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ABSTRACT

The procedures and coding schema that have been developed by the Research on the Improvement Process (RIP) Program for analyzing the frequency of interventions and for examining their internal characteristics are described. In two in-depth ethnographic studies of implementation efforts, interventions were the focus of data collection and analysis. This research resulted in the development of a multi-level intervention classification system. This Taxonomy of Interventions (TI) includes formal definitions and conceptual frameworks which can be used (1) to classify the interventions that are made by the various actors within a change effort and (2) to relate them one to the other along several dimensions. A second framework, the Intervention Coding Framework (ICF), emerged to code each identified intervention in terms of a defined set of sub-dimensions. The resultant TI and ICF provide both the conceptual and analytic tools to describe and compare the actions taken by the various individuals within or across change efforts. Illustrations of the developed analysis option concepts include a definition of the intervention; and the frameworks used for collecting, describing, and analyzing principals' behaviors as they intervened in the change process in their schools. (Author/PN)

PROCEDURES FOR QUANTITATIVE ANALYSIS OF CHANGE FACILITATOR INTERVENTIONS

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Paper presented at the annual meeting of the
American Educational Research Association
New York City, 1982

Procedures for Quantitative Analysis of Change Facilitator Interventions[1,2,3]

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The principal telephones the chairman of the Principals' Committee, the area math coordinator and the assistant superintendent to check out the rumor about the promised math materials for the teachers (Chain Incident Intervention).

In March and April the principal holds a series of three hands-on workshops to train teachers in the metric system: background information, concepts, measures, materials/activities (Tactic Intervention).

Across the second year of implementation the principal encourages the teachers' use of the Math Kits (Strategy Intervention).

During the last several years as more has been understood about the change process, the focus of change research has moved to examining the role and efforts of the front-line actors who are expected to be involved in the process. This focus has been directed at increasing the understanding of how

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[1]This paper was presented at the annual meeting of the American Educational Research Association, New York City, March 1982.

[2]The research described herein was conducted under contract with the National Institute of Education. The opinions expressed are those of the authors and do not reflect the position or policy of the National Institute of Education, and no endorsement by the National Institute of Education should be inferred.

[3]The authors wish to acknowledge the contributions and participation of their co-workers in this study: Teresa Griffin, Nova Washington, Beulah Newlove, Marcia Goldstein, Leslie Huling, Terry Needham, Bill Rutherford, Suzie Stiegelbauer, and Sue Loucks. We also wish to acknowledge the valuable assistance that has been so willingly given by the principals and teachers who participated in the studies.

innovation users and nonusers experience change. In educational settings researchers have looked closely at the teachers' role and experiences as they have implemented various educational innovations. One consistent finding from these studies is that teachers and other innovation users do not act in isolation from the influence of the school context. Such factors as the principal, staff developers, classroom variables and other conditions within the school affect if and how teachers use innovations. These and other factors intervene on teachers who are the front-line users of innovations.

Identifying and describing the various interventions that influence teachers' use of innovations has been a major emphasis of the Research on the Improvement Process (RIP) Program of the Texas Research and Development Center. During the last five years program staff have used qualitative procedures including ethnography and, more recently, quantitative procedures to identify, describe and analyze the interventions that occur during an implementation effort. The most recent studies have focused directly on the principal and the interventions that they make to facilitate their teachers' implementation of curricular innovations.

One problem that the staff encountered in attempting to document and analyze principal interventions was the lack of conceptual frameworks and methodologies that directly dealt with interventions. There was the need for a framework to analyze and code the various interventions that occurred and to examine the internal dimensions of each intervention. There was also a need to identify procedures for combining and reducing the extensive amount of descriptive information about each intervention that resulted from the use of qualitative data collection procedures.

In this paper we describe the procedures and coding schema that have been developed by the RIP Program for analyzing the frequency of interventions and

for examining their internal characteristics. Examples of intervention coding procedures are introduced and used to illustrate some of the analysis options that have been developed. The paper concludes with a brief discussion of some of the implications of this work for future research on the change process, for evaluating intervention effects and for future training of principal/change facilitators. But, first, a brief summary of the development of the procedures, which follows below.

Overview of the Intervention Coding and Analysis Procedures

In two in-depth ethnographic studies of implementation efforts (Analysis of Change Agent Interventions in a Two-Year Innovation Implementation Effort in One junior High School, 1979; and Making Change Happen: A Case Study of School District Implementation, 1980), interventions were the focus of data collection and analysis. This research resulted in the development of a multi level intervention classification system. This work includes formal definitions and conceptual frameworks which can be used (1) to classify the interventions that are made by the various actors within a change effort and (2) to relate them one to the other along several dimensions. One potential use of this Taxonomy of Interventions is to identify individual interventions from the smallest "incident" interventions to the total "game plan" for a particular change effort and then plot their interrelationships and linkages.

As the staff was involved in developing such a classification system that would allow for the identification and mapping of interventions, a parallel effort was being made to develop a system for analyzing the internal aspects of an intervention. Out of this work a second framework emerged that can be used to dissect an intervention into its component parts. This

Intervention Coding Framework can be used to code each identified intervention in terms of a defined set of sub-dimensions.

The resultant Intervention Taxonomy and the Intervention Coding Framework provide both the conceptual and analytic tools to describe and compare the actions taken by the various actors within or across change efforts. The procedures can be used as a standard rubric to identify, classify and describe the interventions that principals, staff developers and other actors make. These procedures also make it possible to compare and contrast the various actors in terms of the amount and kinds of actions that they took to facilitate a particular change effort. Comparisons could also be made between the interventions that were made and their effects in terms of such variables as degree of implementation, or perhaps summative effects such as student cognitive or affective outcomes.

In work at the Texas R&D Center a synthesis of the field data from the ethnographic studies in a cross-case analysis resulted in the contention that the principal as change facilitator is a significant factor in the process of school change. Thus, to better understand the interventions made by the principal as change facilitator, the current Principal-Teacher Interaction Study was designed. This study would explore and document the interventions of principals as they and their faculties engaged in a school change effort. In this study, it would be possible to analyze the principals' interventions through use of the intervention frameworks that had been developed. How the intervention frameworks were used will be described in subsequent sections of this paper. The intervention frameworks will be described in more detail in the next section.

Intervention Concepts

This section of the paper reports the RIP/CBAM intervention concepts: the definition of intervention, and the two intervention frameworks which were used for collecting, describing, and analyzing principals' behaviors as they intervened in the change process in their schools.

Definition of Intervention

During the intervention studies already cited, qualitative data were systematically gathered by field-based ethnographers and transcribed into written descriptions. These soft-bound volumes comprised the raw data of the studies and were circulated among the project staff for perusal and reflection. Monthly debriefing meetings involving the staff and ethnographer occurred over a two-year period. In these meetings items from the data and items from case studies in the literature, which might serve to represent interventions, were printed on cards and analyzed through Q sorting techniques by the staff, ethnographers, and external consultants (Hord, 1979). These deliberations contributed to the refinement and final concensus of the working definition of an intervention:

> Intervention: Event(s) or action(s) that influence use of the innovation (Hall, Zigarmi & Hord, 1979).

An example of an action that is an intervention is: The principal volunteers to help any teacher in grouping students for instruction in the new math program.

An example of an event that is an intervention is: A chemically-oriented illness struck the print shop staff, delaying production of the math program materials.

Taxonomy of Interventions

Utilizing the intervention cards again in sorting activities, the staff developed classification schemes for sorting interventions along several dimensions (Hall, Zigarmi & Hord, 1979). From these sortings policy, game plan, strategy, tactic, and incident intervention levels emerged and were defined (See Figure 1 for definitions). These categories represent a continuum reflecting the scope, size and magnitude of interventions. The number of individuals who are the focus of the intervention and the duration of the action are factors which guide distinctions between the levels. For example, "game plan" is the overall design for implementing an innovation, encompassing all components of the innovation, all aspects of the implementation process, and extending over the full time period of the change process. In contrast, an "incident" is the singular occurrence of an action or event which may target one or more individuals, is of short duration, and is the smallest size intervention.

Sublevels of the incidents and tactics further define these interventions and reflect the degree of the action's complexity (Hord, Hall & Zigarmi, 1980). For instance, an isolated incident is a single action separated in space and time from other actions. A single incident is a simple action or intervention that is functionally related to other interventions; a complex incident is a set of related simple actions within a short time frame. Some incidents group to form a tactic and tactics may be the operationalized components of strategies. The levels of interventions make it possible to "map" the principal's actions (Zigarmi, Goldstein & Rutherford, 1978) and gain insight into the way the interventions may relate to each other and better understand how the principals facilitate change in their school.

Figure 1

Definitions of Intervention Levels

Policy. A policy is a rule or guideline which directs the procedures and actions of an organization. Policies affect most (if not all) of the individuals and are in effect for extended periods of time. Policies serve as the umbrella under which all programs and processes (innovations and those already in place) are governed.

Game Plan. A game plan is the overall plan of actions that are taken to implement the new program. It contains all aspects of the change effort, covers the full time period of the change process, and affects all persons directly or indirectly involved.

Strategy. A strategy is a framework for action, translating the design of the game plan into concrete action to be taken. Strategies cover a large portion of the change process time period and impact most of the users.

Tactic. A tactic operationalizes the strategies undertaken to affect attitudes toward or use of the innovation. Tactics cover a shorter time period than a strategy and affect many innovation users but not necessarily all of them.

Incident. An incident is the singular occurrence of an action or event. Incidents may be one of a kind happenings or they may aggregate into tactics and strategies. Incidents usually cover a very small amount of time and can be targeted at one or more individuals.

Hall, G. E., Zigarmi, P. & Hord, S. M. A taxonomy of interventions: The prototype and initial testing. Austin: Research and Development Center for Teacher Education, The University of Texas, 1979.

Anatomy of Interventions

The Intervention Coding Framework/Intervention Anatomy is a conceptualization of the sub parts of an intervention. This Coding Framework developed out of field research collected over several longitudinal intervention studies begun five years ago. Early intervention data were analyzed and the framework for examining incident and tactic interventions was developed. This framework came as a result of dissecting individual interventions in efforts to find their attributes, characteristics or dimensions. What commonalities did all interventions manifest? The staff grappled with "cutting" and sorting, arranging, organizing. Biological, geological and other classification systems were studied for clues. The use of the field data in clinical analyses by the staff in reflection with the ethnographer-data gatherers and critical external consultants produced the analytical framework, the "Anatomy." This schema is used for analysis and identification of the individual intervention's components. It is useful in providing more specific description and understanding of the principal's intervening behavior by focusing on the internal dimensions of the principal's interventions. These dimensions, as they were originally conceptualized (Hord, Hall & Zigarmi, 1980), are found in Figure 2 with definitions and examples.

The dimensions--source, target, function, medium, flow, location--are the major parts of an intervention. However, there are many different kinds of each of the dimensions. For instance, the source could be various change facilitators--principal, assistant principal, resource teacher, other teachers--or the source could be a central office curriculum consultant, other district person, a parent or the source could be a teacher or student. In short, the source (or the person who initiates the intervention) could be

Figure 2

Anatomy of Interventions

Source. Person(s) who act or events that occur to influence individuals to change. Who are these persons? They might be staff developers, curriculum coordinators, principals, teachers, students, or even events such as snow storms which influence the change effort.

Targets. Person(s) toward whom the intervention is directed. The examples of Targets are the same as Sources except for the addition of the change effort/process as an additional Target. Some interventions are made which have the change process itself as the Target.

Function. The purpose(s) of the intervention. Seven general functions have been identified: (1) Developing supportive organizational arrangements, (2) Training, (3) Providing consultation and reinforcement, (4) Monitoring and evaluation, (5) External communication, (6) Dissemination, and (7) Impeding.

Medium. The mode or form of the action. Such modes might be face to face or a form(s) of written communication. Additional possibilities are audio-visual formats, communication by telephone, or the public media such as newspaper, radio, T.V., journals.

Flow. The direction of the action. The flow of interventions may be one way. There is action directed toward one or more persons who might respond, but there is no interaction. The flow could be interactive, that is, there could be an exchange of actions between the intervenor and the individual(s) being intervened upon.

Location. Where the intervention takes place. Examples would be the setting (campus or school unit building) where teachers or others are using or learning to use innovations, the central administration building, or training sites.

Hord, S. M., Hall, G. E. & Zigarmi, P. Anatomy of incident and tactic interventions dimensions, design. Austin: Research and Development Center for Teacher Education, The University of Texas, 1980.

anyone. Therefore, "kinds" of sources and of each of the other dimensions were conceptualized. As the lengthy lists of "kinds" were generated, there was an attempt to keep each of the kinds mutually exclusive but also to keep the list from becoming overly lengthy and cumbersome. The dimensions and their related kinds were assigned numeral and letter codes for representation. The various dimensions when coded by "kind" identify the who, where, how, why, and toward whom of any intervention.

Intervention Codification

The Taxonomy of Interventions and Anatomy of Interventions were utilized for collecting and analyzing the intervention data in the Principal-Teacher Interaction Study. For data collection, the principals were trained by the research coordinators who used a tested training procedure and materials (Griffin, Goldstein, & Hall, 1981). These materials, developed in a pilot study, were used to train principals to identify interventions and to help them understand the different "levels" of interventions. From this training, they learned also that the researchers would be asking them to describe interventions done by the principals or anyone else, in terms of the earlier developed taxonomy and coding frameworks. Principals were given practice materials to use under the guidance of the research coordinator. They were asked to report actions: What did you do? Why did you do it? To whom was it done? How long did it take? This information would "capture" the intervention which could then be coded for its level and internal parts.

Intervention Codes

The coding procedures were a further refinement of those developed for the Anatomy of Interventions. For instance, sources were described by eleven different kinds of sources. Over several years of use the original codes were

greatly expanded and revised based on the addition of new data and new insights by the staff. The data have "driven" the development of the coding procedures. A priori codes were not developed; codes were "discovered" from field data.

An example of such "discoveries" can be illustrated in the function codes (see Figure 3). Originally there were six major functions, with Number 5000 being Communication and Dissemination. As staff worked further, these two functions were understood to be two unique activities, and so were split apart. This meant that there were then seven functions. These seven stood the test of time for quite a while, until it became apparent that an additional function was appearing in the data. Number 8000, Expressing and Responding to Concerns, was added to respond to this need. At this time there are eleven major coding classifications for sources, eleven for targets, nine for functions, seven for medium, four for flow, and four for location. For each dimension there is also a "Blank (Specify)" so that data which do not precisely fit the existing codes can be noted. In all, there are 105 codes for the kinds of dimensions of interventions that have been identified to date.

Coding Form

In order to organize and reduce the coded data an Intervention Coding Form has been employed (see Figure 4). This instrument has been through several generations of development also. It contains space for quantitative data on the front side of the sheet, and qualitative information is recorded on the reverse side. The form provides for items which identify site and intervention number, date and name of person interviewed, and interviewer. Space for a brief descriptive statement of the intervention is provided, the intervention level is designated and the codings for intervention dimensions

FIGURE 3

INCIDENT AND TACTIC CODES

12/11/81

SUBLEVELS OF INCIDENTS

1. Isolated
2. Simple
3. Complex
4. Chain
5. Repeated
6. Blank (specify)

SUBLEVELS OF TACTICS

11. Single Complex
12. Chain
13. Blank (specify)

SOURCES

1. Clients
2. An individual user
3. Subset(s) of primary or potential users
   A. as individuals
   B. as groups
   C. as a whole subset
4. All primary/potential users
   A. as individuals
   B. as groups
   C. as a whole
5. Implementation site resource people
6. Implementation site decision makers
   A. principal
   B. asst. principal
   C. other (specify)
7. Innovation facilitators
8. Immediate user system
   A. decision makers
   B. resource people
   C. other (specify)
9. Extended user system member(s) (specify)
10. Events
11. Blank (specify)
    A. CBAM

TARGETS

1. Clients
2. An individual user
3. Subset(s) of primary or potential users
   A. as individuals
   B. as groups
   C. as a whole subset
4. All primary/potential users
   A. as individuals
   B. as groups
   C. as a whole
5. Implementation site resource people
6. Implementation site decision makers
   A. principal
   B. asst. principal
   C. other (specify)
7. Innovation facilitators
8. Immediate user system
   A. decision makers
   B. resource people
   C. other (specify)
9. Extended user system member(s) (specify)
10. The change effort/ process
11. Blank (specify)
    A. CBAM

FUNCTIONS

1000. Developing Supportive or Organizational Arrangements and Resources
   A. policy/global rule/major decision making
   B. planning
   C. managing (e.g., scheduling)
   D. staffing or restructuring roles
   E. seeking or providing materials, information, space, other resources
   F. other (specify)

2000. Training
   A. teaching new knowledge, skills
   B. reviewing
   C. clarifying
   D. other (specify)

3000. Consulting and Reinforcing
   A. promoting and encouraging change in innovation use
   B. reinforcing/supporting present innovation use
   C. consulting--problem solving
   D. information sharing (internal communication, e.g., newsletters)
   E. other (specify)

4000. Monitoring and Evaluating
   A. information gathering (data collecting, pulsing, probing)
   B. data analysis processing
   C. reporting
   D. transferring data
   E. other (specify)

5000. Communicating Externally
   A. informing outsiders
   B. other (specify)

6000. Disseminating
   A. gaining support of outsiders
   B. encouraging/promoting use of innovation by outsiders
   C. other (specify)

MEDIUM

1. Face to face
2. Written
3. Audio-visual
4. Telephone
5. Public media
6. None
7. Blank (specify)

FLOW

1. One way
2. Interactive
3. None
4. Blank (specify)

LOCATION

1. Implementation site
   A. office
   B. classrooms
   C. other (specify)
2. Immediate user system
   A. central office
   B. training site
   C. other (specify)
3. Extended user system
4. Blank (specify)

7000. Impeding Use
- A. discouraging use
- B. interrupting use
- C. other (specify)

8000. Expressing and Responding to Concerns
- A. complimenting, praising
- B. joking, fooling around
- C. apologizing
- D. peacemaking, reconciling, reassuring, down playing
- E. acknowledging
- F. complaining, criticizing
- G. reprimanding
- H. belittling, sarcasm
- I. blank (specify)

9000. Blank (specify)

Expanded from Hord, S. M., Hall, G. E. & Zigarmi, P. Anatomy of incident and tactic interventions dimension, design. Austin: Research and Development Center for Teacher Education, The University of Texas, 1980.

Figure 4

INTERVENTION CODING FORM

_____ / _____
Site Intervention #

I. Identifiers

Date of Interview ___/___/___ Person Interviewed _____

Linking Sponsored Intervention #_____ Linking Theme # _____

Antecedent Intervention #'s _____

Interviewer _____ Coder _____ Transcript Page _____ Line _____

II. Brief Statement of Intervention: _____

III. A. Intervention Level (circle one)

1) Game Plan Component 2) Strategy 3) Tactic 4) Incident 5) Theme 6) Policy

B.1. Coding for Incident or Tactic Level (give code #)

Sublevel	Source	Target	Function	Medium	Flow	Location
____	____	____	____	____	____	____

2. Coding for Strategy Level (give code #)

Source	Target	Function
____	____	____

3. Coding for Game Plan Component (circle one)

1 2 3 4 5 6

4. Further Description of Theme or Policy

_____

Time Duration

_____
min/hr/days/mo

Dates

Start ___/___/___
mo day yr

End ___/___/___
mo day yr

IV. Diagnosis (circle one and describe)

SoC	0	1	2	3	4	5	6					
LoU	0	I	II	III	IVA	IVB	V	VI				
IC	1	2	3	4	5	6	7	8	9	10	11	12

Hord, S. M. & Hall, G. E. Procedures for quantitative analysis of change facilitator interventions. Paper presented at the annual meeting of the American Educational Research Association, New York City, 1982. -over-

V. EFFECTS

OTHER INFORMATION (Use quotes whenever possible)

VI. INDICATORS OF LEADERSHIP STYLE

VII. INDICATORS OF PHILOSOPHY/BELIEFS

VIII. OTHER COMMENTS

are recorded. Date and time duration are noted, as is a CBAM diagnosis of Stages of Concern, Levels of Use or Innovation Configuration, if applicable.

These forms make it possible to organize interventions in terms of chronology, or in terms of antecedent interventions, those which stimulate a subsequent action. In addition, "linking" interventions may be noted. Linking interventions refer to an aggregation or collection of lower level interventions which, when gathered together, add up to a higher level. Such an example would be a number of simple incidents (e.g., single activities of a meeting agenda) adding up to a complex incident, such as a faculty meeting where several issues were discussed and resolved.

Coding Rules

As these codes have been used to identify intervention parts, refined code definitions and coding rules have been developed. The rules, like the codes, have become expanded and more specific over time. In our present study we have used a new procedure to guide coding interpretations and to increase reliability. One staff person has been assigned to the official role of coding bookkeeper. This person has continually integrated the revisions of the coding procedure rules and is turned to by all staff when they have coding questions. Thus a nine member staff can turn to one person who has the major responsibility for keeping on top of all coding issues. The resultant coding rules are organized into a rule book around each of the coding dimensions; in addition, there is a general coding section. To date code definitions and 88 rules direct the coding decisions, which in combination have resulted in good reliability for the coding work.

Example Interventions Coded

To illustrate the quantitative procedures, the concepts and codings will be revisited and applied to the intervention examples out of PTI Study data which introduced the beginning of this paper. The principal's behaviors can be classified and coded by their levels and dimensions as has been already described.

> Chain Incident Intervention. The principal telephones the chairman of the Principals' Committee, the area math coordinator and the assistant superintendent to check out the rumor about the promised math materials for the teachers.

This intervention is an incident because it is a single action. The action was targeted at individuals and consumed only a few mintues of time. Because the same action is repeated with three different targets, its sub-level dimension is Chain Incident (coded 4). The source of the incident is the principal (coded 6A), while the various targets are

Principals' Committee Chairperson 8C
Area Math Coordinator 8B
Assistant Superintendent 8A

The function of the chain incident is to gain information about materials, thus it falls under the 1000 function, Developing Supportive or Organizational Arrangements and Resources, and is an E. Thus, the function code would be 1E. The Medium was by telephone and would be coded 4. Flow was one way (1) and Location subsumed the school and was within Immediate user system (the district) and would be coded 2.

In contrast the second intervention is a series of more complex actions involving all the teachers, extending across a two month period. Thus because it is more complex, is of longer duration and impacts more persons, it is a Tactic.

Tactic Intervention: In March and April the principal holds a series of three hands-on workshops to train teachers in the metric system in background information, concepts/measures; materials/activities.

Source -- Principal 6A
Target -- All users as a whole 4C
Function -- Training (teaching new knowledge and skills) 2A
Medium -- Face to face 1
Flow -- Interactive 2
Location -- Library at school 1C Library

The third intervention extended over the entire second year of the implementation effort. In many different ways through various tactics and incidents the principal operationalized this strategy which was meant to influence all teachers all through the year.

Strategy Intervention: Across the second year of implementation, the principal encourages the teachers to use the Math Kits.

Source -- Principal 6A
Target -- All users (at various times as individuals, as groups and as a whole) 4A, 4B, 4C
Function -- Promoting and encouraging change in innovation use 3A

The classification of principals' interventions by levels can provide understanding of the possible extent of impact of the interventions. Typically incidents, of short duration and involving fewer persons, suggest that they do not affect many teachers at any one point in time. Tactics and strategies, which require more investment of time and which target more teachers, have the potential for greater impact. Codification of each of the interventions makes it possible to examine more closely the principals behaviors, to understand how, for whom, why they spend their intervening time.

Analysis Options of Coded Interventions

Once coded the intervention data can be analyzed in several ways. These include frequency counts, cross tab comparisons and possibly some use of inferential statistics. For the Principal-Teacher Interaction Study computer

programs have been developed for correcting coding form errors and for analyzing the completed sets of codes. Computer analysis procedures were especially important for this study since the data base contains several thousand incident level interventions.

Frequency Analyses

The obvious place to begin with analysis of coded intervention data is to calculate frequencies and relative percentages for each dimension and for each kind of dimension. A review of these frequencies can very quickly lead to the identification of trends and likely next steps for analysis.

Frequencies can first be calculated for all of the identified interventions. The frequency analyses can be done for each of the various actors within the change effort. For example all of the interventions for the principal could be counted separately. The same could also be done for the assistant principal, staff developers or particular teachers. If the study questions called for a comparison of the relative frequencies of particular sources, or targets or functions etc., then an inferential statistic could be used to compare frequencies. The assumptions of the statistic would need to be checked closely in case the data collection procedures violated any of them.

Cross Tabs

Another set of readily available computer analyses is to run various comparisons involving the linking of certain codes with other codes. For example the data base could be checked to see how many times a particular principal as the source intervened on the target of individual teachers versus all teachers as a group. Or, as is planned with the data base, this set of

comparisons could be asked of principals with different change facilitator styles.

Not only are we hypothesizing that principals who used different change facilitator styles will have a different total number of interventions, we are also hypothesizing that they will use targets differently and will utilize different functions. All of the different combinations of codes can be tested for occurrence and relative frequence of occurrence using a cross tab procedure.

Reliability

Estimating the reliability of intervention coding work must be considered whenever these techniques are used. There are at least three questions that must be asked:

1) What proportion of the total number of interventions that actually occurred do the researchers know about?

2) How consistent are different coders in identifying interventions in the raw data?

3) How consistent are different coders in coding the sub-parts of identified interventions?

Each of these questions must be addressed for each study and for each coder. Even if only one coder is used, the reliability and related validity questions must be faced.

In the PTI study a great deal of time was spent examining the first question. Different methodologies for obtaining information about the occurrence of interventions were explored. The range and depth of the intervention data were examined. A range of on site informants were asked to confirm information about interventions and to identify additional interventions about which they might know. On-site informants were also asked to estimate the number of interventions that may have been omitted and to

review the data base to see if it appeared that what was collected was consistent with their perceptions, recall and experiences.

In the end we concluded that for this study we had probably gotten close "to the bottom of the barrel." We also were reasonably confident that we knew about all of the interventions that in some way could have significantly affected the larger change effort.

We are less sure that we have a complete picture of the incident interventions that were directed toward each individual teacher. We know in general about these, but we do not know exactly how many hallway conversations or classroom stops were made by the principal with each teacher, or which interventions were really impactful at the individual level for all teachers. Answering these needs will require a different data collection methodology next time.

In order to estimate the answers to the second and third questions of reliability, a specially designed reliability task was undertaken by the nine intervention coders in the PTI Study. This task was in two parts. First reliabilities were estimated for how consistent each person was in identifying interventions from a sample of raw data, namely one audio-taped 25 minute intervention interview with one change facilitator.

For the second task, each intervention coder completed coding sheets for thirty identified interventions from another of the intervention interviews. Percentage agreements and coefficients of reliability were then computed for each individual coder and for the staff as a whole.

Implications and Concluding Discussion

The intervention concepts and tools described in this paper have been useful for reducing and organizing a very large and rich data base. They make

it possible to select and perform intervention analyses with an array of options. In addition there are other uses that can be made of these frameworks.

In future research on the change process interventions may be quantitatively described for comparison and contrast across various intervention studies. Frequencies of various types of interventions could be expressed, and change efforts could be characterized in terms of their predominant kinds of interventions. In so doing, the relationship of the major kinds of interventions might be drawn to implementation effects or degree of implementation.

Because the concepts and procedures can be used to describe principals' intervening behavior, the different change facilitating styles of principals (Hall, Rutherford & Griffin, 1982) might be distinguished. The various actions/styles of principals and their effects on teachers could then be studied in order to identify the most effective facilitating styles.

The constructs of interventions presented in this paper could be useful to principals as they consider interventions. The future training of principals and other change facilitators will require an emphasis on doing, or operationalizing leadership. Facilitating teachers' efforts at instructional improvement is one way for principals to operationalize instructional leadership. Designing and delivering appropriate interventions is a means for supporting teachers.

Constructing a "game plan" of interventions could help a principal to specify in advance the actions to be made, thus utilizing the levels of interventions as a planning tool. In this way, with training, principals could enhance their planning and intervening skills (Hord, Thurber & Hall, 1981).

As a growth and improvement technique change facilitators, such as principals, could learn to use the Anatomy framework for analysis of his/her own interventions. This tool for self analysis could reveal gaps in the facilitators' attention to "targets" or "functioning." Use of the Anatomy could be employed also in their day to day intervening. Consideration of the array of "kinds" of dimensions could provide facilitators with more options for the design of their actions, thus structuring them for greater effectiveness. Facilitators who understand and take into account concepts underlying the Anatomy may improve change facilitation skills and more effectively plan actions to support school improvement efforts.

There are many questions yet to be asked and explored regarding change facilitators' interventions, their characteristics, and their effects. The methodology and constructs described in this paper have proved useful for collecting and analyzing complex intervention data. The frameworks made researching the principals' behaviors possible. We believe these procedures can contribute to research which will further illuminate our understanding of the school principal's intervention behavior and role in change in schools. As described, we believe that the concepts and techniques can help change facilitators, such as principals, be more effective in supporting and helping front-line innovation users and nonusers. We invite others to explore these research and training proposals along with us.

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