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ABSTRACT

This paper deals with systems concepts, particularly those related to management information systems (MIS) as exemplified by the Center for the Study of Evaluation (CSE) Formative Evaluation Kit. The concept of MIS is in numerous ways more flexible than might be imagined from a cursory reading of the business-management literature. An MIS does not have to be an expensive, computerized system. An economical, manual MIS can be created to meet the needs of a single school. The CSE Formative Evaluation Kit operates as an MIS to provide a principal with information on a new program. Heavy emphasis is given to planning activities that relate directly to analysis of program performance and decisionmaking. The CSE kit users are directed to plan evaluation activities every time major program components are changed. Pilot-test and field-test results suggest that the kit is useful with a variety of programs. The kit has the capability of making important planning activities a formal process. (Author)

FORMATIVE EVALUATION AS MANAGEMENT INFORMATION*

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Introduction

References to the use of management information, management information systems, and systems management began appearing in the educational literature about 10 years ago. Both the vocabulary and the substantive techniques behind the vocabulary were borrowed from the world of business, much as the efficiency movement in education had done in the 1920's. The reasons for this recent borrowing were varied -- the success of systems approaches as used in industry (especially the defense industry), the subsequent adoption of systems procedures by the U.S. Office of Education and, perhaps more fundamentally, the growing faith that increased clarity and rationality were needed if better solutions were to be found to contemporary educational problems. Historical descriptions of this trend can be found in Handy and Hussain (1969), Banghart (1969), and Yee (1973).

This paper will deal with one of these systems concepts, namely management information systems (MIS), especially as exemplified by the CSE Formative Evaluation KIT. It will show that the concept of MIS is in numerous ways, more flexible than might be imagined from a cursory reading of the business-management literature:

1. An MIS does not have to be an expensive, computerized system. An economical, manual MIS can be created for the needs of a single school.
2. The CSE Formative Evaluation KIT operates as an MIS to provide information on a new program to a principal. Heavy emphasis is given to planning activities that relate directly to analysis of program performance and decision making. KIT users are directed

to plan evaluation activities every time major program components are changed.

3. Pilot-test and field-test results suggest that the KIT is useful with a variety of programs. The KIT has the capability of making important planning activities a formal process.

Computerization and MIS

Many business-management authors stress the automated aspects of MIS. For example, Davis (1974) defines an MIS in this way: ". . . an integrated man/machine system for providing information to support the operations, management and decision-making functions in an organization. The system utilizes computer hardware and software, manual procedures, management and decision models and a data base." (p. 5) Although some consideration is given to "manual procedures," the emphasis here is clearly on a computerized system. A similar connotation is found in O'Brien (1970): "A useful MIS accumulates, processes stores and transmits data to relevant people in management." (p. 11)

The description of MIS by these authors (and most others of similar background) basically expounds a common theme -- how to integrate the information needs of a manager with a computerized system. Topics such as information data banks and transaction processing systems are considered at some length. At first glance, it may appear that an MIS without a computer is a contradiction in terms. That this is not true becomes clear only after a consideration of both the basic nature of a system and the range of environments in which an MIS can operate.

Whatever else it is, a system essentially is a set of components working toward a common objective. As C. W. Churchman puts it, "Systems are made up of sets of components that work together for the overall objective of the whole. The systems approach is simply a way of thinking about these total systems and their components." (p. 11) A management-information system is a set of components that work toward the objective of providing a manager with information. There is nothing in the basic conception of an MIS that requires computerization. Certainly, computerized systems are not a disadvantage. But the context in which they are to be used must be appropriate.

A typical computerized MIS exists in a business organization marked by large-scale production processes, inventory control, and marketing demands. Computerized MIS do exist in higher education and in local school districts vis-à-vis district-wide programs and district-wide needs. But an individual principal is as much a manager as a superintendent is; and although the principal's organization is obviously smaller, his needs for management information are as real. A small, manual MIS can be as much a system as a large-scale computerized MIS.

How the KIT Operates as a System. The CSE Formative Evaluation KIT provides the principal with an MIS appropriate for an individual school program in its development stage. It is an MIS because all of its parts aim at providing formative evaluation information -- as distinct from information gathered for needs assessment, program planning, or summative evaluation. In the Center for the Study of Evaluation (CSE) model (Klein, Fenstermacher, & Alkin, 1971), Implementation Evaluation and Progress Evaluation serve the

formative function. Formative Evaluation has as its aim program improvement through decisions to change a new program while it is going on.

Implementation Evaluation focuses on the extent of program installation and Progress Evaluation on the extent of the program's performance in meeting objectives. Since implementation begins as soon as the program begins and progress of some sort should be occurring the entire length of the program, information is needed quickly after the program starts and in recurring cycles after each change in program direction. Information collected in the course of Formative Evaluation should be relevant and timely for the fluid events of an evolving program.

An overview of the 16 Steps of the KIT is shown in Figure 1. The figure shows that the initial 8 Steps of the KIT are devoted to planning activities. The first time they are used (the "first iteration") the program has not started yet. Thus, the first half of the KIT is used for evaluation planning before instructional staff and students actually begin program processes; many of the Steps are used again after some information is gathered on the performance of the program.

The second half of the KIT is devoted to collecting, analyzing, and reporting information that was planned with the first set of steps. They also guide the user in recycling to do more planning based upon initial results of the program.

The first 8 Steps or "planning half" of the Formative KIT, including its information outputs, is detailed in Figure 2. The information outputs are in the form of Worksheets completed by the principal in cooperation with the instructional staff. Although the Worksheets are completed one at-a-time,

Figure 1

Overview of the CSE Formative Evaluation KIT

Steps 1 through 8

PLANNING

1. Reviewing the Program Plan
2. Constructing a Master Plan
3. Developing Evaluation Questions
4. Selecting a Measurement Strategy
5. Estimating Evaluation Resources
6. Determining Appropriate Measures
7. Setting Evaluation Deadlines
8. Establishing Communication

Steps 9 through 16

ANALYZING and REPORTING

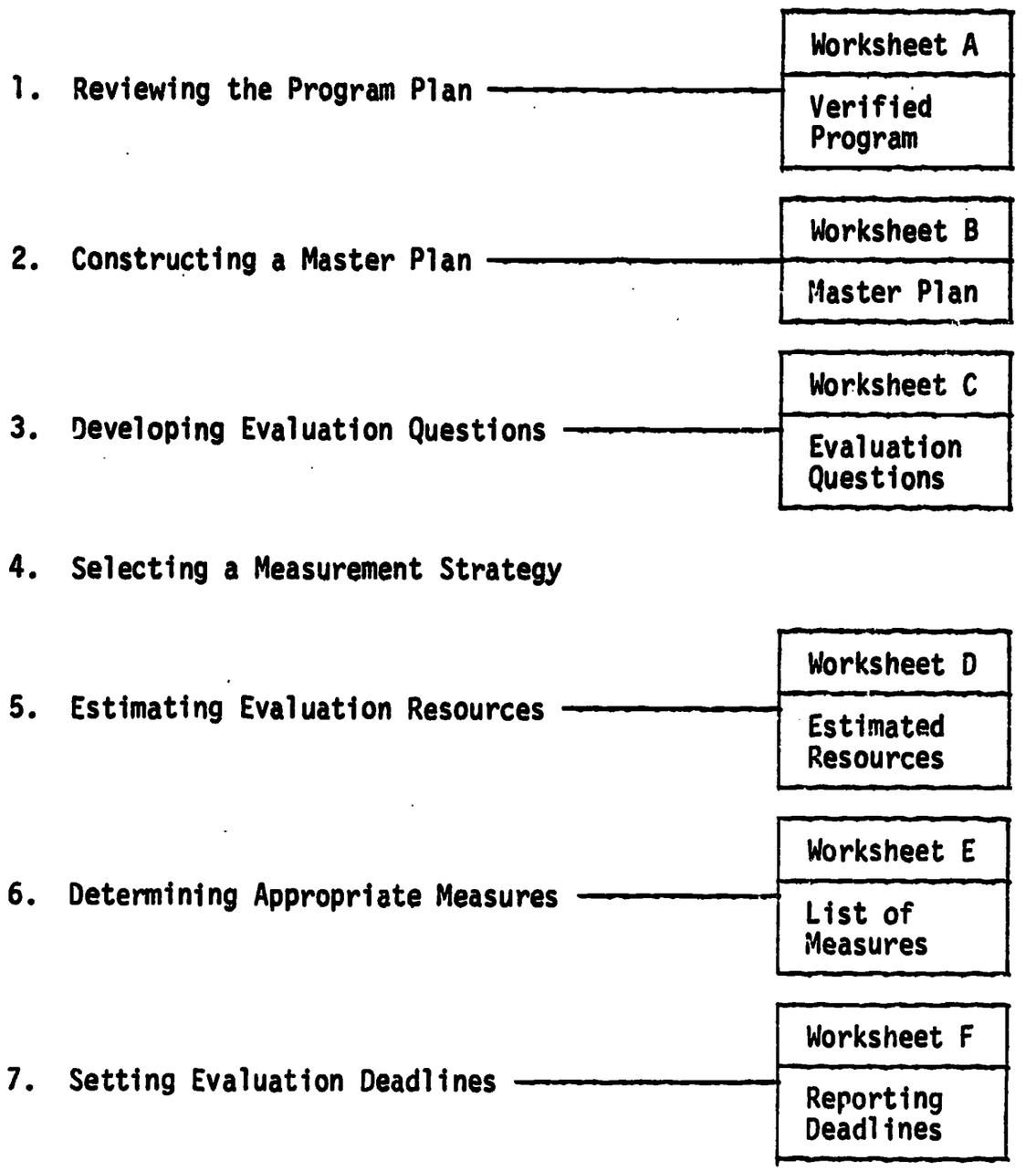
9. Collecting Data
10. Discovering Unanticipated Outcomes
11. Scoring Measures
12. Preparing Data for Presentation
13. Making Recommendations
14. Implementing Recommended Changes

(15.) Deleted

16. Preparing Reports

Figure 2

Overview of the Planning Phase of the CSE Formative KIT



there is not a strict linear relationship among them (e.g., each one requiring the absolute completion of the preceding). Nor are they all equal in importance -- some are clearly subsidiary to others in scope and function.

Worksheets B, C, and F are the keystones of the planning steps: B summarizes staff preparatory activities and major student objectives; C elicits evaluation questions that should be answered as the program is installed and in operation; and F requires the setting down of deadlines for when information should be reported regarding the evaluation questions. Worksheet A serves a basic need since the user must make a master plan and develop questions and can do so only if the program plan has been verified, e.g., there is general agreement on the content and boundaries of the program. Worksheets D and E are important because they require a consideration of the constraints operating in the system (money for purchase of tests and employment of personnel, time for acquisition or construction of instruments). Planning of this type fosters the setting of realistic deadlines.

The planning approach in these early steps follows what G. B. Davis, speaking from a business-management orientation, calls a "top-down" rather than a "bottom-up" or "evolutionary" approach to MIS development. Explaining the former approach, Davis (1974) says, "In order to define the overall system plan, the top-down analysis approach begins by defining the objectives of the organization, the kind of business it is in, and the constraints under which it operates. The activities or functions are identified. The crucial strategic and tactical decisions are then defined and the decisions necessary to operate the activities are specified." (p. 408)

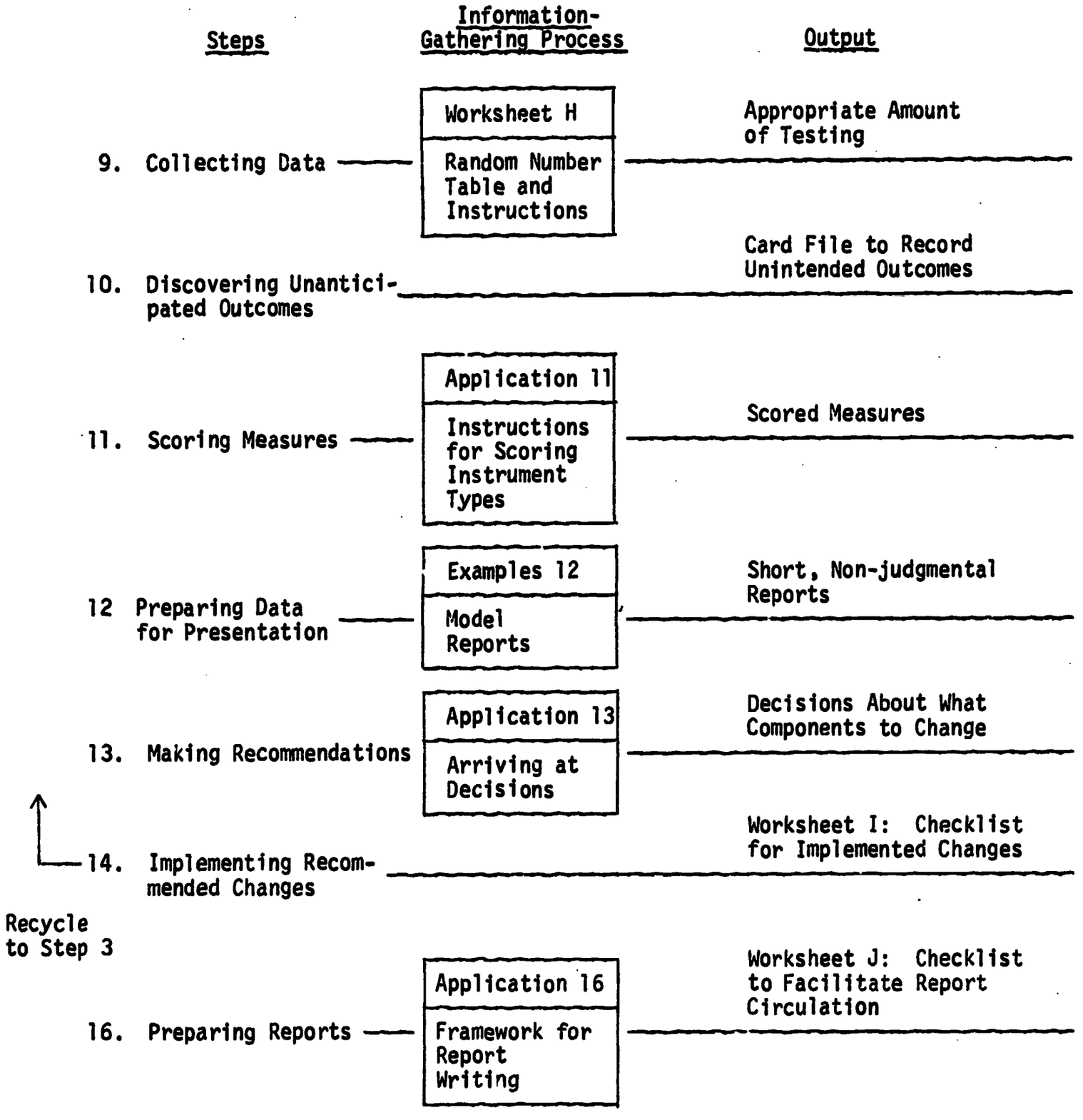
The bottom-up approach is, logically enough, the inverse of the top-down. The order of activities is "backwards" in that the existing information systems are used as a foundation and are built upon as needed to satisfy the decision needs of the manager. The top-down approach used by the KIT is in keeping with the nature of Formative Evaluation. With Formative Evaluation, the user is looking at a new program. It is critical to identify clearly at the outset the objectives of the program, formulate relevant questions on these objectives, and select the proper measures to administer. There is little likelihood that pre-existing testing systems or other-directed information gathering can provide necessary data on a new program. Further, since students may be heavily tested as a part of the regular school routine, specifying objectives and carefully selecting measures for them at the outset minimizes possible problems of overtesting or confused or conflicting scheduling of tests.

The Steps devoted to analyzing and reporting are shown in Figure 3. In the two right-hand columns following the Step title are entries for information-gathering processes used in the Step and output yielded by the Step. All outputs are program-relevant, e.g., critical tasks directly involving monitoring of program implementation and progress. In contrast, outputs for planning Steps served to yield planning information only.

Although Steps 9 to 16 are all of great importance, 10, 13, and 14 are the critical ones. Step 10 focuses on an often-neglected topic -- unintended outcomes as revealed by unobtrusive measures. These outcomes serve as an important back-up device for more traditional measurement techniques by trying to ensure that all outcomes receive examination in assessing program

Figure 3

Overview of the Operational Phase of the CSE Formative KIT



performance. Step 13 gives the user a technology for decision making -- a simple group-discussion approach that minimizes complex statistics and maximizes involvement of all teachers in the program. The Step is analogous to the component of a business MIS where a decision rule is used to guide the manager in his actions. This is the point at which decisions are made regarding which program components to change and how to change them. The third crucial Step, number 14, serves a dual function: it returns the user to Step 3 for new planning activities and it provides a checklist to determine whether the recommended changes are, in fact, carried out. This checklist is called a Worksheet although it does not serve the same purpose as Worksheets A to H.

The KIT gives the user what Davis calls "information system support for decision making." (p. 319) It provides information on many aspects of the program, so that by the time Step 13 is reached there is sufficient basis for choosing which components of the program could benefit from change.

Routinizing Formative Evaluation for Many Types of Programs. One of the goals of the KIT is to make previously "hit-or-miss" procedures a part of the regular operation of the school. This function is well summarized by the phrase "routinizing evaluation" -- an expression used by sociologist Daniel Glaser (1973) in describing his ideal of evaluation procedures in crime-and delinquency-prevention programs. Evidence is presented on the KIT's potential of making evaluation procedures routine administrative activities.

While in its development stages, a draft version of the Formative KIT was produced and circulated for use and/or review by several southern

California elementary schools. Principals were asked to read the material in the KIT, use it wherever possible, and compare it to previously employed procedures. Participants were then interviewed about the KIT. Table 1 shows responses to several key questions on the material presented in the pilot-test version.

Table 1

Number of Responses of Pilot-Test Users to Selected Questions on the CSE Formative Evaluation KIT

		How pertinent was this Step to conducting an evaluation?			Were the activities required by this Step ever done before with a new program?		
Step #	Number of Respondents	Very Pertinent	Pertinent	Not Pertinent	No	Yes, informally	Yes, formally
1	5	5	0	0	3	2	0
2	3	2	0	1	2	0	1
3	3	3	0	0	2	1	0
4	1	1	0	0	0	1	0
5	2	2	0	0	1	1	0
6	2	2	0	0	0	1	1
7	2	2	0	0	0	1	1

The pilot test involved only a few schools (studied more or less case-study fashion), with a sample size that was not merely small; it was miniscule. However on several key questions regarding the KIT's potential as an information

system, results tended to support the contention that the KIT gives users information they view as important, but that they rarely collect in a formal way.

As can be seen with the Steps involved in planning the evaluation (see Table 1), the Steps were overwhelmingly viewed as "Very Pertinent." However, evaluation-planning activities required by the Steps were rarely done with regard for a new program, or were done in an informal way only. It appears that the KIT has the potential for giving people a framework for routine, formal gathering of pertinent information.

A national field-test sample of about 25 participating schools began using the KIT in the 1974-1975 school year. Results, although not yet complete, are consistent with the small-scale pilot test -- the KIT has been perceived as being pertinent and as providing information not usually gathered with a new program. Furthermore, field-test sites have involved programs in many areas of the curriculum. Several of these programs are listed below:

Program Name	Location of School
Continuous Progress Program (cognitive objectives)	Pennsylvania
Fresno Prime Reading Program	California
Self-Concept Development	Georgia
Psychomotor Skills	Minnesota
Basic Reading Skills	Illinois
Elementary Reading Program	California
Open Court Reading Program	Arizona
Plant Ecology	Texas

Field-test data on the use of the KIT are contained in the Appendix.

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APPENDIX

Table 2

Responses of Field Test Users to the Language, Flexibility and Organization of the CSE Formative Evaluation KIT

	How do you rate the language and vocabulary of each part of the KIT?			
Step #	Very Clear	Clear	Unclear	Very Unclear
1	9	8	1	0
2	9	8	1	0
3	9	8	1	0
4	9	7	2	0
	How adaptable was the material to your own needs? Rate each section on Flexibility			
Step #	Very Good	Good	Poor	Very Poor
1	7	9	1	1
2	7	6	3	2
3	7	8	2	1
4	8	5	3	2
	How well put together were the sections? Rate each part of the KIT on Organization			
Step #	Very Good	Good	Poor	Very Poor
1	9	9	0	0
2	7	8	3	0
3	9	8	1	0
4	8	8	1	1

NOTE: Results based on questionnaires received prior to February 1, 1975. Field test continues to May 1975.

Table 3

Responses of Field Test Users to Comparing the KIT to Previously Used Material

	Have you previously used material that was similar in purpose to parts of the KIT?	
Step #	Yes	No
1	6	12
2	4	14
3	5	13
4	3	15

	How does each part of the KIT compare with previously used material?				
Step #	Very Good	Good	Poor	Very Poor	Not Applicable
1	2	4	0	0	12
2	0	3	1	0	14
3	1	4	0	0	13
4	2	1	0	0	15

NOTE: Results based on questionnaires received prior to February 1, 1975. Field test continues to May 1975.