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ABSTRACT

This product development report is one of 21 reports, sponsored by the U.S. Office of Education, dealing with the developmental history of a recent educational product. This report deals with Facilitating Inquiry in the Classroom, a teacher training program, focusing on instructional skills needed to stimulate and sustain students in self-directed inquiry. The major goal of the program is to develop teacher responses which will produce a) a classroom climate, b) self-directed discovery, c) knowledge building, and d) evaluative processes by the students. Participant manuals, audio tapes, and demonstration equipment form the framework of a five-step sequence of activities. This five-step sequence is repeated three times during training, once for each of the three major areas: allowing inquiry to happen, facilitating student reception of inquiry processes, and tuning in to student reception of inquiry processes. This report also includes further information in areas concerning background, development, diffusion, adoption, and future of the product. The summative evaluation of the program indicated that relatively inexperienced trainers could successfully use the materials. A 6-month follow-up indicated that secondary teachers tended to value inquiry highly and achieve a significantly higher comprehension than primary teachers. A five-item bibliography and a list of products and developers that are the focus of the 21 product impact evaluations are included. (MJM)

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PRODUCT DEVELOPMENT REPORT NO. 20

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Contract No. OEC-0-70-4892

FACILITATING INQUIRY IN THE CLASSROOM

DEVELOPED BY THE NORTHWEST REGIONAL EDUCATIONAL LABORATORY

Jack J. Crawford

American Institutes for Research
in the Behavioral Sciences

Palo Alto, California

March 1972

The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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Office of Program Planning and Evaluation

SP 005 196

PREFACE

This product development report is one of 21 such reports, each dealing with the developmental history of a recent educational product. A list of the 21 products, and the agencies responsible for their development, is contained in Appendix A to this report. The study, of which this report is a component, was supported by U.S. Office of Education Contract No. OEC-0-70-4892, entitled "The Evaluation of the Impact of Educational Research and Development Products." The overall project was designed to examine the process of development of "successful educational products."

This report represents a relatively unique attempt to document what occurred in the development of a recent educational product that appears to have potential impact. The report is based upon published materials, documents in the files of the developing agency, and interviews with staff who were involved in the development of the product. A draft of each study was reviewed by the developer's staff. Generally, their suggestions for revisions were incorporated into the text; however, complete responsibility for interpretations concerning any facet of development, evaluation, and diffusion rests with the authors of this report.

Although awareness of the full impact of the study requires reading both the individual product development reports and the separate final report, each study may be read individually. For a quick overview of essential events in the product history, the reader is referr i to those sections of the report containing the flow chart and the critical decision record.

The final report contains: a complete discussion of the procedures and the selection criteria used to identify exemplary educational products; generalizations drawn from the 21 product development case studies; a comparison of these generalizations with hypotheses currently existing in the literature regarding the processes of innovation and change; and the identification of some proposed data sources through which the U.S. Office of Education could monitor the impact of developing products. The final report also includes a detailed outline of the search procedures and the information sought for each case report.

Permanent project staff consisted of Calvin E. Wright, Principal Investigator; Jack J. Crawford, Project Director; Daniel W. Kratochvil, Research Scientist; and Carolyn A. Morrow, Administrative Assistant. In addition, other staff who assisted in the preparation of individual product reports are identified on the appropriate title pages. The Project Monitor was Dr. Alice Y. Scates of the USOE Office of Program Planning and Evaluation.

Sincere gratitude is extended to those overburdened staff members of the 21 product development studies who courteously and freely gave their time so that we might present a detailed and relatively accurate picture of the events in the development of some exemplary educational research and development products. If we have chronicled a just and moderately complete account of the birth of these products and the hard work that spawned them, credit lies with those staff members of each product development team who ransacked memory and files to recreate history.

TABLE OF CONTENTS

PREFACE ii

LIST OF FIGURES iv

LIST OF TABLES v

PRODUCT DESCRIPTION

Product Characteristics 1

Rationale for Product 1

Description of Materials 4

Procedures for Using Product 4

ORIGINS

Key Personnel 7

Funding for Product 10

PRODUCT DEVELOPMENT

Management and Organization 11

Original Development Plan 12

Modifications of the Original Plan 12

Actual Procedures for Product Development 14

The Precursor Version 14

The Model T Version 17

The Product Generation Workshops 18

SUMMATIVE EVALUATION 20

DIFFUSION

Agency Participation 24

Diffusion Strategy 24

Product Characteristics Affecting Diffusion 25

ADOPTION 26

FUTURE OF THE PRODUCT 26

CRITICAL DECISIONS 27

REFERENCES 31

APPENDIX A: LIST OF PRODUCTS AND DEVELOPERS 32

LIST OF FIGURES

Figure		Page
1	NORTHWEST REGIONAL EDUCATIONAL LABORATORY ORGANIZATIONAL CHART, DECEMBER 1971	13
2	Major Event Flow Chart	15

LIST OF TABLES

Table		Page
1	COMPARISON OF PARTICIPANT'S CLASSROOM INTERACTION BEFORE AND AFTER TRAINING	22

PRODUCT DESCRIPTION

Product Characteristics

Name

Facilitating Inquiry in the Classroom.

Developer

Northwest Regional Educational Laboratory.

Distributor

Copy-Print Centers, 1206 S.W. Jefferson, Portland, Oregon, are assuming interim responsibility for publishing the program. Northwest Regional Laboratory is currently searching for a national commercial distributor.

Focus

The focus of Facilitating Inquiry, a teacher training program, is on those instructional skills needed to stimulate and sustain students in self-directed inquiry.

Grade Level

One through Twelve.

Target Population

The target population consists of teachers of all students who are capable of learning in the typical classroom. The product goals are not restricted to any particular subject matter area.

Rationale for Product

Long-Range Goals of Product

Ultimately, Facilitating Inquiry will be integrated and revised as part of a comprehensive program that will combine Facilitating Inquiry with other current Northwest Regional Laboratory products, e.g., Interaction Analysis, Higher Level Thought Processes, and Questioning Strategies, into a more generalizable teacher training program.

Objectives of Product

The general goal of the program is to develop teacher responses which will produce a classroom climate facilitating self-directed discovery, knowledge building, and evaluative processes by the students. The training goals are that the teacher trainees acquire knowledges, skills, and attitudes which will encourage students to increase their awareness and use of inquiry processes. Relatively specific objectives for trainee participants are explicitly stated, and are related to global long-range goals. Twenty-two performance objectives are listed for both trainer and participant. Typical examples include:

1. Use speaking skills in trios, small groups.

2. Name tactical moves which allow inquiry and state the intent of each.

3. Identify student actions which indicate awareness of the inquiry process.

4. Identify when a teacher is using those tactical moves which foster awareness.

5. Use tactical moves facilitating growth with students so that they indicate an awareness of the inquiry process.

Objectives for the trainee are centered around eighteen teacher responses, which are called tactical moves. These eighteen responses are organized into three sets: (1) Allow Inquiry to Happen, (2) Facilitating Student Growth of Inquiry Processes, and (3) Tuning In to Student Reception of Inquiry Processes. Most of the training is devoted to the moves in set (1).

Four long-range personal behavior goals have been keyed to specific objectives for each training session. The four broad goals are:

1. To integrate into a personal theoretical/conceptual structure the ideas contained in the inquiry workshop, how they can be tested and tried, and the process be subjected to the rational and creative processes of the individual trainee. The individual will sense his cognitive power growing as he conceptualizes new learning and human interaction phenomenon, as he identifies these in operation, and as he forms theoretical constructs from which he searches out change.

2. To function as a supportive member of a learning group by being willing to attent to, understand, and help another express himself; by being attentive to the processes and actions of the group; by helping the group analyze the strengths and weaknesses of its action; and providing feedback to other group members to facilitate their growth in workshop skills.

3. To establish and maintain the classroom condition allowing inquiry to happen.

4. To become aware of the perceptions and attitudes of inquirers concerning inquiry processes.

Approximately 80 enabling behaviors are grouped under these four long-range goals. These are given in moderately specific terms; e.g., participant presses for clarity and specificity; asks a student to predict or explain a new situation with his theory; revises a theory in light of conflicting data. . .

In view of the overall intent of the materials, the objectives for each unit appear to be fairly explicit for both trainer and trainee, although in no case is any quantitative degree of successful performance stated.

Philosophy and Theories Supporting Product

The most immediate, and publicly acknowledged, ancestor of the product is Richard Suchman. His earlier work on inquiry development (Suchman, 1961), led directly to the development of Facilitating Inquiry in the Classroom. The entire approach is built upon a presumed model of scientific investigation, with major emphases upon hypothesis formulation and hypothesis testing. The reflection of the post-Sputnick concern with the value of a scientific education may be discerned. Many of the demonstrations or examples, i.e., the initial problem focuses for each of the units, are physical science illustrations. This natural science bent presents additional problems to teachers in other content areas, despite the intent of the developers to generalize across all subjects.

The "Discovery Learning" movement, probably best articulated by Bruner and Fenton, manifests itself throughout the materials. And, although the developers are no staunch supporters of operant conditioning, the continual emphasis upon brief and observable behavior episodes, frequent and prompt reinforcement, is marked.

Description of Materials

Organization and Content of Materials

The materials for Facilitating Inquiry in the Classroom consist of: a 400+ page Leader's Guide, which also contains the participant materials, a participant manual, four audio tapes, and some demonstration equipment.

Facilitating Inquiry provides 18 subsets of instruction, most of which require from 2-3 hours per subset. The program is designed to fit an extension class or continuing education schedule. Total time required is approximately 42 hours, which can be arranged into a 14-day schedule with weekly meetings of approximately 180 minutes each. The materials are also adaptable for a regularly scheduled college course.

Cost of Materials to Users

The Leader's Guide is priced at $15.00, each set of participant materials at $2.50, the audio tapes are $12.27 per set. Special demonstration, other than that which can be obtained locally, costs approximately $45 for a dozen sets. Thus, the approximate cost for a 24 trainee workshop would be $130. No additional materials designed for subsequent use in the classroom are included.

Procedures for Using Product

Learner Activities

Facilitating Inquiry emphasizes doing or performing, rather than knowing. The sequence of learner activities reflects this priority. A five-step sequence of activities is provided.

1. The trainee is confronted, by exposure to a model, with an example of the behavior he is to produce. Frequently, this consists of oral teacher/student interaction recorded on tape.

2. The trainee, with support, places the behavior of the model in some conceptual framework.

3. He practices recognizing the concept or class of behavior from alternatives. This is usually in the form of paper and pencil exercises.

4. The trainee demonstrates the desired behavior with other trainees, usually a role playing context.

5. The trainee attempts to perform the desired behavior with children. Typically, the children are from the participant's own class, as most trainees are classroom teachers. However, any source may be used.

After each of the five steps, detailed feedback is given by the trainer. This five-step sequence is repeated three times during the training, once for each of the three major areas; i.e., allowing inquiry to happen, facilitating student growth moves, and tuning-in to student moves.

During most of the activities, trainees work in groups of three or six. Within such trios, trainees work with each other to obtain objectives. Communication within small groups and the "force field" technique for problem diagnosis, adapted from Lewin, are stressed. The program has been designed to place responsibility for learning among peer groups, and to lessen that required of the trainer.

Trainer Activities

Originally, the development of inquiry trainers was based on a guru-disciple model in which candidates attained high skill level after prolonged apprenticeship to a "master trainer." The master trainer, e.g., Fred Newton, had spend years developing his inquiry skills. Facilitating Inquiry is now designed to allow a trainer to function effectively with a minimum of experience. The trainers are expected to have no more direct experience than participating as a trainee in one previous inquiry workshop. Many of the inputs, demonstrations, and feedback previously given by the leader are now carried on by small group activities. The trainer is bolstered by a very complete and detailed Leader's Guide. For each instructional subset the leader is given an orientation, total time recommended, and detailed description of the preparation and material requirements. For each step within the subset the Leader's Guide presents a rationale for the step, the time required in minutes, scheduled sequence of steps, and the specific input to the trainees, frequently in the form of word by word directions to read to them. Written inputs which are

recommended to be read aloud by the trainers, have been repeatedly tested for clear and effective communication to participants. However, the developers recognize that some trainers dislike reading from a prepared script, as indicated by the following quotation from the Introduction to the Leader's Guide:

> Therefore, it is recommended that the leader read the directions to the participants. If, for whatever reason, this procedure is perceived as abhorent by the leader, he should spend time rewriting his own directions and comments. Make sure to include all the points in the test directions. If participants appear confused, if they sit without getting started, if they aren't doing the assigned task, then the leader should begin his analysis of the situation by looking at his own directions. More time is lost, more experiences screwed-up, and more frustrated participants and leaders are caused by poor directions than by any other single factor.

The leader occasionally presents demonstrations, usually from the physical sciences, and prepares required visual aides. Masters for duplication are furnished in the Leader's Guide, but duplication is required. A general assessment form, meant to be useful for all subsets, is provided to assess trainee perceptions of: the productivity of the session, factors contributing to and hindering productivity, clarity of objective and task, and effectiveness of small group interactions.

Most of the prescribed trainer activities focus on initiating the small group interactions, consulting, maintaining the schedule, and listening and responding to participants. Subsets are designed so that participants practice each set of inquiry moves under the observation of peers and are then subject to frequent feedback by members of their group.

Provisions for Parent/Community Involvement

No special provisions are made or thought necessary.

Special Physical Facilities or Equipment

A special pulse glass and bimetallic strip are the only equipment required. Access to four tape recorders is recommended for a 24 participant workshop.

Recommended Assessment Techniques for Users

A variety of assessment techniques are used and are included in the Leader's Guide. These vary from subset to subset. Occasionally written exercises are evaluated by the trainers. More typically, self tests, with keys, are given. However, no specific achievement level is required or recommended in the materials. There is no specific requirement of a mastery level to attain before moving to a subsequent subset.

The bulk of assessment is carried by the small group teams. In almost every session, team members listen to and observe each other, and then make an evaluative report on other members' responses. Since this process is usually repeated across observers, or roles are reversed, some indication of reliability may be available. No specific guidelines for evaluating trainee consensus are given.

In the case of the four prepared tapes, keys are available to check trainee analyses. Each trainee is required at several intervals in the program to bring in for analysis an audio tape of his own classroom behavior. This is analyzed by fellow participants and immediate group feedback is given.

ORIGINS

Key Personnel

Since its birth in 1966, the Northwest Regional Educational Laboratory's Executive Director has been Dr. Lawrence Fish. Although Facilitating Inquiry has been but one of many products of the NWREL, the managerial influence of Dr. Fish in assessing the educational needs of the Northwest, in stressing the search for and weighing of alternate strategies, and par-particularly, once an activity was initiated, in allowing a large degree of freedom to the developmental teams created an atmosphere that permitted and facilitated the completion of Facilitating Inquiry in its present form. During this period, Dr. John Sandberg was deputy director of the Laboratory. Responsible for administration, planning, and finance, Dr. Sandberg performed Herculean stable duty in the early stages of the product.

That the product survived its tenuous postnatal period is due in large part to Dr. Sandberg's efforts as rescuer, panic-solver, and chastizer.

Dr. William Ward was program director of the Teacher Competency Program, which included Facilitating Inquiry. If Richard Suchman was the cognitive godfather of the product, Bill Ward was certainly its affective parent. Bull of the woods and perdurable project protector, Dr. Ward initiated and assumed personal responsibility for the inquiry project in its early phases. In later development, Dr. Charles Jung, program coordinator, helped to shape the product into a feasible and economically marketable form.

Initially for both planning and prototype development, a number of key consultants worked on the project: Dick Suchman, Ben Strasser, Chuck LaVarone, Art Costa, and Fred Newton. Later, Fred Newton assumed the major responsibility for its development. Fred Newton had been a public school teacher and principal in California, and had been involved in inquiry training, first as a trainee under Dick Suchman, later as a trainer since 1964. In 1969 Jean Butman joined the Laboratory from the Institute for Social Research at the University of Michigan. Dr. Butman assisted Fred Newton in refining formative evaluation procedures and designed the field test for the product. Dale Rothlind, who at the time was a graduate student at Portland State University, worked with Fred Newton throughout several generations of the product as participant observer, evaluative information gatherer, and assistant. As indicated in the subsequent Product Development section, at several points in time participants from prior training sessions served as trainers and as sources of input.

Sources of Ideas for Product

Two educational trends of the time helped to set the stage for this product: a rediscovered emphasis upon the active, curious learner, typically described as "discovery learning," and a wave of concern with effective science teaching. Richard Suchman, who more than any one individual bears direct responsibility for the ideas which germinated in this product, drew most of his examples and demonstratons from the physical science realm. A prior product, designed primarily by Dr. Suchman, was

marketed by Science Research Associates several years before the publication of Facilitating Inquiry (Suchman, 1966 a, b). The SRA product had versions in physical and earth sciences, and was designed to be used directly in the classroom, not as a teacher training program.

Ben Strasser's earlier efforts (Strasser, 1967), which attempted to supplement Suchman's efforts by identifying specific teacher actions which would stimulate inquiry, represented a direct influence on this product. Both Suchman and Strasser were directly involved as consultants in the early stages of the product, and Strasser continued to serve occasionally in this respect.

Various workshops and training institutes made available by both private and public monies had allowed the key staff to become acquainted with and skilled in inquiry training. For example, Fred Newton attended several early workshops conducted personally by Suchman, and later was able to participate in and then conduct workshops himself before joining the Northwest Regional Educational Laboratory. In the Northwest area, the "Oregon Program," a broad front series of projects exploring new ways of improving instruction, had been funded by the Ford Foundation. People who later were to become key personnel in product development at NWREL (e.g., Fred Newton, Bill Ward, Larry Fish, and others) participated in this program. For many people in the Northwest, the exposure through the Oregon Program gave them an awareness and interest in such innovations as inquiry training.

Evolution of Ideas for Product

A regional needs assessment was conducted during 1966, the first year of the NWREL operation. Panel meetings, mailed questionnaires, and direct interviews were used. A sample of several hundred people of various education related professions identified teacher education as a major regional need. This need was categorized into several components, one of which was the need for assistance to teachers in the classroom. The Board of Directors of NWREL established teacher education, including this component, as a high priority Laboratory program. The Laboratory assembled a preliminary planning staff. This staff developed alternate strategies and plans in cooperation with a representative advisory committee from the

region. The Northwest Region consists of Washington, Oregon, Idaho, Montana, and Alaska.

The alternative plans were reviewed by Laboratory staff and the Board of Directors. Inquiry was one of the component topics selected for initial development work. The following criteria were among those influential in this decision:

1. The availability of either a research or a conceptual framework on which to base the developmental work.

2. The availability of skilled personnel to develop and carry out the program.

3. The availability of financial resources.

4. The judgment of the Laboratory and its Board of Directors.

The distal and proximate forces that evolved the initial ideas for Facilitating Inquiry are many and complex. However, if one were to oversimplify and search for one key motivating force, that force would be Dr. Bill Ward. He midwifed and nurtured the project, defended it against opposition, and initially handcarried it into the region, himself. Although other personnel exerted more influence in shaping the final nature of the product, it owes its life to Dr. Ward.

Originally, the major idea was to train teachers much in the way that Newton, Strasser, and others had been trained, and to train them to a high degree of skill level. A number of constraints, which will be discussed later in the section on development of the product, pressed the project to reduce the time of training and the intended skill level of both trainer and participant completing training. In addition, emphasis upon product development and upon a generalizable and exportable training system, as opposed to a training program, came to the forefront of Laboratory emphases. Both USOE policy and the NWREL directorship contributed to this new emphasis.

Funding for Product

Operating funds for the Northwest Regional Educational Laboratory have come primarily from the U.S. Office of Education. From 1967 through 1971,

annual funding for NWREL ranged from approximately $1,500,000 to $1,800,000. Funding to the Laboratory is not assigned by the funding agency to a particular project or product.

Inasmuch as the NWREL had not in the past accounted for funds by products, but rather by programs, some difficulties were encountered in tracing the product's cost. However, at the time of our investigation of Facilitating Inquiry, NWREL had recently hired staff to develop an improved cost accounting procedure. They were able to provide us with the following breakdown for Facilitating Inquiry:

Year	Direct	Indirect	Total
66-67	$10,400	$ 4,000	$14,400
67-68	54,000	18,500	72,500
68-69	5,700	1,500	7,200
NWREL Total	$70,100	$24,000	$94,100

Additional support was supplied by state and local district sources who helped to fund many of the workshop expenses in which the product was successively tried out and revised. An estimate of these costs, sufficiently accurate to be useful, could not be made.

PRODUCT DEVELOPMENT

Management and Organization

The Northwest Regional Educational Laboratory is one of the regional laboratories funded by USOE and is located in Portland, Oregon. Inquiry training was one of the initial projects started in the first year (1966) of the Laboratory's operation. At that time there were four major development programs in the Laboratory. Inquiry was one of the projects within the Teacher Competency Program. Additional projects have been initiated by the Laboratory during subsequent years. Thus, from its inception, Facilitating Inquiry never represented more than a small fraction of the

Laboratory's resource allocation or efforts.

NWREL is similar to most organizations in that its internal administrative structure is frequently revised. Figure 1 shows the organization of the Laboratory in 1971.

Original Development Plan

The major objective of the original inquiry project was to train teachers to a high level of skills. Skilled trainers, primarily from California, were brought in and conducted training much in the way that they, themselves, had been trained. NWREL provided management, organization, and support. The Laboratory also paid the entire cost of the training. It was anticipated that the extensive amounts of training time, i.e., a number of workshops across several months, would be required to develop requisite skill levels.

Inquiry training, as other staff training programs, was to be designed as part of an elaborate network of continuation programs. This network was to be built in each of the five State Departments of Education. NWREL would support the network by providing workshops and materials for initial and continuing training. The plan was based upon direct Laboratory involvement in most, if not all, stages of training and diffusion, and was quite different from the publishing orientation of a marketable product accompanied by minimal prequisite training or supervision.

Modifications of the Original Plan

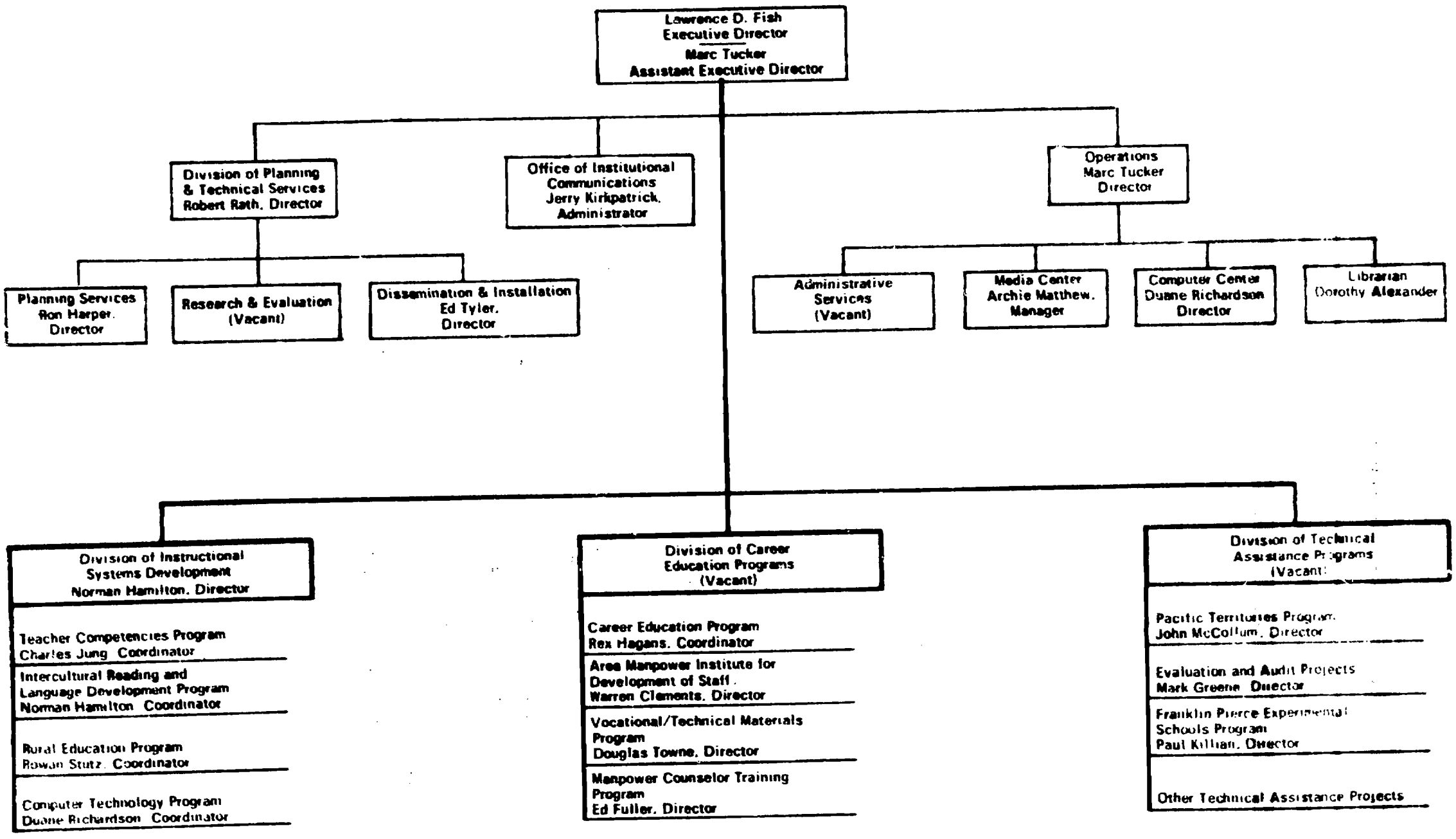
The original plan was soon modified. Time of training had to be reduced. Participating institutions, LEA's, colleges, etc. were not willing to absent their staffs for the lengthy periods of time originally required. Furthermore, the Laboratory foresaw that substantial impact of inquiry training depended upon it being acceptable to both pre-service and in-service training programs. Maximum time allowable for these appeared to be in the neighborhood of 40 hours. The program had to be trimmed to fit the time.

Figure 1

NORTHWEST REGIONAL EDUCATIONAL LABORATORY

ORGANIZATIONAL CHART

DECEMBER 1971



The original notion of having highly skilled and experienced trainers conduct all training sessions proved unfeasible. There was not an adequate supply of skilled trainers.

The original conception of a complex diffusion network, supported by continuing training, went down the drain. The marketable product emphasis similar to that established in commercial practices replaced it.

Thus, modifying forces pointed to a briefer training program, utilizing less skilled trainers, and oriented to an exportable product.

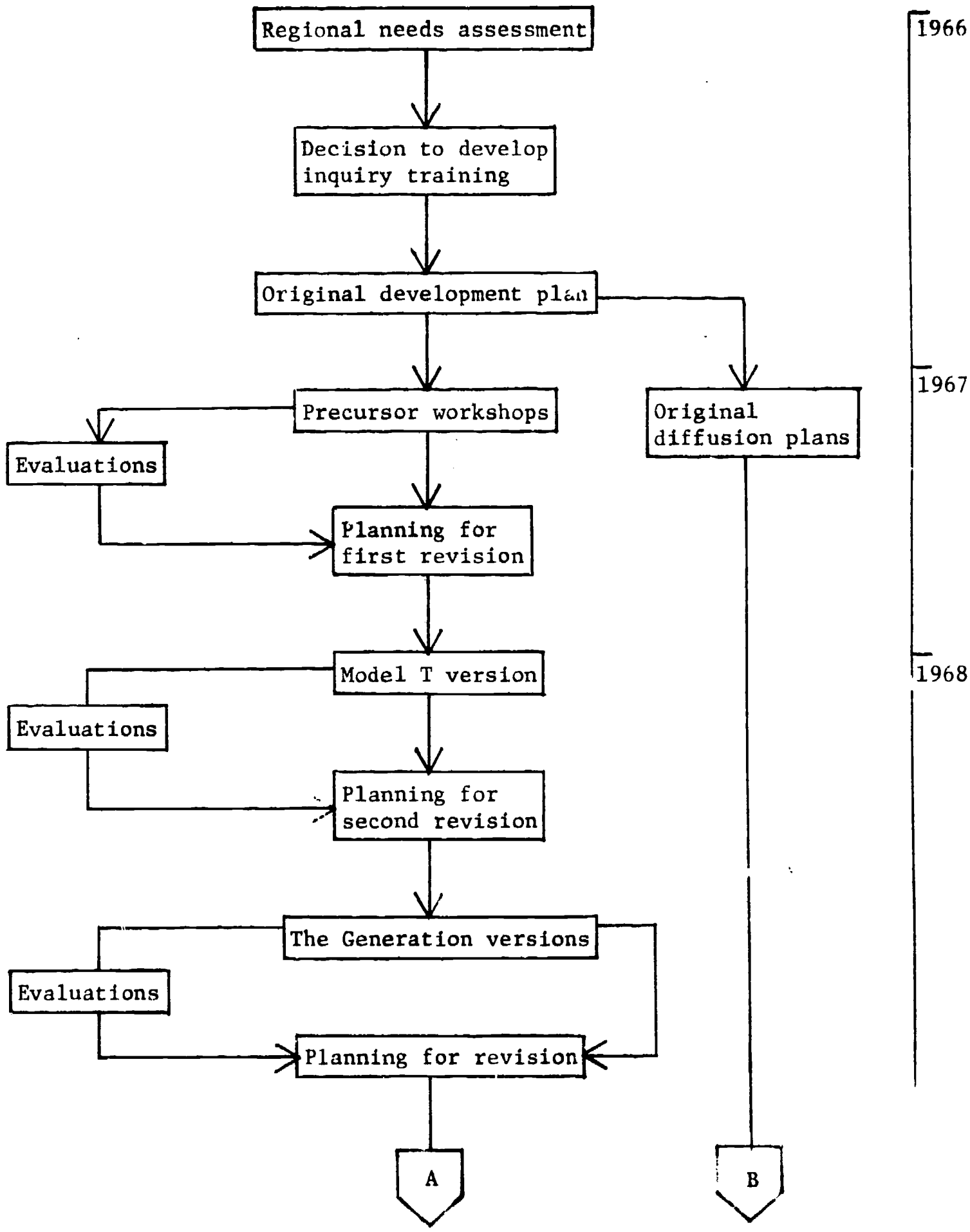
Actual Procedures for Product Development

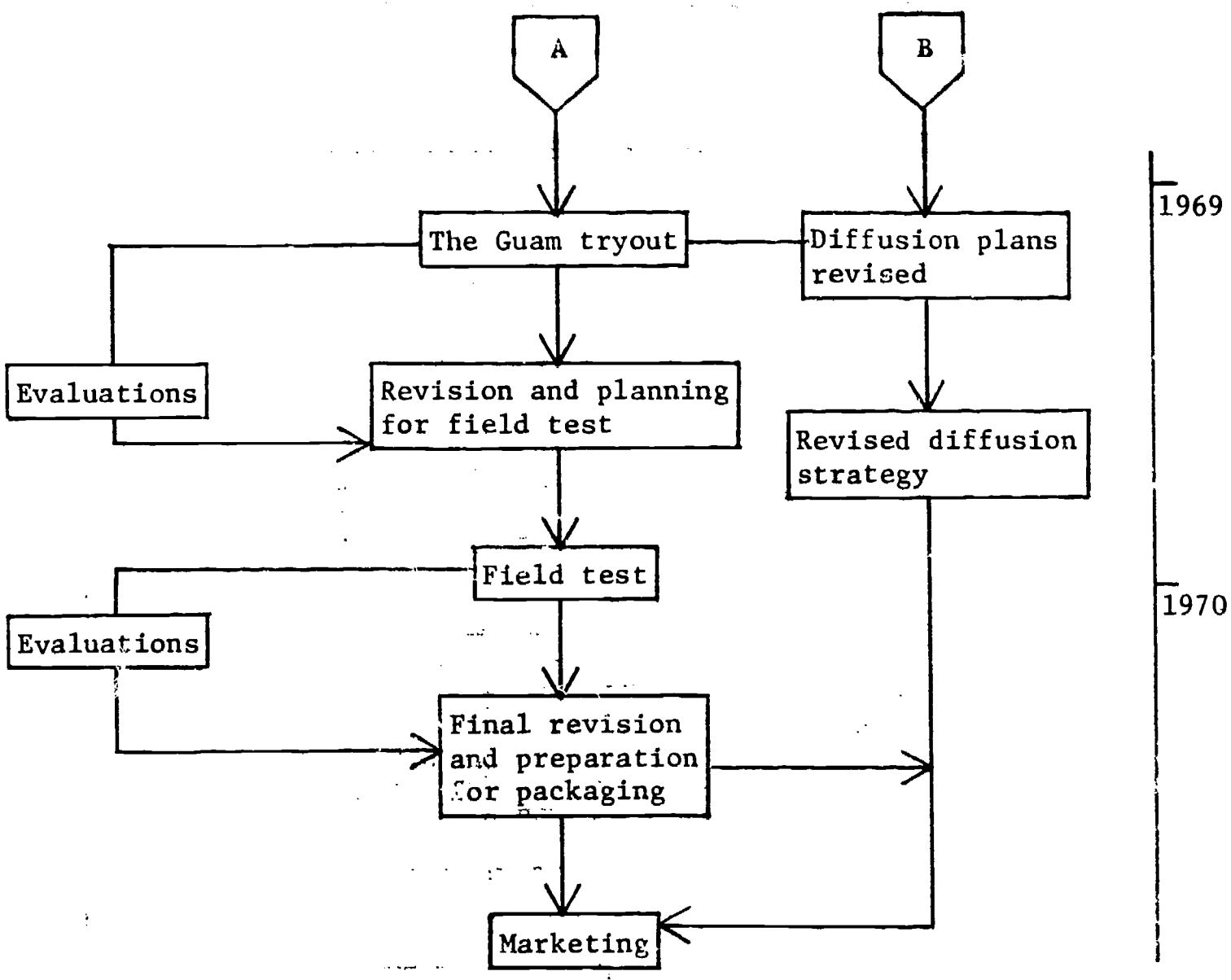
Four major phases were identified in the developmental/formative evolution of Facilitating Inquiry. They are described below. Figure 2, the Major Event Flow Chart, depicts the sequential order of events.

The Precursor Version

During November 1966 through May 1967, a series of workshops were instituted by NWREL at the Pacific Science Center in Seattle. These were organized and conducted in much the same way as the previous Oregon Program had operated. Several highly skilled inquiry trainers, primarily from California, were engaged as consultants to conduct the training at two to three day intervals over the several month period. School districts were required to send four-man teams of participants, including at least one administrator. A variety of individual training approaches were tried depending upon the preference of each trainer. Training was conducted under the assumption that each session was part of a long and elaborate series of training sessions designed to produce high levels of skill among participants. It was assumed that eventually many of those participants who achieved the requisite level of skills would themselves become workshop leaders in later years. The materials used were extensive, depending somewhat upon the decision of each of the trainers, but included a variety of audiovisual materials. Both audio tape and video tape recordings of

Figure 2. Major Event Flow Chart




A
B
1969
The Guam tryout
Diffusion plans revised
Evaluations
Revision and planning for field test
Revised diffusion strategy
Field test
1970
Evaluations
Final revision and preparation for packaging
Marketing

participants before, during, and after completion of training were included. A number of tests were given to participants, including scales on dogmatism, Bills Self-Interest Inventory, etc.

Included in the evaluative plan was a rather elaborate attempt to compare pre- and post-tapes of participant behaviors across participants who were being trained in various teacher training programs, such as Inquiry, Taba, Flanders, etc. As far as can be determined at this time, this data exists but has never been fully analyzed.

The conduct of training during this precursor phase was instructor centered, incorporated a rather elaborate assortment of background materials and references, and made relatively little use of the participants as trainers themselves.

The Model T Version

A second generation of training was instituted during 1967-1968. A series of conferences among training staff from previous workshops, laboratory management, and other specialists in the laboratory program resulted in decisions to make the following emphases:

1. Training should be directed at developing trainers from at least a selected portion of the trainees. This trainer training was to be developed during the sessions and not at a later date.

2. The varied inputs and insights, which had been somehow or another translated verbally, visually, and dramatically by the master trainers to the trainees, were to be written down in specific formats.

3. It was the intend of this version to initiate behavioral objectives for each of the major units of training.

4. Furthermore, each unit was to be accompanied by a rationale which explained the basis of importance of each exercise. This second version of the program development involved: 10 senior trainers, again the highly trained and experienced people, primarily from California; 40 "associate trainers," these were people who had participated in the previous 1966 training program; and approximately 320 new participants. Approximately eight sites in the Northwest were utilized.

At this time Fred Newton began to assume increasing responsibility in observing, supervising the conduct of training, and planning for revision of the materials.

Several transitional approaches were begun at this stage. These included reducing the role of the leader as the conveyer of information and converting him more into the manager of materials and conductor of sessions. His role increasingly emphasized mediating the key presentations and demonstrations via audio tapes or other materials, and continual checking that each unit and sub-unit was clearly communicated to the participants.

It should be noted that not all the senior trainers agreed on the direction of the new approach. The codifying of material, the increasing use of less skilled associates, and the continual pressure to which the NWREL was reacting in shortening the training period were all operating at this time. Several senior trainers rejected what they perceived as an impersonalizing and automating approach.

Throughout each major phase and each workshop, numerous formative evaluation procedures were utilized. Frequently, participants were given daily questionnaires regarding their reactions to the relevance, usefulness, and clarity of the day's input. Exercises, either written or audio-taped, were developed and were used at frequent intervals to determine if the participants could discriminate between appropriate and inappropriate inquiry moves. Informal contact and feedback between trainers and participants was almost continuous. Summative rating sheets were filled out by all trainees.

The Product Generation Workshops

At some period during the latter stages of 1968 "Model T workshops," a further set of decisions was made by NWREL which materially changed the course of Facilitating Inquiry. Due in large measure to the influence of Dr. Chic Jung, who had recently joined the Laboratory staff, it was decided to place increasing emphasis upon small-group interaction and training as opposed to leader-student interaction. All training input was to be reduced to mediated versions, preferably some economical written

form; materials which appeared to be superfluous were to be eliminated; and both inputs and student activities were to be specifically checked for clarity of communication, relevance to the objectives of the training, and attainment of desired performance.

During 1968 and 1969, a series of developmental training workshops were held in such Northwest locations as Salishan, Oregon; Evergreen, Washington; Kelso, Washington; and Guam. The primary objective of these workshops was to develop Facilitating Inquiry as a marketable training product which could be utilized by leaders who had relatively minimal skills. Each of the five successive training workshops was used as a trial, evaluation, revision cycle. Fred Newton carried the major burden of developing and revising the training materials. Participant-observers were used in each session. Dale Rothlind assumed responsibility for this task. Participant-observers circulated among trainees and actually did the exercises required. Observers then checked their responses with those of the trainees and, to determine trainee reliability, continually conferred with the leader both during and after the sessions.

In addition to the observers' and the leaders' own observations, the written exercises of each participant were collected and analyzed. Frequent questionnaires were administered, and tapes were made by participants and were reviewed by the staff. Participants filled out numerous rating scales regarding each exercise and sub-unit included in the materials.

An attempt was made in each training workshop to shift the burden of the interaction and evaluation from the trainer to the small peer group, in this case usually trios. This required considerable revision of initial input material and meticulously framed written directions; it also placed the trainer or leader more and more in the role of a traveling consultant, i.e., traveling among trios.

After each of the five developmental workshops, NWREL staff reviewed the materials and the suggested changes made by participants and made recommendations for the next revision.

The final generation development workshop was conducted in Guam. It was felt at this time that the materials had been sufficiently developed that less skilled trainers could conduct the sessions. Accordingly,

for the first time Fred Newton was able to devote his entire attention to evaluating the product in situ. Following this workshop, minor revisions, primarily emphasizing clarity of the materials and trainer instructions, were made.

It should be emphasized that a voluminous amount of formative evaluative material was gathered during the various developmental periods of this product. Much of this was in the form of rather loosely-phrased comments and ratings by participants; others in the form of recorded criterion behavior. Typically, this was analyzed by Fred Newton and staff; later with the help of Jean Butman. This was done as quickly as possible to determine directions for revisions. Time was not taken to formally organize, analyze, and report this data, as for a professional journal report. There appears to be sufficient formative evaluation data to make a wealth of such reports.

SUMMATIVE EVALUATION

A field test of the materials was conducted in 1969-70. Both development staff and laboratory management had decided the product should be ready for diffusion. Informal measures taken by the development team indicated that the product was achieving its objectives. To make substantial revision in it would require more time and effort than appeared practicable. In addition, work on the new "integrated" system, i.e., a combination of teacher-student interaction approaches of which inquiry was one, had been scheduled. There was an indication that the laboratory management felt some pressure to turn out a completed product.

The field test was primarily designed by Jean Butman. A technical report published by NWREL provides a detailed description of the field test (Butman et al, 1971). Six workshop training programs, with a total trainee population of 143, were utilized for the field test. Two of the six workshops were conducted in Alaska. These were the most closely controlled of the six and provided relatively more information. Two workshops were held in Oregon, one in Montana, and one in Washington. The workshops were supported in part by other institutions, e.g., an extension course at Portland State University. This reduced the cost to

NWREL but resulted in some loss of control. Trainees were members of the target populations for whom the product was designed, e.g., pre-service teachers, elementary and secondary teachers, administrators, and college level instructors. The two Alaska groups consisted of volunteer teacher trainees and were matched by the NWREL on age, grade level taught, years of experience, and socioeconomic background of students.

Training for the two Alaska groups was closely controlled and followed the recommended procedures for the product. One Alaska group was exposed to a highly experienced trainer, and the other to a minimally experienced trainer, i.e., one who had completed a previous laboratory workshop in inquiry development. The trainer of the Washington group was considered to have considerable expertise, while the trainers in Oregon and Montana had skills described by development staff as minimal to moderate. At one site in Oregon, time constraints forced substantial reductions in the trainee program. At two sites, trainers with moderate previous experience added or substituted other materials to the product. Thus, five different treatment applications were involved in the field test.

Data collected included attitudes and expectations; pre- and post-training comprehension as measured by multiple choice questions; and for the Alaska groups only, competency measures based upon audiotapes and a follow-up questionnaire six months later regarding the value and use of the training.

Tape recordings of classroom interactions of the Alaskan participants included a pre-training tape, two tapes collected during training, and a tape collected at the end of the training program. These were recordings of classroom interactions by participants. The tapes were coded independently by three raters under a blind coding system. Results indicated adequate interrater reliability. A comparison of the pre- and post-training tapes indicated a significant increase in the percentage of inquiry moves related to total teacher moves, and a significant decrease of inquiry incompatible moves.

A summary of the pre-training and post-training percentage of appropriate and inappropriate moves is contained in Table 1. No significant differences were found comparing the two treatment groups, one of

which was trained by an expert and the other by a minimally experienced leader whose only training consisted of participation in one previous workshop.

Table 1

COMPARISON OF PARTICIPANT'S CLASSROOM INTERACTION BEFORE AND AFTER TRAINING

	Percent of pretraining tapes (N=58)	Percent of posttraining tapes (N=56)
Percent of 18 tactical moves to total teacher acts:		
30% or less	75%	10%
31 - 69%	18	25
70% or more	7	65
Percent of teacher behaviors incompatible with inquiry to total teacher acts:		
70% or more	60	24
69 - 31%	21	9
30% or less	13	69

Attitudinal and expectation measures were obtained by participant rating on a six-point scale. Items included: extent to which training was worthwhile; extent to which training met expectations; extent to which issues were relevant; extent to which materials were clear; etc. Across the six sites, over 75% of the participants rated the training program as either five or six (the positive end of the scale) on the six-point scale on 70% of the 36 separate ratings.

A multiple choice test for the recognition of key concepts was given prior to the beginning of training and at the end of training. On the four sites for which data were available, significant differences

were found with typical pretest means of 11 and posttest means of 25, from a maximum possible score of 34. A six month retest was given to the Alaska groups. Their scores dropped approximately four points, a statistically significantly decrease in comprehension.

After six months, the Alaska participants were queried as to the value of the training. Results were analyzed according to three categories of inquiry moves: (1) allowing inquiry to happen; (2) facilitating student growth; and (3) tuning in to student perceptions. These correspond to the three sets of inquiry moves in the training program itself. In general, participants valued, used, and could accurately describe only the first set of moves, i.e., allowing inquiry to happen. This result was interpreted by the developers as consistent with the emphasis in the training program itself. Eleven of the 18 training units were devoted to this category.

Inasmuch as one of the major assumptions of the final product is that a trainer with minimal expertise can successfully conduct workshops, comparisons between the expert and inexpert trainers is most relevant. Comparison of those two groups in which trainer expertise was regarded high versus the other four in which trainer expertise was regarded as moderate to minimal indicated that significant attitudinal differences occur. Participants exposed to training by an expert trainer tended, to a significantly greater degree, to: rate the training as worthwhile, perceive the issues addressed as relevant, and find the materials clear and not full of jargon. On the multiple choice test of concept identification, no test of significance comparing expert versus inexpert trainers was performed on the data. However, developer standards of 80% of the participants being able to correctly respond to two-thirds of the test items was met by participants in the minimally experienced trainer groups.

As mentioned previously, no significant differences on the audiotape measures were revealed between the inexpert and expert trainer groups, nor in follow-up data. NWREL felt that on the basis of these results they were justified in their assumption that relatively inexperienced trainers could successfully use the materials.

A comparison of primary and secondary teachers indicated some significant differences. Secondary teachers manifested a significantly

greater percentage of the appropriate inquiry moves, tended to value inquiry more highly, and made significantly higher comprehension scores in the six month follow-up. Again, significance tests were based on the two Alaska groups.

DIFFUSION

Agency Participation

At present, NWREL is assuming responsibility for all diffusion and marketing efforts. Copyprint Centers, a printing firm in Portland, Oregon, publishes both the leader guide and participants manuals as well as handling orders. The Laboratory is continuing efforts to interest national publishing firms in the marketing of the product.

Diffusion Strategy

Throughout the development of Facilitating Inquiry, the TTT concept has been a predominant one, i.e., training for teachers of teachers. By the time the final product was ready for marketing in 1970, a relatively large cadre of qualified trainers had been developed in the five state region. All former trainers were notified of the availability of the final product. Those trainers who were able to attend received a copy of the leader's manual and, in a session conducted by Fred Newton, reviewed changes in the material and were encouraged to assist in the diffusion of the product.

Laboratory staff roles include those of maintaining continuous contact with educational institutions in the region, and of informing them of Laboratory capabilities, products, and services. John Picton of NWREL regularly visits state departments, colleges, and LEA's in this role. In addition, he arranges for demonstration of Laboratory products, including Facilitating Inquiry.

Creating awareness of the product has also been attempted through an initial announcement brochure which was mailed primarily to educational institutes in the region. Approximately 10,000 of these were sent out. A general mailing publication list of Laboratory products which includes

references to Facilitating Inquiry is sent throughout the region as well as nationally. National mailings numbered over 12,000 as of the date of our interview. NWREL does some advertising in professional magazines; e.g., in May of 1971 a one-page advertisement in the Grade Teacher described four NWREL products, including Facilitating Inquiry.

NWREL encourages and assists local sponsorship of training programs as well as state departments of education sponsorship and sponsorship by out-of-region agencies. An index of qualified trainers is maintained by NWREL to assist other agencies who wish to sponsor training.

As mentioned previously, a major revision in Laboratory focus toward increasing emphasis on marketable products affected the development of Facilitating Inquiry. This is also affecting the diffusion efforts in which marketing the product alone is increasingly emphasized, as contrasted with directly offering training.

Product Characteristics Affecting Diffusion

During the latter stages of development, product development was shaped toward making Facilitating Inquiry more readily diffusible. The resulting training package is relatively low in cost; has been reduced in time requirements to meet at least minimal in-service and pre-service training constraints; and both trainer and start-up requirements have been reduced to what is probably minimal. Although the product itself is not divisible, training foci could vary, e.g., a sequence AGA workshop concentrating on the first of the three major categories of teacher moves. However, divisibility has neither been recommended nor utilized by NWREL.

Probably the training time required of approximately 40 hours and the need of at least a moderately experienced trainer represent the major factors constraining diffusion. Educational trends of the times continue to support the product. Emphasis upon individualization, self-initiated learning, taking responsibility for one's own learning, learning to think rather than memorizing facts, etc. remain in currency. Direct competition in the form of alternative inquiry training products does not appear to be a major factor. As previously mentioned, the product marketed by Science Research Associates was designed for classroom use with minimal emphasis

on teacher training. However, it should be noted that many of the former Laboratory "associate trainers" have developed their own versions of the materials. This was evident in the field test during which NWREL had difficulty locating trainers who would use the final version of the material. General competition with other forms of training based upon improved student-teacher interaction presents more serious competition. NWREL itself has developed at least four of these. Since 1966 when product development was initiated, a myriad of teacher training products designed to improve some aspect of student-teacher verbal interaction have emanated from both private and public sources, all competing for teacher-trainees's time.

ADOPTION

Facilitating Inquiry in its final form was not publicly available until the fall of 1970. Sales from the fall of 1970 through March of 1971 indicated approximately 1,400 purchasers of the product. However, this is probably a misleading guide to the extent of its adoption. Laboratory records indicate that over 2,000 workshop participants received copies of the materials in a relatively final form during the last two years of the product development. An unidentified number of the early "associate trainers" have continued to teach workshops using early versions of the materials or their own revisions. At least 11 colleges or universities in the Northwest are known to offer inquiry training as a regular course offering. However, as it is frequently offered during the summer, sales figures would not reflect this. Although NWREL has had some indication of a ripple effect, e.g., college staff trained by the Laboratory presenting workshops for other institutions and in other areas, it has had no systematic way of documenting this activity.

FUTURE OF THE PRODUCT

NWREL anticipates a relatively widespread use of Facilitating Inquiry. However, the Laboratory does not feel it is either qualified or designed to promote diffusion of the product on a national basis. Its

prior efforts to interest national publishers were not successful. The Laboratory feels that its own current diffusion efforts are an interim procedure. NWREL is maintaining close watch on sales, respective user interest, tryouts, etc. in an attempt to assemble an initial track record that would interest a major publisher. Within the Laboratory's own region, use of the product in college courses and in teacher workshops appears to have moderate insurance.

No major revisions of Facilitating Inquiry are planned by NWREL. However, as previously noted, planning is underway to develop an "integrated product." The new product will combine selected strategies from inquiry training with those from other teacher training approaches, e.g., Taba's work on the development of higher level thinking strategies, to a generalized teacher training product. A development period of several years is foreseen before this new integrated student-teacher interaction product will be available.

CRITICAL DECISIONS

The following description is intended as a reasonable approximation of several critical decisions made in the developmental history of the Northwest Regional Educational Laboratory's Facilitating Inquiry in the Classroom. The linear outline gives an impression of more chronological order than may be the case.

Decision 1: To Focus on Developing Teaching Skills Which Will Allow Students to Inquire

Alternatives open to the developers included: (a) training for skills in interacting with students; (b) training participants primarily so they can train others to do (a); or (c) training participants so they can use such skills in their own position, for example, in administration or with professional peers, subordinates, etc. The latter would represent an orientation not exclusively in the classroom.

The decision was made to focus on alternatives (a) and (b) in a dual effort. Classroom skills with students were given. Even a training of trainer program demanded a prerequisite that trainers demonstrate

skills with students. There appeared to be no alternative for this; furthermore, working with students was an objective more common to participants than becoming a trainer.

The training of trainers was included because of the intent of the entire program which was to disseminate skills and practices as widely as possible within the Laboratory's area. As previously mentioned, skilled trainers were not in adequate supply. The initial decision was that selected participants would receive additional training to become trainers. As discussed previously, the final version of the product was built on the assumption that most participants could adequately train using the Leader's Guide.

The focus remained on the classroom rather than on other positions in education, perhaps primarily because that was the source of the original input. Suchman, the original cadre of consultants and trainers, and the development staff taught inquiry with this focus. The development staff was confident they could teach classroom skills. Adaptations to administration and other educational roles were considered, but were never fully explored.

Decision 2: To Limit the Training To Approximately 40 Hours Participation

Originally, a much more extended training program was envisaged and was actually used in the first tryouts. Constraints from the field demanded a shortened version. Development staff had little choice in this issue. Participating institutions would not readily cooperate on longer training programs. Furthermore, the quarter system used in colleges and universities in the area placed similar time limitations. Both regular and extension courses placed a ceiling of approximately 40 hours' participation. To make the broad impact desired in both pre-service and in-service education, it was necessary to fit the training program into the existing system.

Decision 3: To Limit Training Materials to the Printed Page Supplemented by Audio Tapes

Various multi-media alternatives were available, e.g., videotape, film, etc. The decision to limit the nature of the materials was deter-

mined by cost, by facilities available to participants, and partly by overload of equipment demand. Initially, videotapes were used extensively in the early versions of the project. However, there was no evidence that suggested the more expensive media would produce significantly better performance from participants than audio tapes. The decision to limit the cost of materials was made at a higher management level.

Decision 4: To Develop a Training Program That Did Not Require A Highly Skilled Leader

After the first year of the project, the staff felt there was no alternative. There were not enough skilled trainers, and the cost of training them to make available an adequate supply was prohibitive.

Decision 5: To Channel a Large Share of Written Instructions to Participants and the Documented Conceptual Input Through the Trainer

Given the decision to produce an organized instructional package which a relatively unskilled leader could manage, two choices appeared open. Instructions and other input could be written, or otherwise mediated, and given (a) directly to the participants, or (b) to the leader who would then transmit the instructions to the participants.

The first alternative required participants to read accurately and completely. Early trials of the product convinced the developers that this meant too much paper and papershuffling. One consequence was that the leaders were struggling much of the time to manage each participant's paper input. Participants frequently did not read the material, but picked up versions of the directions from others. At one point, directions were inserted periodically for participants who were lost in the materials.

The decision was made to incorporate such written instructions into the Leader's Guide so they would be read to the trainees. This eliminated considerable paper, although it made the Leader's Guide a rather overpowering volume. Otherwise, however, participant materials would have been even larger.

Decision 6: To Use a Five-Step Sequence of Training

Numerous sequences were open. The developers felt that they needed some order and that a random array of steps would not be appropriate. Staff meetings were held involving other Laboratory specialists. Given the general goal that the program would be oriented toward performance by participants, the following appeared to be reasonable sequence and was agreed by the development staff, representatives from the evaluation staff, and consultants.

1. Present the model.
2. Present a conceptual order or explanation of the model.
3. Participant practices recognizing the behavioral concept involved.
4. Participant practices the behavior in small group settings.
5. Participant practices the behavior with students.

After each step, feedback is given by other participants or by the trainer.

Decision 7: To Drop Plans For an Elaborate Diffusion and Training Network

The original NWREL plans for diffusion of products included an intricate network of mutually supporting training and diffusion activities. Constraints of resources and perceived pressure to demonstrate productivity led to the abandonment of this plan. The resulting orientation was a more conventional product marketing. This substantially influenced the final format of the product.

Decision 8: To Package the Materials in the Form of a Manual

Various forms of packaging were considered. The primary alternative was a box of handouts. However, previous efforts convinced the staff and other trainers that "you go out of you head trying to manage all this stuff." There was simply too much time involved in passing out handouts.

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Suchman, R.J. Developing Inquiry. Chicago: Science Research Associates, 1966a.

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APPENDIX A

LIST OF PRODUCTS AND DEVELOPERS

The following is a list of products for which Product Development Reports have been prepared.

Arithmetic Proficiency Training Program (APTP)
Developer: Science Research Associates, Inc.

The Creative Learning Group Drug Education Program
Developer: The Creative Learning Group
Cambridge, Massachusetts

The Cluster Concept Program
Developer: The University of Maryland,
Industrial Education Department

Developmental Economic Education Program (DEEP)
Developer: Joint Council on Economic Education

Distar Instructional System
Developer: Siegfried Engelmann & Associates

Facilitating Inquiry in the Classroom
Developer: Northwest Regional Educational Laboratory

First Year Communication Skills Program
Developer: Southwest Regional Laboratory for
Educational Research & Development

The Frostig Program for Perceptual-Motor Development
Developer: The Marianne Frostig Center of Educational Therapy

Hawaii English Program
Developer: The Hawaii State Department of Education
and The University of Hawaii

Holt Social Studies Curriculum
Developer: Carnegie Social Studies Curriculum Development Center,
Carnegie-Mellon University

Individually Prescribed Instruction--Mathematics (IPI--Math)
Developer: Learning Research and Development Center,
University of Pittsburgh

Intermediate Science Curriculum Study
Developer: The Florida State University,
Intermediate Science Curriculum Study Project

MATCH--Materials and Activities for Teachers and Children
Developer: The Children's Museum
Boston, Massachusetts

Program for Learning in Accordance With Needs (PLAN)
Developer: American Institutes for Research and
Westinghouse Learning Corporation

Science--A Process Approach
Developer: American Association for the Advancement of Science

Science Curriculum Improvement Study
Developer: Science Curriculum Improvement Study Project
University of California, Berkeley

Sesame Street
Developer: Children's Television Workshop

The Sullivan Reading Program
Developer: Sullivan Associates
Menlo Park, California

The Taba Social Studies Curriculum
Developer: The Taba Social Studies Curriculum Project
San Francisco State College

The Talking Typewriter or
The Edison Responsive Environment Learning System
Developer: Thomas A. Edison Laboratory,
a Subsidiary of McGraw Edison Company

Variable Modular Scheduling Via Computer
Developer: Stanford University and
Educational Coordinates, Inc.