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Intervention Coaching for Mathematics Implementation: A C-BAM Application for School Improvement

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ABSTRACT. A school improvement model intended to facilitate the implementation of a new mathematics curriculum in a large heterogeneous school district is described. The model is based primarily on the concepts and components of the Concerns-Based Adoption Model, and it includes theory and research findings from recent studies involving the role of the principal in the change process and supervisory coaching. Tentative findings indicate that the model is a viable one for bringing about change in the implementation of a new curriculum program.

Many educational practitioners distrust theory and theoretical models, perceiving them to be abstractions with little relevance to the day-to-day functioning of schools. Theory, interrelated constructs used systematically to explain and predict phenomena, both engenders research and is dependent upon it for empirical verification. However, the rule-of-thumb that it takes 20 years for research to inform practice reflects the uneasy meshing of theory, research and practice. Yet, unless research-supported theoretical models are applied in real situations to address actual problems, their formulation is a hollow exercise.

Districts as well as individual schools within districts often are forced into a reactive posture in response to mandated innovations rather than being able to assume the proactive stance of implementing change systematically. One large school district, faced with the task of implementing a new elementary mathematics program, turned to a research-supported theoretical model, the Concerns-Based Adoption Model (C-BAM), to pilot in six schools a two-year project, *Intervention Coaching for Implementing the District Mathematics Plan*. While the Intervention Coaching project was based largely on C-BAM concepts, it tailored the model to meet particular district requirements and incorporated coaching technology into the design to enhance the project's capacity to bring about change.

Background

Over the past decade, the Research and Development Center for Teacher Education at the University of Texas, Austin, explored the change process. Their conceptualization and subsequent research resulted in the Concerns-Based Adoption Model, which posits that change or innovation adoption occurs gradually, is developmental in nature, and must address personal needs before organizational ones (Hall, Wallace, & Dossett, 1973). The model has resulted in three diagnostic tools: the Stages of Concern (SoC) questionnaire to measure individuals' feelings about an innovation (Hall, George & Rutherford, 1977); the Levels of Use (LoU) interview to measure the extent to which a person is using an educational innovation (Hall, Loucks, Rutherford & Newlove, 1975), and the Innovation Configuration to assess what form the innovation should and does take (Hord, 1986).

A fourth C-BAM element, the Intervention Taxonomy or game plan, is a systematic approach for making change happen (Hall & Hord, 1984). Through a structured planning process, formal implementation plans are developed which consider rules, procedures and interventions in the following six areas: developing supportive organizational arrangements, training, providing consultation and reinforcement, monitoring and evaluation, external communication, and dissemination. In addressing each of these game plan components, activities are grouped into strategies, an interrelated set of interventions typically covering a school year; tactics, an interrelated set of interventions within a short period of time; and incidents, the singular occurrence of an action or event (Hall, 1979).

Associated with C-BAM, another initiative of the Research and Development Center was Research in the Improvement of Practice (RIP) which examined selected variables that influence school improvement (Huling-Austin, Stiegelbauer & Muscella, 1985; Murphy, Huling-Austin & Steigelbauer, 1986). Research supported the importance of the principal in fostering innovation implementation in the school. Apparently, effective principals use all of the game plan components as they engender change. Furthermore, another role essential to the change process uncovered in RIP investigations is the second change facilitator, either a school- or district-based person who supports the principal's efforts, contributing uniquely to the innovation implementation (Hall & Hord, 1986).

Complementing the C-BAM/RIP vantage, coaching is a staff development technique that holds great promise both for specific training programs and for principals to use in working with their staff. The underlying metaphor of an athletic coach suggests change in individuals can be brought about by close supervision by an expert in the field who operates according to a clearly understood game plan that can be modified as game conditions change. Furthermore, the coach works closely with players, observing their performance, providing feedback, demonstrating techniques, and monitoring progress.

Research in the coaching model as a training technique has supported its value in implementing change in individuals and programs and has identified the following coaching elements: providing companionship, giving technical feedback, analyzing application, adapting to students, and providing personal facilitation (Joyce & Showers, 1982). The principal can fulfill the coaching function for his or her teachers; moreover, district supervisory staff may act as coaches for the school-based administrators as well.

Thus, the Intervention Coaching model integrates theory and research on the change process, the role of the principal in school improvement, and supervisory coaching to address a major program implementation. In the project's first year, the application of the model to a real world situation created a productive tension between the theory and research on one hand, and the immediate and practical district requirements, on the other. This tension resulted both in a more successful change effort and in a refined perception of the theory, research and model which facilitated that change. The interaction is somewhat analogous to the Piagetian concept of intellectual development in both the assimilation of theory into practice and the accommodation of the theory-based model when subjected to practical exigencies.

The remainder of this paper will describe the Intervention Coaching project and briefly chronicle its first year, present the evaluation plan and its outcomes, and describe conclusions and implications of the project as an exportable model for school improvement.

Project Description

In early spring of 1985, as a result of integrating the need for suitable management training models for district administrators with past applications of C-BAM products and training, the idea for the Intervention Coaching Project was conceived. Coincidentally, a new elementary mathematics curriculum was to be implemented in all elementary schools the following fall term. Through discussion among staff development, elementary education and evaluation decision-makers, the district agreed that the new mathematics program would provide a vehicle for determining the viability and worth of the IC model.

After a presentation to all elementary principals, six schools volunteered to participate in the IC project. Each school formed a coaching team consisting of the principal, curriculum specialist, and district general supervisor.

All participants, including the project management team (supervisors from staff development, elementary mathematics, and evaluation) received 16 hours of training in the C-BAM/RIP content with a focus on the Intervention Taxonomy. Training was provided by a consultant from the R & D Center. Because of their new and unfamiliar team role, district supervisors were given six additional hours of training. As a result of the training, teams each developed a unique game plan for implementing the new mathematics program at their schools. Plans were submitted to the project manager and critiqued by the consultant, who made written comments to the teams.

During preplanning, IC teachers participated with others in the district in an inservice session which explained the new mathematics curriculum. Most teams used this event as a springboard for the year's game plan activities. Other activities teams fostered during the first semester included: parent workshops, mathematics lessons for American Education Week, student mathematics projects, teacher training in the use of manipulatives or problem solving, bulletin board displays, notes in the school-wide newsletter and/or classroom observations.

The school leadership teams were themselves the target of district-planned interventions during the first semester as well. Based on feedback from the initial training, additional inservice on coaching technology was offered to participants in September. In a follow-up group meeting, sets of all game plans were distributed to participants, project events were discussed, and teams were given a configuration checklist for the elementary mathematics program. Finally, by-school Stages of Concern profiles from an August administration of the SoC questionnaire to teachers were distributed and IC teams were encouraged to use their school profile to address their faculties' major concerns.

In January 1986 the consultant spent one-half day in each IC school conferring with the team and selected teachers. Using the original game plan as an information source, she explored actions that had occurred at the school and coached team members through obstacles to implementation of their plan. Her visit culminated in a three-hour afternoon meeting at which she summarized impressions of her school visitations and presented relevant C-BAM/RIP research. At the same meeting the evaluator shared interim evaluation data, the math supervisor reported recent happenings in district mathematics, schools remarked on successful activities, and teams made plans for the remainder of the school year.

Back in their respective schools, IC teams proceeded with their planned actions until the school year's end. School events included observations of mathematics lessons, manipulatives workshops, math-oriented activity days and contests, and math-related acquisitions for the professional library.

In May, the mathematics supervisor provided each IC school with a math consultant to spend a day talking with groups of teachers about their concerns and to elicit suggestions for future implementation. The consultant shared impressions and recommendations with the school IC team and, later, with the mathematics supervisor.

The project developer and evaluator closed out the project year by conducting a third set of school visits in which IC team members reviewed the year's activities, shared their perceptions about the project, and stated their plans relative to the mathematics curriculum for 1986-87. All teams expressed intentions to continue in the project for the second year and to submit written plans during the summer.

Evaluation Issues and Methods

Evaluation of the IC project followed a traditional formative model wherein some activities emphasize the implementation of the overall project and others focus on project outcomes. To provide rigor and credibility to design, the product portion includes a group of six comparison schools that are implementing the new mathematics curriculum but are not participating in the IC project.

Specific implementation questions were developed around the issues of IC team composition, training activities and their value, game plan production, and the role of the central office. To investigate these questions, a series of three unstructured interviews occurred during the 1985-86 school year. In each case, school teams at their respective sites were interviewed for approximately one hour. In October, the project evaluator conducted the interviews, after which she provided a written summary of findings to the district team and each school team. In January, the external consultant talked with the administrative team and teachers at each IC school. She too provided a written summary that was disseminated to all participating teams and district staff. In May, the project developer and the evaluator jointly visited each IC school and talked at length about the team's experiences and feelings throughout the first year of the project. Following each of these May meetings the evaluator wrote a detailed summary of impressions and shared it with the project developer who added her own insights. Conclusions about the overall project's implementation were drawn after integrating the findings of the three process interviews.

Four questions were designed to determine the impact of the IC project on teacher behaviors and concerns and on student achievement in mathematics.

Specifically, the questions raised the following points: 1) What effect does the IC model have on the speed with which teachers reach routine implementation of the new mathematics program? 2) What effect does the IC model have on the types of concerns that teachers express about implementation of the new mathematics program? 3) What effect does the IC model have on the full use of the various components of the new mathematics program? 4) What effect does the IC model have on student achievement in mathematics?

In response to the first question regarding rapidity of routine implementation, Levels of Use (LoU) interviews were conducted with a random sample of teachers in IC and comparison schools. The LoU system consists of a series of questions designed to determine where an implementor is functioning in regard to an innovation. After the 20-minute interview, an individual is assigned to one of eight levels -- varying from non-use of the innovation (Level 0) to a re-examination of the innovation in relation to other alternatives (Level 6). In August 1985, it was assumed that all IC and comparison teachers were preparing to use the new mathematics curriculum. Thus, all were assigned to Level II, Preparation. In December 1985, a team of trained interviewers discussed the mathematics program with 108 teachers -- 54 IC and 54 comparison -- and assigned individual LoUs to each interviewee. Then, by-level frequency distributions were compared for the IC and comparison groups.

In response to the second question regarding concerns teachers were feeling about the new mathematics curriculum, Stages of Concern (SoC) questionnaires were administered to all teachers in IC and comparison schools in August 1985 and May 1986. For each data point, survey results were analyzed by school and by group, and comparisons of the August and May profiles were made. The SoC questionnaire consists of 35 statements to which teachers respond on a scale of 0 to 7. Numbers at the low end of the scale indicate no or little concern about the statement.

Statements are then clustered into seven areas of concern: awareness, information, personal, management, consequences, collaboration, and refocusing. Raw scores in each area are converted to percentile ranks so that the relative intensity of an individual's or group's concerns can be revealed.

To investigate the third question regarding the extent of implementation of various components of the new mathematics program, Innovation Configuration surveys were completed in December 1985 by all teachers in the IC and comparison schools, and the percentages of teachers in each group who reported acceptable or unacceptable behaviors were compared. The Innovation Configuration survey was constructed from a checklist in which the elementary mathematics supervisor had specified behaviors that teachers could exhibit as they implemented the new mathematics program. For each behavior she had delineated to the IC teams and district staff what she considered acceptable and unacceptable levels of performance.

The final question regarding student achievement in mathematics was investigated via student performance on the district's annual achievement test battery, the Comprehensive Test of Basic Skills (CTBS, Form U). A predicted score in total mathematics was calculated for each student in third, fourth, and fifth grades in the IC and comparison schools. Then, percentages of students who met or exceeded their predicted score were compared across the groups. Predicted scores were derived by using test data from the 1984 and 1985 Hillsborough County School population to determine appropriate variables and relative weights to enter into prediction equations for the three grade levels. Identified predictors of significance included previous mathematics score, aptitude score, age, sex, and exceptionality. Stepwise and backward regression procedures yielded a different subset and/or order of the identified variables for each grade.

Evaluation Results

Process data indicated the following: the IC project was implemented in some fashion in each participating school; IC teams generally were operational; supervisory members of the IC teams performed diverse functions; district management and intervention were regular and responsive; training was adequate but not exemplary; and systematic mathematics-related activities occurred which would not have taken place were it not for the IC project. This information was used by the project developer and the mathematics supervisor in planning for the second year of the IC project and in planning future school interventions of this nature.

Preliminary product data were collected throughout the first project year. For each question, results from the LoU interviews, SoC questionnaires, Innovation Configuration surveys, and student achievement tests are shown and discussed.

Program Implementation Speed

What effect does the IC model have on the speed with which teachers reach routine implementation of the new mathematics program? As shown in Table 1, LoU results revealed a substantially higher level of routine implementation of the new mathematics program at the IC schools than at the comparison schools. After five months in the program almost 80 percent of interviewed IC teachers stated that the program was operating smoothly and with a minimum of difficulties; less than half of the comparison teachers expressed the same level of use. Additionally, the interviewers commented that IC teachers seemed more aware of the various components of the new mathematics program and were more focused and specific in their remarks about the curriculum than were comparison teachers.

Teachers' Implementation Concerns

What effect does the IC model have on the types of

Table 1 Levels of Use Results -- December 1985

Level of Use	Intervention Coaching Schools N (%)	Comparison Schools N (%)
0 - Non-Use "I really don't know much about the new mathematics program."	0	0
I - Orientation "Although I haven't been involved yet, I've attended all the workshops and have books and materials."	0	0
II - Preparation "My kindergarten students are using DMP now. In the spring, we'll use some of the Addison-Wesley materials."	1(1.9%)	0
III - Mechanical Use "I can't figure out how these materials all fit together. Time is a real problem."	8(14.8%)	27(50.0%)
IVA - Routine Use "This program is working smoothly. My kids like it and we're moving through it at a steady pace."	43(79.6%)	24(44.4%)

Table 1 Continued

Level of Use	Intervention Coaching Schools N (%)	Comparison Schools N (%)
IVB - Refined Use "Some of my kids caught on right away to fraction concepts, but others needed a longer review. So now I have two groups--one works along at the regular pace. The other uses more manipulatives."	2(3.7%)	3(5.6%)
V - Collaboration "The fourth grade teachers meet once a week to plan our manipulative lessons. Kids are shuffled depending on the type of lesson they need that week."	0	0
VI - Refocusing "The Addison-Wesley program is fine for a review text, but after using it for two years, I've found a dynamite way to improve on it."	0	0
TOTAL N	54	54

concerns which teachers express about implementation of the new mathematics program? SoC profiles indicated that initially, faculties at both IC and comparison schools were most concerned about becoming familiar with the program and determining the new demands it would place upon them. Thus, relatively high percentile ranks (in the high 70's and mid 80's) in the "Awareness," "Information," and "Personal" categories were noted for groups. After eight months of program implementation average percentile ranks in every category were significantly reduced (in the high 30's to 60's) with no particular concern substantially outweighing another. According to a non-parametric Median test, no single category was significantly different from any other.

Discrepancies between the two treatment groups were not sizable nor immediately discernible for either data collection point. However, further analysis did reveal one area in which IC teachers apparently were somewhat more concerned about aspects of program management than were comparison teachers. Given the overall low percentile ranks (34 and 30 respectively) for the IC and comparison groups, however, this difference does not appear to be practically significant. Thus, no real differences exist between the two groups in terms of their concerns about the new mathematics program.

Full Program Implementation

What effects does the IC model have on the full use of the various components of the new mathematics program? Between 106 (IC group) and 126 (comparison group) teachers responded to the Innovation Configuration survey. Their responses revealed substantial differences between the groups on six of the 22 behaviors. (Substantial difference was defined as a difference of at least 10 percentage points -- the equivalent of 10-12 teachers.) Teachers at IC schools were more likely to report frequent use of manipulatives in their mathematics lesson, adherence to the district-recommended mathematics time frame when planning their lessons, conformity to the lesson development sequence specified in the teacher's edition, use of diverse means of assessment of student performance, and frequent use of a management profile sheet to monitor student progress. Three of these behaviors (use of manipulatives, time frame planning and lesson sequence) are major departures from the previous mathematics program. The fact that a greater percentage of IC teachers reported acceptable use is a powerful indicator in favor of the IC model.

On the other hand, kindergarten and first grade IC teachers reportedly were less likely than comparison teachers to use district objectives for identification of prerequisite skills when planning instruction for their primary students. For analysis purposes, kindergarten and first grade teachers were targeted as a special subgroup. The mathematics supervisor has constructed a five-year plan for training all teachers in the new mathematics program and new district reaching objectives and strategies. Kindergarten and first grade teachers were the first groups to receive such training and were expected to integrate these changes into their teaching behaviors. Thus, the mathematics supervisor anticipated that this IC subgroup would perform differently (i.e., better) than their comparison counterparts.

Although it is uncertain why the observed difference was the opposite of that anticipated, two explanations are possible. First, by their actions toward total school involvement in the new mathematics curriculum, IC schools may have stressed other mathematics instructional behaviors. As members of the local improvement effort, kindergarten and first grade teachers may have concentrated on school priorities rather than district expectations. Second, IC administrators may have been unfamiliar with the kindergarten and first grade objective and strategies, and thus, did not focus on acknowledging and expecting these behaviors. The small number of respondents (18) in each group may further account for the magnitude of difference between the two and bring into question the practical significance of this difference.

Student Achievement

What effect does the IC model have on student achievement in mathematics? At IC and comparison schools, the percentages of students in grades 3, 4 and 5 who met or exceeded their predicted scores in total mathematics on the 1986 administration of the CTBS were almost identical. Fifty-seven percent of IC students performed at least as well as expected, whereas 58 percent of comparison students performed at least as well as expected. Given the newness of the new mathematics curriculum and the first year status of the IC project, this finding is not surprising. However, it is anticipated that between group differences will be discernible at the end of the 1986-87 school year.

CONCLUSIONS AND DISCUSSION

Based on reconstruction and reflection of events and findings of the Intervention Coaching project's first year, some tentative conclusions about the characteristics that would constitute a successful IC model have been drawn. The tentative nature of the conclusions is necessary because of the case study approach used with a small sample of schools. Furthermore, lack of formative data from the comparison schools hinders a full understanding of what occurred in those alternative settings. Despite these concerns, the following conclusions were reached.

A School Improvement Framework

The IC model appears to provide a viable framework for school improvement that can be uniquely applied to individual schools. While the IC model is not the only way to approach change systematically, it is one potentially effective alternative which school-based change agents can use in planning for and implementing an innovation program. The model provides two important resources: a conceptual framework for thinking about change and a set of tools (i.e., SoC questionnaire, LoU interview, Innovation Configuration checklist, and game plan structure) change agents can use in intervening and monitoring throughout the change process. By using the IC model, school efforts towards change can be proactive rather than reactive; that is, school-based administrators can plan for change systematically rather than react to change in a haphazard fashion.

The IC model seems to be particularly cogent when the school improvement task is the implementation of a district program. When a program is mandated by district policy, such as the new elementary mathematics program, the school must implement the program as effectively and efficiently as possible. The impetus is "top down" rather than "bottom up" and is most common in school districts. Other school improvement efforts (e.g., building consensus, developing collaborative work groups) might require a different model.

Analysis of the first year of the IC project identified six essential components: the game plan, a school team, a district team, related training, change process orientation, and evaluation. Each of these elements appeared to contribute uniquely to the project's success; the elimination of any one element would endanger the integrity of the model as a whole. Each of these six elements will be discussed in subsequent conclusions.

The Game Plan

The game plan process provides necessary structure to the IC model. The game plan provided a formal opportunity for each of the six school teams to work collaboratively to solve a problem. Of principal value was the realization that systematic and comprehensive planning could assist in bringing about change. Phases involved in developing the game plan offered the means for setting goals, exploring strategies, scheduling interventions, monitoring, and providing feedback for the mathematics innovation. Furthermore, the existence of a written product prompted action and encouraged self-monitoring. (The rather simplistic analogy of a "Things to Do Today" list comes to mind.)

By sharing the game plan with their faculties, some IC teams communicated their expectations and intentions for the way in which the new mathematics curriculum would be implemented. In so doing, the game plan became an informal contract among the IC team members and between the team and its faculty. All could see the team's work, relate some administrative actions to the plan, and join in judging the plan's implementation status and degree of success. Thus, common goals were established for the team and the school.

Although the game plan provided a formal document and common structure for the IC project, it was flexible. In format, four variations existed among the six schools. These personalizations worked to enhance rather than detract from the project's implementation.

A less tangible but equally attractive benefit was the changeable nature of the game plan. When obstacles were encountered or unforeseen needs emerged, they were accommodated. Most schools experienced time and resource constraints during the first implementation year and were able to modify their course of action. Although teams oftentimes did not physically alter their original document, their actions changed to account for the new circumstances.

The game plan, or Intervention Taxonomy, component seems to be the least developed of the C-BAM products. It is loosely constructed and its training episodes are not firmly structured or delivered. While a vocabulary and classification scheme exist for planning and categorizing goals and actions, the concept itself seems to lack depth. For these reasons, some IC participants were disappointed in the game plan notion and came away from the first training sessions with an "unfinished" feeling. The game plan components and taxonomy are useful in structuring one's thinking about planning interventions. They are less helpful, however, in operationalizing the concept.

The IC Team

Each school's IC team should consist of at least three active members: the principal, the CIS and other change facilitator. A number of recent studies (Hall & Rutherford, 1983; Hord & Hall, 1982; Hord, Steiegelbauer & Hall, 1984; Rutherford, Hall & Hord, 1983; have emphasized the importance of the principal as the primary change agent in a school improvement effort. While the IC principals each exhibited different leadership styles, most assumed responsibility for directing their team's effort. Even when the IC principal was not a continually visible force, he/she clearly sanctioned the changes that were expected to occur relative to the new mathematics program.

In addition to the principal, a person at each site who was almost or equally as active as the principal was necessary for a fully operative team. In apparently effective IC teams, the CIS fulfilled this function. Pointing out the significance of this second team member as a source of important interventions, Hord and her colleagues (1984) refer to this person as the second change facilitator (SCF). Their studies regard this person as essential to any substantive and long lasting change process. Importantly, a predetermined division of tasks so that the SCF and principal serve complementary functions has been found to play a major role in implementation (Hord, 1984). These circumstances appear to exist in successful IC teams.

The active participation of a third team member, either a supervisor or other school-based staff member such as the primary specialist, supplemented the IC team. While this member's responsibilities were not as clearly defined as those of the principal and CIS, his/her working involvement seemed to add strength and purpose to the team. Perhaps the increased ability to share game plan tasks, a visible show and feeling of unity, and the addition of a third mind to sift through problems and construct solutions account for the positive effects of this third member.

A major task of the IC team is in coaching teachers to add new behaviors to their teaching skills. Thus, the functions of observation, feedback and reinforcement become foremost for the team. Influential and cohesive teams appeared to be those in which these responsibilities were shared by all of its members.

It is important to note that some successful school teams did not include an active district supervisor. Initially, the project developer and district administrators felt that a supervisor would provide an "official link" that would facilitate the team's operation. This did not always occur, however. In some instances where the principal or CIS was not a fully functioning team member, the supervisor served as the second change facilitator and as a necessary support for the other member. In the presence of a strong school-based team, however, the absence of or lack of activity by the supervisor did not hinder the team's effectiveness.

The District-Level Team

District sponsorship and direction is essential to the success of the IC model. An effective composition for the district level coaching team includes a management training specialist, the content area specialist, and an evaluator. Although the critical role of the district team was not emphasized in the original IC project design, its importance became clear as the year progressed. Beyond the obvious function of the district coaching team in initiating, sanctioning, and managing the project, the team developed a collaborative relationship which was more than the sum of the parts. The three team members were available to one another to problem solve, to explore new ideas, to share frustrations, to reflect upon the implications of the project, and to maintain interest and activity level in the project. Each of the three persons was quite busy with other commitments; any one alone could not have sustained the extra effort the program required.

In turn, the continued focusing on the project by this collaborative group helped maintain the momentum at the school level. With three "super-coaches" with different perspectives available to provide support to school teams as required, participating schools could select the one which best met their particular needs at any time.

Each of the district team members functioned differently in the project. The management training specialist (the staff development supervisor) acted as project manager, planned process training (e.g., C-BAM, coaching), scheduled events, reminded schools about program requirements (e.g., submission of game plans), communicated with project participants periodically, assessed and responded to participants' needs, and disseminated interim project information to others in the district. The content specialist (the elementary mathematics supervisor) provided content area expertise, reported the status of the district mathematics program at IC meetings, and made available perquisites in the form of mathematics resources (i.e., consultants) to IC schools. The evaluator collected and analyzed data throughout the year, reported her findings at team meetings, gave feedback to individual schools, served as a neutral person to whom schools could report negative information, and proposed conclusions about the effectiveness and generalizability of the project.

District Team Intervention

The timing and frequency of intervention by the district team is critical to sustaining school involvement in the IC project. the district coordinating team was responsible for providing feedback and reinforcement to school teams in much the same way as school teams provided feedback and reinforcement to their teachers. Even with a well developed game plan, daily pressures and distractions at the school level acted as obstacles to its implementation. For this reason, among others, the time and structure of district interventions made an important contribution to maintaining the school team's orientation and momentum.

District intervention with IC teams occurred at the rate of at least one intervention per month during the first six months of the project followed by a three-month period in which no interventions occurred and then a final discussion session with each team. At various times, interventions consisted of written messages, conversations, oral presentations, or formal training sessions. Twice during the project year, specific information regarding other teams' progress was provided to all teams. Three times, results particular to each school (in the forms of SoC profiles, LoU and Configuration charts, and verbal summaries of teachers' concerns) were given.

These feedback mechanisms served a variety of purposes: disclosure of teams' activities so that each team could gauge its performance and transfer some strategies which already had proved effective; support for teams' efforts so that members could feel good about themselves during the early stages of the IC project; provision of common "conversation pieces" by which discussions of relevant issues could begin; and communication of school-specific data which teams could use to decide on their next course of action. Interestingly, reports of each school's progress spurred others into action and fostered a friendly competitive spirit.

Mostly, the functions of the district team's interventions were those of coordinating, telling, helping, training, and encouraging. In addition, this pilot endeavor sought to use IC teams' experiences and perceptions to shape a usable framework for subsequent school improvement attempts. To this end, the district team solicited information about the roles which the district team should assume. Judging from team's comments and a review of project documents, the district team's consultation and feedback responsibilities were of prime importance. Also, the schedule by which the district team's interventions occurred was appropriate. Frequent interventions in the initial months of project involvement with a tapering off in the second school term prodded school teams into action as the project began, then allowed them to work at their own pace through their planned activities.

Participant Training

Initial and follow-up training is required to provide all participants with necessary knowledge and skills to implement the IC process. Although the initial training given to all participants in June 1985 did allow the project to get underway, the training design was less than adequate and should be configured differently in future applications of the IC model. A three-pronged training program would allow individual school teams to plan for and implement the innovation more effectively.

First, training in the Concerns-Based Adoption Model and Research in the Improvement Process should continue as a major training component. An orientation towards change is essential for those responsible for implementing innovations as well as the need for specific planning and assessing tools. The training could be more condensed, however, than the 20 hours allocated in the initial project. Also, additional separate training provided to supervisors does not appear to be warranted.

A second essential element is training all participants in the coaching or clinical supervision model. Although participants in the 1985-86 project received a day of training in this area, additional training coupled with brainstorming on applications for both district and school personnel would be useful.

The final prong of the training program should include content specific information. Once participants understand the change process, acquire some planning tools and practice coaching skills, they need state-of-the-art information about the subject area so they can include effective interventions in their game plans. Although this training piece was missing in this year's project, mathematics content could have included such components as suggestions on teaching manipulatives, using the direct instruction model, teaching problem solving, and observing a math lesson.

An especially effective aspect of the training for the IC model, regardless of the specific content that was built into the program, was the validated staff development component of follow-up. By program design, the initial training was reinforced throughout the project as participants worked to apply their newly acquired knowledge and skills.

One concern that arose during the first year of the project and which would require attention in any application of the model is that relatively high participant turn-over necessitates periodic entry level training for new participants. Of the six project schools, there was one change of principal and three new curriculum intervention specialists over the first year. Moreover, the elementary education department was reorganized, giving different general curriculum supervisors responsibilities for several of the schools.

Educational Managers

The IC model has considerable potential for training educational managers. In response to national and state focus on the principalship and other leadership positions, school districts continue to seek a repertoire of effective training programs for both school and district managers. The training and follow-up to prepare administrators and supervisors to implement the IC model can be a valuable piece of a school district management training program, especially for experienced managers. Principals in the IC project included both experienced and relatively new administrators. New principals seemed to have more difficulty in starting and/or sustaining the IC project at their schools. Perhaps the IC model is more appropriate for experienced principals who are looking for ways to refine or expand their expertise in bringing about change. Beginning principals may be so overwhelmed by the myriad of new responsibilities that they may not be able to assimilate the IC concept into their school situation.

IC Model Differences

Measurable differences exist between schools that implemented the IC model and comparison schools. Application of the IC project model resulted in focused and systematic implementation of the new mathematics program at six elementary schools. Although some teams were more successful than others in carrying out their game plans, all IC schools placed additional emphasis on the mathematics innovation and enacted a significant number of their game plan activities.

Systematic interviews and survey responses revealed that teachers at IC schools behaved differently in their implementation of the mathematics program. Four out of five IC teachers reached a routine level of implementation after only five months in the program; about two out of five comparison teachers reached this level. Moreover, IC teachers were more aware of the various aspects of the new mathematics curriculum and were substantially more likely to report acceptable use of five program components: frequent use of manipulatives, adherence to the district-recommended time frame in their lesson plans, conformity to the lesson development sequence specified in the teacher's edition, diverse assessment of student performance, and use of a student management profile sheet. Three of these areas represent major instructional changes from the previous mathematics program and their reported use after a relatively short period of program implementation is a powerful indication of IC project effects.

Given the imperfection of student achievement measures and the limitations of implementing evaluation designs in complex and fluid school systems, it is difficult to link causes and effects of school improvement efforts. However, if the observed school-wide and teacher behaviors in the IC project are sustained and have the intended positive effects on student learning, differences between IC and comparison students' mathematics achievement should be observable in the future.

In conclusion, the Intervention Coaching project, in its first year of implementation, confirmed the value of the underlying change theory and the viability of the IC model in enhancing change efforts. In addition, the model from which the IC concept derived, the C-BAM/RIP framework, was modified somewhat in the process of applying it in an actual school district situation. The productive tension between the research-based theory and its application reflects the optimal relation between those forces in the larger educational community.

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