

interviews) teachers seemed appreciative that this district had rarely taken such a step before. At School B (the low implementing one), this was seen as a negative; one set per classroom should have been purchased. Finally, the mathematics curriculum committee chairman, who then organized building meetings at his school (School A) to discuss it, was cited as a positive influence. The meetings had mixed reviews, however; benefits were mitigated by grumbling about the extra meetings.

Time

One variable mentioned in the literature was the effect that elapsed time would have on implementation. Wasserman[31] and Van den Akker[32] both mentioned time needed with the materials, using them with children, as favorably disposing teachers toward implementation. Perhaps this is the answer to experienced teachers who question the potential longevity of recommended reforms.

However, during the five months over which this research occurred, implementation rates did not increase. Rather than having, for example, a positive effect of practice, there seemed to be a relationship to time of year. After natural breaks in the school calendar (e.g., card marking) or vacation periods, implementation rates were higher. Before these times, rates declined.

Summary

Most of the organizational variables suggested in the literature failed to produce differences in implementation rates.

There were clear distinctions in school culture and leader behavior, but not in implementation. Neither training differences nor participative decision making resulted in such differences. Perhaps the individualistic nature of teaching was too difficult to overcome; once the classroom door is closed, the taught curriculum predominates, not the written one. While the effective use of consultants and material resources seems to have positively influenced implementation decisions (at least based on the interviews), further refinement of the other independent variables might yield different results in the future.

For example, perhaps teachers did not perceive that they really were making important decisions. Reasons for the ineffectiveness of participation may relate to the way it was used. Having so many consultants on the Language Arts Committee may have overwhelmed the classroom teachers. They let the experts do it. Further, since much of the actual writing was done by those experts, perhaps no real decision-making authority was perceived by the teachers. Finally, although specific teachers were "invited" to join, this was clearly a professional obligation that they were fulfilling. Volunteers were not solicited from among the general population of teachers.

Similarly, the lack of effect that training had may be attributable to its method. While there was some pre-service (i.e., pre-implementation) training, it did not continue on a consistent basis once the curricula were adopted. Thus, an "on-going" component to the training was missing.

Another interesting factor was school culture. The expressed "school-wide" beliefs resulted in few significant school-based differences. However, at School A, there was a clear dichotomy between high and low implementers, depending on grade level. Thus, the effect of work groups (as first mentioned in the Hawthorne studies) to either limit or encourage "productivity" (i.e., implementation) may have been evident. That would certainly be worth exploring in the future.

Finally, the importance of personnel recruitment is emphasized by the inverse relationship of age and experience to implementation. Since it may not be desirable always to hire young, inexperienced teachers, careful identification of those teacher candidates predisposed toward district curriculum initiatives becomes critical to their implementation. Additionally, if, as this research suggests, the nature of prior experience may help determine individual adoptions, teacher assignment takes on added significance. Thus, implementation may be idiosyncratic; that is, certain personal characteristics lead to a predisposition to implement, regardless of other factors.

Endnotes--Chapter V

[1]Gaynor, "A Dynamic Model."

[2]Peters, Models for Teacher Pre-Service.

[3]Katz, Curriculum Innovation.

[4]Kimpston, "Curriculum Fidelity."

[5]Coch and French, "Overcoming Resistance to Change."

[6]Kardas and Talmadge, "Characteristics of Teacher Participation.

[7]Firestone, "Participation and Influence."

[8]Schaffarzick, "Teacher and Lay Participation."

[9]Conway, "Myth, Mystery, and Mastery."

[10]Fullan and Pomfret, "Research on Curriculum."

[11]Rhodes and Young, "Making Curriculum Development Work Again."

[12]Walberg, "Productive Teaching and Instruction."

[13]Fullan, "Staff Development."

[14]Stiegelbauer, More Effective Leadership.

[15]Leithwood and Montgomery, "Role of the Elementary School Principal."

[16]Squires et al., Effective Schools and Classrooms.

[17]Desler, Organization Theory.

[18]Fullan, "Staff Development."

[19]Kardas and Talmadge, "Characteristics of Teacher Participation.

[20]Langenbach, "Development of an Instrument."

[21]Gaynor, "A Dynamic Model."

[22]Wasserman, "Curriculum Reform."

[23]Ponder, "Rassling With the Bear."

[24]Katz, Curriculum Innovation.

[25]Kimpston, "Curriculum Fidelity."

[26]Squires et al., Effective Schools and Classrooms.

[27]Gardner and Beatty, "Vocational Curriculum Development."

[28]Ponder, "Rassling With the Bear."

[29]Fullan and Pomfret, "Research on Curriculum."

[30]Squires et al., Effective Schools and Classrooms.

[31]Wasserman, "Curriculum Reform."

[32]Van den Akker, The Teacher as a Learner.

APPENDIX

Dear Colleague,

Enclosed with this letter is a sample of a brief survey. It will form the heart of a doctoral dissertation examining what factors influence how teachers implement curriculum change. All elementary classroom teachers in Holly Area Schools are asked to complete these questionnaires.

In order to get enough data, I am asking each of you to respond about one time per month, January through May. While I know this appears burdensome, each occasion should take only 10 minutes. At the end of each day listed below, I would appreciate your returning that month's survey to Gary Spencer, who has agreed to collect them for me:

Wednesday, February 15
Tuesday, March 21
Wednesday, May 3
Friday, June 2

For those who are interested, results will be available during the next school year. I am grateful to all those participating; obviously, if everybody consistently returns their surveys, the information will be much more valuable. However, participation is strictly voluntary. You may choose not to participate at all or not to answer certain questions without penalty. Completion and return of surveys will signify your consent to participate. And let me assure you that all responses will be kept confidential, and written reporting will be done anonymously.

Thanks for the time you will invest in this. If you have any questions, please contact me.

Steve Gaynor

CURRICULUM SURVEY

PLEASE COMPLETE AND RETURN TO GARY SPENCER BY 3:30 ON WEDNESDAY, FEBRUARY 15. THANK YOU.

1. Grade level (circle that which applies):

   K 1 2 3 4 5 6

2. Gender: ____Male ___Female

3. Age range:

   ___20-30 ___31-40 ___41-50 ___51-60 ___61+

4. Years of teaching experience (not including 1988-89):

   a. Total (in all districts worked) _____

   b. In Holly only _____

5. Curriculum committee service (list those on which you have served and the year the study ended)

TOPIC (e.g., language arts, math, social studies, science, computers, testing, etc.)	YEAR STUDY OR SERVICE ENDED
_____	_____
_____	_____
_____	_____
_____	_____

   For purposes of this survey, Process Writing lessons or "time" includes brainstorming, writing, editing, conferencing, sharing publishing, or illustrating.

6. In the last three years (1986-1988), how many days of training (to the nearest half-day) have you received:

   a. In Process Writing _____
   b. In using calculators to teach math _____
   c. In using manipulatives to teach math _____

7. In language arts, how many times since January 17 have you:

	No. of Times	Average Length of Time
a. taught a Process Writing lesson?	_____	_____
b. given students class time for Process Writing?	_____	_____
c. given students class time for keeping a journal?	_____	_____

8. In mathematics, how many times since January 17 have you:

a. taught a lesson in which students use calculators?	_____	_____
b. taught a lesson in which students use manipulatives (e.g., for free exploration, patterning, calculation, place value, fractions, etc.)?	_____	_____

INTERVIEW

Curriculum

1. How important do you think a written curriculum is?

2. How often do you use it, or refer to it, in planning lessons?

3. Are there areas in the new Math Curriculum that are very different from the previous one?

4. Do you have a preference between the past Math Curriculum and the new one?

5. Has past training addressed your needs adequately to help you implement the new Math Curriculum?

6. Are there skills taught, or strategies recommended, in the new Math Curriculum, for which you need more training?

7. Are there factors in your personal or family life that affect your ability or willingness to implement new curriculum? What are some of those? Have they had a serious impact or a minimal one?

Organizational Support for the Curriculum

8. How do you think your principal feels about the new Math Curriculum?

9. What has he/she done to lead you to believe this?

10. How committed to new curricular directions (specifically in math) do you feel this district is? Why do you think so?

11. How supportive is the district of teachers' needs, to help them with instruction or learning how to implement new methods?

12. How committed to new curricular directions (specifically in math) do you feel this school is? Why do you think so?

13. How supportive is this school of teachers' needs, to help them with instruction or learning how to implement new methods?

Professional Values

14. Do you feel professionally "comfortable" within this organization? In other words, do you feel your professional values are the same as those of the district?

15. What are those professional values that are most important to you?

16. Do you feel professionally "comfortable" within this school? In other words, do you feel your professional values are the same as those of most others in this school?

Collegiality

17. How about your colleagues:

    --With whom do you work most closely?

    --How do you think they feel about the new math curriculum?

    --What leads you to believe they feel this way?

    --Outside of school, are you active socially with this same group of colleagues?

    --Do you work with a group of colleagues specifically to implement the new Math Curriculum?

18. Do you know of other teachers who are reluctant to implement the new Math Curriculum?

19. For what reasons do they seem reluctant?

Table 19.--Total writing time (in minutes) by Language Arts Committee service.

Language Arts Committee Service	n	Mean	F	Signif. of F	Deviation From Mean
Never served	32	2135.06			-127.60
Served	11	2633.86			371.20
Total	43	2262.66	1.286	.263	

r^2 = .030

Table 20.--Total minutes taught process writing by Language Arts Committee service.

Language Arts Committee Service	n	Mean	F	Signif. of F	Deviation From Mean
Never served	32	691.88			-1.56
Served	11	697.97			4.52
Total	43	693.43	.001	.978	

r^2 = .000

Table 21.--Total minutes of class time for process writing by Language Arts Committee service.

Language Arts Committee Service	n	Mean	F	Signif. of F	Deviation From Mean
Never served	32	1080.63			-57.40
Served	11	1305.00			166.98
Total	43	1138.02	1.047	.312	

r^2 = .025

Table 22.--Total minutes taught calculators by Math Committee service.

Math Committee Service	n	Mean	F	Signif. of F	Deviation From Mean
Never served	32	331.72			-1.39
Served	11	337.16			4.05
Total	43	333.11	.003	.955	

r^2 = .000

Table 23.--Total minutes taught manipulatives by Math Committee service.

Math Committee Service	n	Mean	F	Signif. of F	Deviation From Mean
Never served	32	903.25			-2.25
Served	11	912.05			6.55
Total	43	905.50	.101	.973	

r^2 = .000

Table 24.--Total math time (in minutes) by Math Committee service.

Math Committee Service	n	Mean	F	Signif. of F	Deviation From Mean
Never served	32	1234.97			-3.64
Served	11	1249.20			10.59
Total	43	1238.61	.002	.963	

r^2 = .000

Table 25.--Total minutes taught process writing by any committee service.

Any Committee Service	n	Mean	F	Signif. of F	Deviation From Mean
Never served	10	793.50			100.07
Served	33	663.11			-30.32
Total	43	693.43	.339	.564	

r^2 = .008

Table 26.--Total minutes of class time for process writing by any committee service.

Any Committee Service	n	Mean	F	Signif. of F	Deviation From Mean
Never served	10	1169.00			30.98
Served	33	1128.64			-9.39
Total	43	1138.02	.031	.861	

r^2 = .001

Table 27.--Total minutes taught calculators by any committee service.

Any Committee Service	n	Mean	F	Signif. of F	Deviation From Mean
Never served	10	413.50			80.39
Served	33	308.75			-24.36
Total	43	333.11	1.155	.289	

r^2 = .027

Table 28.--Total writing time (in minutes) by any committee service.

Any Committee Service	n	Mean	F	Signif. of F	Deviation From Mean
Never served	10	2199.00			-63.66
Served	33	2281.95			19.29
Total	43	2262.66	.032	.858	

r^2 = .001

Table 29.--Total writing and math time (in minutes) by any committee service.

Any Committee Service	n	Mean	F	Signif. of F	Deviation From Mean
Never served	10	3862.00			360.73
Served	33	3391.96			-109.31
Total	43	3501.27	.547	.463	

r^2 = .013

Table 30.--Total minutes of class time for process writing by days of process writing training.

Process Writing Training	n	Mean	F	Signif. of F	Deviation From Mean
0-2.4	22	1095.23			-42.80
2.5+	21	1182.86			44.83
Total	43	1138.02	.205	.653	

r^2 = .005

Table 31.--Total minutes of class time for journal keeping by days of process writing training.

Process Writing Training	n	Mean	F	Signif. of F	Deviation From Mean
0-2.4	22	443.59			11.38
2.5+	21	419.29			-11.92
Total	43	431.21	.020	.888	

r^2 = .000

Table 32.--Total minutes taught calculators by days of calculator training.

Calculator Training	n	Mean	F	Signif. of F	Deviation From Mean
0-.5	24	308.70			-24.41
.6+	19	363.95			30.84
Total	43	333.11	.436	.513	

r^2 = .011

Table 33.--Total minutes taught manipulatives by days of manipulatives training.

Manipulatives Training	n	Mean	F	Signif. of F	Deviation From Mean
0-1	24	752.77			-152.73
1.1+	19	1098.42			192.92
Total	43	905.50	2.554	.118	

r^2 = .059

Table 34.--Total minutes taught process writing by total days of writing.

Total Training	n	Mean	F	Signif. of F	Deviation From Mean
1-5.99	22	649.20			-44.23
6+	21	739.76			46.33
Total	43	693.43	.228	.635	

r^2 = .006

Table 35.--Total minutes of class time for process writing by days of total training.

Total Training	n	Mean	F	Signif. of F	Deviation From Mean
1-5.99	22	1035.23			-102.80
6+	21	1245.71			107.69
Total	43	1138.02	1.214	.277	

r^2 = .029

Table 36.--Total minutes taught calculators by days of total training.

Total Training	n	Mean	F	Signif. of F	Deviation From Mean
1-5.99	22	297.90			-35.21
6+	21	370.00			36.89
Total	43	333.11	.759	.389	

r^2 = .018

Table 37.--Total minutes taught manipulatives by days of total training.

Total Training	n	Mean	F	Signif. of F	Deviation From Mean
1-5.99	22	808.02			-97.48
6+	21	1007.62			102.12
Total	43	905.50	.829	.368	

r^2 = .020

Table 38.--Total writing time (in minutes) by total days of training.

Total Training	n	Mean	F	Signif. of F	Deviation From Mean
1-5.99	22	2057.70			-204.96
6+	21	2477.38			214.72
Total	43	2262.66	1.192	.281	

r^2 = .028

Table 39.--Total math time (in minutes) by days of total training.

Total Training	n	Mean	F	Signif. of F	Deviation From Mean
1-5.99	22	1105.92			-132.69
6+	21	1377.62			139.01
Total	43	1238.61	1.066	.308	

r^2 = .025

Table 40.--Total minutes writing and math by total days of training.

Total Training	n	Mean	F	Signif. of F	Deviation From Mean
1-5.99	22	3163.63			-337.65
6+	21	3855.00			353.73
Total	43	3501.27	1.709	.198	

r^2 = .040

Table 41.--Total minutes of class time for journal keeping by days of total training.

Total Training	n	Mean	F	Signif. of F	Deviation From Mean
1-5.99	22	373.27			-57.94
6+	21	491.90			60.70
Total	43	431.21	.524	.473	

r^2 = .013

Table 42.--Total minutes taught process writing by grade level.

Grade Level	n	Mean	F	Signif. of F	Deviation From Mean
K-3	25	683.40			-10.03
4-6	18	707.36			13.93
Total	43	693.43	.015	.902	

r^2 = .000

Table 43.--Total minutes class time for process writing by grade level.

Grade Level	n	Mean	F	Signif. of F	Deviation From Mean
K-3	25	1115.20			-22.82
4-6	18	1169.72			31.70
Total	43	1138.02	.077	.783	

r^2 = .002

Table 44.--Total minutes class time for journal keeping by grade level.

Grade Level	n	Mean	F	Signif. of F	Deviation From Mean
K-3	25	493.20			61.99
4-6	18	345.11			-86.10
Total	43	431.21	.801	.376	

r^2 = .019

Table 45.--Total minutes taught calculators by grade level.

Grade Level	n	Mean	F	Signif. of F	Deviation From Mean
K-3	25	316.00			-17.11
4-6	18	356.88			23.76
Total	43	333.11	.235	.631	

r^2 = .006

Table 46.--Total minutes taught process writing by school.

School	n	Mean	F	Signif. of F	Deviation From Mean
A	10	591.25			-102.18
C	16	873.75			180.32
B	17	583.82			-109.61
Total	43	693.43	1.099	.343	

r^2 = .052

Table 47.--Total minutes of class time for process writing by school.

School	n	Mean	F	Signif. of F	Deviation From Mean
A	10	1059.50			-78.52
C	16	1205.63			67.60
B	17	1120.59			-17.44
Total	43	1138.02	.171	.844	

r^2 = .008

Table 48.--Total minutes of class time for journal keeping by school.

School	n	Mean	F	Signif. of F	Deviation From Mean
A	10	460.50			29.29
C	16	322.00			-109.21
B	17	516.76			85.55
Total	43	431.21	.556	.578	

r^2 = .027

Table 49.--Total writing time (in minutes) by school.

School	n	Mean	F	Signif. of F	Deviation From Mean
A	10	2111.25			-151.41
C	16	2401.38			138.71
B	17	2221.18			- 41.49
Total	43	2262.66	.171	.844	

r^2 = .008

Table 50.--Total minutes taught calculators by school.

School	n	Mean	F	Signif. of F	Deviation From Mean
A	10	335.38			2.26
C	16	368.13			35.01
B	17	298.82			-34.29
Total	43	333.11	.261	.771	

r^2 = .013

Table 51.--Total minutes of math and writing by school.

School	n	Mean	F	Signif. of F	Deviation From Mean
A	10	3882.38			381.10
C	16	3657.00			155.73
B	17	3130.53			-370.74
Total	43	3501.27	.673	.516	

r^2 = .033

Table 52.--Total minutes taught process writing by school and grade level.

School	Grade Level			
	K-3		4-6	
	n	Mean	n	Mean
A	6	856.67	4	193.13
C	11	753.64	5	1138.00
B	8	456.88	9	696.67

	F	Signif. of F
Main Effects	.821	.490
School	1.224	.306
Grade level	.153	.698
2-way interaction	2.443	.101
School, grade level	2.443	.101

$r^2 = .056$

Table 53.--Total minutes of class time for process writing by school and grade level.

School	Grade Level			
	K-3		4-6	
	n	Mean	n	Mean
A	6	1300.00	4	698.75
C	11	1048.64	5	1551.00
B	8	1068.13	9	1167.22

	F	Signif. of F
Main Effects	.159	.925
School	.200	.820
Grade level	.124	.726
2-way interaction	2.184	.127
School, grade level	2.184	.127

r^2 = .011

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