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Developing behavioral objectives and criterion-referenced tests in occupational education : the evaluation of a pioneering endeavor.

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DEVELOPING BEHAVIORAL OBJECTIVES AND CRITERION-REFERENCED TESTS IN OCCUPATIONAL EDUCATION: THE EVALUATION OF A PIONEERING ENDEAVOR

A Dissertation Presented

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This dissertation is dedicated to:

My wife Marilou for her kind understanding, encouragement and support throughout my doctoral studies.

And also to the late Jesse O. Richardson, the first director of ESCOE, whom I knew as a respected co-worker and as a warm personal friend.

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ABSTRACT

DEVELOPING BEHAVIORAL OBJECTIVES
AND CRITERION-REFERENCED TESTS
IN OCCUPATIONAL EDUCATION: THE EVALUATION
OF A PIONEERING ENDEAVOR

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The Massachusetts and New York Evaluation Service Center for Occupational Education (ESCOE) conducted a two-year research project to develop a statewide evaluation system for determining the outcomes of instructional programs in secondary and postsecondary vocational and technical schools. The major goals of the ESCOE project were: (1) to train vocational/technical school teachers to write behavioral objectives for their programs and interpret information reported to them about their programs; (2) to develop a bank of behavioral objectives for occupational education; (3) to develop criterion-referenced tests related to the objectives; and (4) to maintain a high degree of autonomy of the local school boards in setting curriculum policy.

Purpose. This study was carried out to provide decision makers in occupational education with data about the activities and products of a project. Since little or no formal research is conducted by local school districts, these decision makers rely on educational literature such as this study to find trends and innovations which might be useful to their situations.

Research issue. A primary assumption of ESCOE was that a broad-based, statewide evaluation and information system in occupational education which was developed jointly through state and local cooperation, would be a feasible and acceptable method for producing information upon which decision makers at all levels might base changes to improve occupational education. The thorny issue of state regulation versus autonomy of local schools was constantly weighed in designing the project.

Procedures. The study had two separate but related phases. First, a determination of the achievement of ESCOE's goals was conducted by comparing the goal statements with the activities and products which resulted from the project efforts. Second, the goal statements were compared with information collected from the personnel connected with the project via a survey questionnaire. These two types of data, along with the personal observations of the author are the basis for the interpretations presented in this report.

Results. Although the project produced a bank of over 12,000 behavioral objectives for occupational programs, the input of participating schools varied greatly and appeared to have a positive correlation with the extent to which the schools provided released-time to their teachers for the purpose of writing objectives.

Four separate and distinct strategies and test packages were developed in Machine Shop, Automechanics, Electronics, and Woodworking. Certain of the test materials were ready for immediate use, but others needed more work before they could be used. However, in all cases the four test strategies provided useful prototypes for continued development of test instruments for occupational education.

The analysis of the survey data identified attitudes which were not otherwise evident, e.g., that the local school districts did not provide adequate time for the teachers to write objectives for their instructional programs, and that the respondents regularly employed at schools expressed a positive attitude toward statewide evaluation and sharing of information even though they held a negative attitude toward state access to the results of testing in the local schools.

Conclusions. Although ESCOE produced a useful bank of behavioral objectives written by trained school staffs, the same product could have been developed faster and cheaper by using a few selected teachers and experts for each subject area. Other important conclusions were: (1) adequate time and expert training must be provided before teaching staffs are able to produce well-written objectives; (2) the participants expressed a favorable attitude toward computer-assisted technology in classifying, storing and retrieving objectives and test items; and (3) a greater amount of time and money should have been devoted to the test development component of ESCOE.

Recommendations. ESCOE's concept of evaluation and information systems for occupational education appears viable for both statewide assessment and for instructional systems, and should be continued in future development. A central information system for occupational education should be designed, operated and financed through the mutual cooperation of local and state agencies, so that the needs of each are met.

The four test strategies should be used as prototypes for further development in designing tests that accommodate both statewide evaluation systems and local achievement monitoring systems.

TABLE OF CONTENTS

LIST OF TABLES

Table

Page

LIST OF FIGURES

CHAPTER I

INTRODUCTION

The purpose for conducting this study, i.e. evaluating a research project, was to analyze the activities and outcomes of the project in detail to provide decision makers at all levels of occupational education with useful information. If the knowledge that resulted from the research carried out by the Evaluation Service Center for Occupational Education (ESCOE) was to be utilized by potential users, a systematic evaluation of the experience needed to be conducted. Such an evaluation would clarify the goals and activities of the ESCOE project and determine the extent to which the goals were achieved. Consequently, this study was concerned with questions like: Where are we now? What have others done? Where should we be heading? How do we get there?

The study analyzed evidence of ESCOE's goals, activities and products, and further data were collected by means of a survey questionnaire which supplied additional information including the opinions of the participants of the ESCOE project. These data, along with the personal observations of the investigator, who was also a participant in the project, formed the basis upon which conclusions were drawn and recommendations were made to potential users.

Background of ESCOE

The Massachusetts and New York Evaluation Service Center for Occupational Education was an outgrowth of MIFS (Massachusetts Information

Feedback System for Vocational Education) whose purpose was to design and develop a statewide evaluation system for vocational education. MIFS was planned to provide both the state department of education and the local school districts with evaluation information collected by means of a statewide testing program. The decision makers in the MIFS plan were to receive feedback on such essential aspects of vocational education as program products, processes and costs. During 1969 and 1970, MIFS, with the aid of 18 teachers from six vocational schools in Massachusetts, produced a bank of 3,000 behavioral objectives for various vocational subjects and one performance test for the Machine Shop program.

ESCOE, which was financed jointly by the State of New York and the Commonwealth of Massachusetts, continued the MIFS effort. The two states contracted to base the research project at the University of Massachusetts where the project operated from September 1970 to June 30, 1972. ESCOE's purpose was to continue the program evaluation phase of the total management and information system conceived by MIFS. The three components of the ESCOE project were: (1) training; (2) behavioral objectives development; and (3) test development.

The project staff trained local school personnel to analyze courses of study, write behavioral objectives, and classify objectives for systematic storage and retrieval. The two major products of the ESCOE project were a computerized bank of over 12,000 behavioral objectives and four criterion-referenced tests in occupational education. Currently, objectives and test banks are being expanded as Massachusetts and New York State continue the ESCOE work in separate efforts within their own states.

The need for clarification of educational goals and more relevant

assessment of learning outcomes is not new. However, a strong emphasis on these needs has emerged during the past few years, caused primarily by two sources: (1) taxpayers and (2) federal funding agencies. Increased school enrollment coupled with spiraling inflation has resulted in taxpayers' resistance to indiscriminate use of educational dollars. Federal legislation has mandated that, henceforth, funds will be allocated in terms of evaluation responsibilities on the part of the states or other receiving agencies. P.L. 90-576 (Amendments to the Vocational Education Act of 1963) mandates that state advisory committees shall, " . . . evaluate vocational education programs, services and activities assisted under this title and publish and distribute the results thereof; and prepare and submit . . . an annual evaluation report, accompanied by such additional comments of the State Board as the State Board deems appropriate, which (1) evaluates the effectiveness of vocational education programs, services, activities. . . . "

It was in this atmosphere of educational accountability that ESCOE was conceived and operated. The Research Coordinating Units of the two participating states agreed on the goals to be pursued and on the decision to base the research project at the University of Massachusetts. Although the focus for training teachers and generating objectives and tests would be at the local school level, it was realized that the expertise available in a university environment would be a critical component of the research project.

Historically, the Evaluation Service Center for Occupational Education was the first phase of developing a model for management and information systems for occupational education at state and local levels. Philosophically, the model made three basic assumptions: first, that

educational management must be a cooperative effort between local, state, federal and other agencies; second, that evaluation must be based on specified goal attainment; and third, that the independence of local school districts, i.e. local autonomy, must be respected in making decisions for local instructional programs. Subsequent phases of the total management system were envisioned as including cost-effectiveness analyses and impact studies.

Rationale of the Study

Evaluation can help decision makers decide, among other things, the changes necessary in terms of continuing, modifying, expanding, or aborting existing programs; and evaluation information from a previous research program can be useful in encouraging and assisting the implementation of innovation. However, an evaluation must be systematic and objective in its analysis, and the findings should be organized for the understanding of the potential users.

Wynne (1970) points out, " . . . that school districts spend almost no money on actual research or evaluation [p. 245]." Thus local educators must, of necessity, search through educational literature for information on recent studies which are relevant to their own situations and which will be useful in helping them make critical decisions. It is axiomatic that information is the most important product of research and evaluation, and also that it is the major source of change in a rationally developing society. The author contends that, " . . . nothing important happens differently in a democracy unless some members of the society are told something they didn't realize before [p. 246]."

The information provided by this study should be useful in the

context of developing systematic learning and evaluation strategies. The ESCOE project terminated and a final report described the activities and products of the project. The project developed strategies for generating behavioral objectives, writing criterion-referenced test items, and training occupational education personnel. These three primary components of ESCOE are essential elements which form the basis of a major reform in educational instruction and evaluation which is currently expanding throughout the nation. Educational agencies at all levels and of all types are presently embarking on the development of educational systems that rely on a clear definition of specific learning goals and on the distinctive assessment of a learner's achievement based directly on his performance of selected program objectives.

Local Educational Uses of the Data from the Study

Local educational agencies might find it useful to consider this study of ESCOE's experiences in order to gain insights and knowledge about several integral components needed to develop learning environments in terms of the instructional systems methodology. ESCOE worked directly with such systems components as: task analysis, behavioral objectives, performance testing, computer storage, information feedback, and training. The study analyzed and interpreted the project data in terms of supplying information which could help local educators in developing systematic components such as these in their own systems.

Behavioral objectives. ESCOE information on how to transform general educational goals into specific learning outcomes should be particularly interesting and useful to local educators. Pertaining to the

format of a behavioral objective, the project developed a model for writing objectives which not only facilitated computer storage of the separate parts of an objective, but also allowed for the subsequent storage and retrieval of associated test items and learning resources.

Classification of objectives. An early concern of the project was storing behavioral objectives in a way that they could be retrieved easily and systematically for various purposes. Thus, the need emerged for a simple, practical classification system. With the help of participating instructors who analyzed their occupational subjects in terms of the various performance tasks, ESCOE developed taxonomies--blocks and units--for 38 separate occupational programs. Because these classification schemes grew out of input from 30 different local educational agencies (LEAs), they should be comprehensive enough to have general utility across various types of educational and training programs. The block and unit scheme also provided a coding format which might be particularly useful to LEAs who plan to utilize computer access to objectives and test items.

Criterion-referenced measurement. The development of an alternative to norm-referenced testing was a major thrust of the ESCOE research that produced valuable information for use in local educational systems. Four different strategies for criterion-referenced measurement emerged as four test development teams, each in a different occupational subject, constructed tests to measure the performance of examinees on associated behavioral objectives. Users may utilize the tests as developed, or the ESCOE strategies could be adapted to the unique needs of the local system. Local users of information from this study may benefit, also, from the

analysis of the survey data on the testing component of the project. The survey respondents expressed their opinions towards various aspects of a statewide testing program.

Training. Preparing teachers to write, classify and use behavioral objectives and criterion-referenced tests was another major concern of the project. Usually, local systems have no one with sufficient background to begin a teacher-training program. ESCOE produced a training package and a programmed text for writing behavioral objectives, both of which could be used wholly, or partly, to develop a program for local training needs. The opinions of ESCOE participants toward ESCOE's training procedures may be useful in planning for the retraining of local teachers to utilize systematic procedures in their instructional programs.

State Department Uses of the Study Data

Behavioral objectives. ESCOE developed a two-state, central bank of behavioral objectives for occupational education by training large numbers of teachers in all the participating schools. Was the method feasible? Was it efficient? This evaluation study analyzed the attitudes of project participants on those issues and others which relate to statewide evaluation projects such as: (1) Who should generate behavioral objectives for a statewide data bank?; (2) Who should finance such banks?; and (3) Why did local instructors participate in the ESCOE project?

Testing student performance. Since the direct measurement of the outcomes of instruction in occupational education is a current concern of state-level management and information systems personnel, any significant

and related trends indicated in this evaluation will be useful. The question of local autonomy and state department involvement is always a controversial issue when planning statewide evaluation and accountability projects, and ESCOE participants responded to questions which focused on such problems.

Computer application. State and federal agencies may be interested in the critique of ESCOE's strategy for synthesizing objectives and the ways in which it can be used to facilitate both test development and a computerized information system. ESCOE's statewide computer bank of objectives and test items has distinctive features for classifying and storing curriculum and evaluation data. If state departments are considering a computerized, centralized support system for LEAs as well as for their own needs, the assessment of ESCOE's prototype in this study offers empirical evidence which might be helpful in determining appropriate strategies.

Teacher training. One of the major problems in implementing change in educational systems involves the training and retraining of instructors. To realize an accountability system based on specific learning outcomes, traditional teaching concepts and methods must be revised. Local educational systems seldom have personnel with adequate training to carry on this task, so they look to state and federal sources for the expertise which is needed. If the systems-evaluation movement is to take root at the local scene, then state and/or federal agencies must provide the initial training which local educators seek. ESCOE developed such a support system and this study determined those aspects of the training component which can be useful to local and state agencies. Participants

were queried for their opinions as to the usefulness of ESCOE's training components.

Significance of the Study

The significance of the study lies in the relevance of the project data to the concerns and decisions presently facing occupational educators in their search for effective ways to improve instruction and evaluation. ESCOE dealt with real issues and real educators in real schools. The problems and pitfalls that challenged ESCOE are the same ones that now confront local, state and federal educators; the study should be of consequence to teachers, administrators, and researchers because it: (1) focused on relevant issues; (2) systematically pursued an objective treatment of the data; and (3) provided practical recommendations. Thus, it is important that the information provided by the study be disseminated to the participants of the project and to other educators as an aid in planning and implementing instructional and evaluational systems.

Definition of Terms

Following are definitions of key terms as they are used in this study:

behavioral objectives: clear, specific statements of intended learner performance which are observable and measurable.

criterion-referenced tests: instruments to measure the examinee's performance on related behavioral objectives.

decision maker: a person who makes decisions about an educational situation. They may be teachers, counselors, students, administrators, parents, industry, and others; and they may be located at the local, state, or federal levels.

ESCOE: the Massachusetts and New York Evaluation Service Center for Occupational Education; also the project.

facilitator: the local school staff member who served as liaison between the school and ESCOE; usually a teacher, but some were administrators or counselors.

instructional system: an organized set of materials to facilitate student learning, including the specification of needs, goals, objective content, and evaluation.

local autonomy: the principle which establishes the independence of local school boards from state education agencies to make decisions about goals and managing learning environments.

local educational agency (LEA): a school district composed of one or more towns as distinguished from state and federal educational agencies.

norm-referenced tests: instruments to measure an examinee's proficiency in relation to other examinees.

the Planning Document: the original document which described the ESCOE project, and upon which the project was funded.

Research Coordinating Unit (RCU): a branch of a state department's Division of Occupational Education.

Synthesized Objective (SYNOB): a complex objective composed of elements from individual behavioral objectives which are similar in nature.

USOE: United States Office of Education.

CHAPTER II

RELATED RESEARCH AND LITERATURE

Individualized Instruction! Performance Contracting! Accountability! Instructional Systems Development! Planning-Programming-Budgeting System! Needs Assessment! Task Analysis! Performance-Based Education! Computer-Assisted Instruction! Programmed Learning! Management Information Systems! Learning Domains! Item Banking! --- The jargon of contemporary educational technology goes on in a seemingly endless pattern. Behind the facade of such terminology, however, lie the concepts of recent innovation and change in the pedagogic disciplines; and if one can bear the initial shock of the technical verbiage the reward is a resource of fundamental strategies for planning, implementing and improving education programs. One such strategy--criterion-referenced measurement--was the ultimate aim of ESCOE and provides the central theme for this chapter.

Educational technology may not be the panacea for all the ills of education, but it offers a logical and orderly approach for determining: the goals to be pursued, the procedures for carrying out an instructional program, the techniques for evaluating success, and the process for affecting appropriate improvements. Current multimedia teaching aids notwithstanding, the typical learning environment is basically not much different from its counterpart of 50 years ago. Most education is still teacher centered, textbook oriented and lecture prone. Evaluation of learner achievement is usually based on testing after instruction only,

and in most learning situations, grading and reporting systems continue to rely exclusively on norm-referenced methodology. How can such long-established patterns be revised, and who must provide the initiative for beneficial changes? The typical instructor is overburdened with instructional and extra classroom duties, and usually he does not have the training to develop his own instructional program according to systematic principles. Thus, if the technological developments of the past decade are to be used for the improvement of education, there must be close and supportive relationships between instructional practitioners, systems developers, and state and federal funding agencies.

This chapter presents ideas and strategies from the works of contemporary innovators in the field of educational systems development, with the hope that such information may stimulate interest and further action by decision makers in the local school districts and in the state departments of education. First, the concept of evaluation is discussed from various perspectives including recently developed methodologies for evaluation in instructional systems. The remainder of the chapter presents current literature which relates to three focuses of the ESCOE project: (1) articulation of goals for program evaluation; (2) specification of instructional objectives; and (3) development of strategies for criterion-referenced measurement.

Concept of Evaluation

For the purpose of this study, a distinction is made between testing or measuring and evaluation. Testing is viewed in the narrow context of determining the achievement of an individual learner or a class of students on a set of instructional objectives or units. An example

of such measurement would be to test the proficiency of a nursing student in administering a bath to a bed-patient. Although such a test provides information about the student's progress, its function usually is limited to reporting the student's achievement to teachers, counselors, parents, and the student.

Evaluation is defined in a much broader context which conceives of providing as much data as possible to all decision makers involved in the enterprise, i.e. the thing which is being evaluated. A systematic evaluation process seeks to provide choices among available alternatives to satisfy the particular needs of each decision maker in such a manner that important decisions are supported by the evaluation data. Testing the proficiency of a nursing student on a learning objective as described above would be only one of many aspects of a comprehensive evaluation which sought the total effectiveness of a nursing program in training prospective nurses for successful and satisfactory employment.

Thus, the key word in developing evaluation strategies is decision making. The successful evaluation provides data which focuses on the important issues or goals defined by each participating decision maker. Concurring with such a concept is the Phi Delta Kappa National Study Committee on Evaluation who defined evaluation as a process of delineating, obtaining, and providing useful information for judging decision alternatives. While Gronlund (1965) agrees with that decision making purpose of evaluation, he emphasizes the accuracy of the information in his definition of evaluation, " . . . a systematic procedure for collecting and analyzing reliable and valid information for the purpose of decision making [p. 6]."

The theme of providing relevant information to decision makers

is evident in the following section as the views of several authors on the methodology of evaluation are discussed.

Evaluation Methodologies

A methodology was developed by Gorth, O'Reilly, and Pinsky (1973) and was used as a guide for presenting the related literature hereafter in this chapter. The evaluation design presented by the authors was established as 12 clearly defined steps:

Step 1. Definition of the enterprise to be evaluated.

Step 2. Determination of the resources available for the evaluation.

Step 3. Selection of the decision makers to whom data will be provided.

Step 4. Articulation of goals for the enterprise by each decision maker.

Step 5. Specification by each decision maker of the objectives for their goals.

Step 6. Specification by the decision makers of the alternative decisions to be made about the objectives.

Step 7. Development of measurement techniques for the objectives.

Step 8. Design of data to be collected.

Step 9. Collection of the data.

Step 10. Analysis of the data.

Step 11. Report of the data to the decision makers.

Step 12. Revision of the evaluation design to improve the data supplied to the decision makers.

The ESCOE project focused predominately on activities which relate to steps 4, 5 and 7 of the evaluation methodology described above,

i.e. goals, objectives and measurement; and ESCOE's activities in developing these three components are related throughout this chapter to the principles espoused by others in the field of evaluation.

A fundamental design is suggested by Armstrong, Cornell, Kraner, and Roberson (1971, pp. 19-21) which agrees with the scheme of Gorth, et al. The authors describe evaluation as a four-phase process. Phase I consists of planning the evaluation and it includes identifying the variables, stating objectives, selecting the evaluation design, developing a monitoring system, and finalizing a schedule of events. Phase II defines the procedures for implementation, including the collection and feedback of data. Phase III is concerned with the analysis of the data and the resulting decisions. Phase IV describes the recycling procedures, including the modification of the system. Although the formats vary in the two methodologies, both include such critical aspects as: (1) specifying objectives; (2) collecting, analyzing and disseminating data; and (3) modifying the system for improvement.

The concept of evaluation is inherent in the systematic development of instruction. Banathy (1968) agrees that goals must be articulated and schedules must be finalized, " . . . the identification of what has to be done and how, by whom or by what, when and where, so as to ensure that the predetermined performance will be attained [p. 22]." Similarities to the two previous methodologies may be seen in Banathy's strategy for an educational system:

1. Formulate the specific learning objectives, clearly stating whatever the learner is expected to be able to do, know, and feel as an outcome of his learning experiences.

2. Develop tests to measure the degree to which the learner has attained the objectives.

3. Examine the input characteristics and capabilities of the learners.

4. Identify whatever has to be learned, so that the learner will be able to perform as expected.

5. Consider alternatives from which to select learning content, learning experiences, components, and resources needed to achieve the stated objectives.

6. Install the system and collect information from the findings of performance testing and system evaluation.

7. Regulate the system. The feedback from testing and evaluation will serve as a basis upon which the system will be changed, by design, in order to ensure ever-improving learning achievement and optimum systems economy.

In Banathy's strategy, similarities appear, particularly with Gorth, et al., in terms of: specifying objectives; developing tests to measure the objectives; considering alternative decisions; collecting relevant information; and changing the system for improvement.

Astin and Panos (1971) support the decision-making focus of evaluation, " . . . the fundamental purpose of evaluation is to produce information which can be used in educational decision making [p. 733]." The authors go on to state two fundamental conditions implied by the need for educational decisions, " . . . some recognized educational objective or set of objectives and at least two alternative means for accomplishing these objectives [p. 733]." Thus, the specification of educational objectives has been identified in all methodologies discussed herein, while the idea of the availability of alternative decisions appeared in the methodologies of Banathy, Gorth, et al., and Astin and Panos.

ESCOE was a project which saw the total picture of evaluation as described above. However, because of the short duration of the project,

most of the effort and resources went toward the development of goals, objectives and tests for occupational education. The ESCOE Planning Document treated other phases of evaluation such as: (1) alternatives in decision making; (2) collecting, analyzing and disseminating data to decision makers in local and state agencies; (3) improving occupational education based on the evaluation data; and (4) modifying the evaluation system as needed. Eventually, ESCOE planned to implement the whole spectrum of evaluation strategies, and one reason for conducting this study was to encourage others to continue the work begun by the ESCOE project.

In the next section is a more detailed presentation of the three components of evaluation on which ESCOE focused its attention, and a discussion of those components as seen by several notable authors in the area of educational instruction and evaluation.

Articulation of Goals

Gorth, et al. (1973) define a goal of an enterprise as a, " . . . broad statement of what the decision-maker wants the enterprise to accomplish [p. 1.21]." They go on to state that since the different decision makers served by the evaluation would probably have different goals, the evaluation should be designed to identify the goals of each decision maker in order to satisfy their various needs.

An operational methodology for identifying and clarifying goals of decision makers has been developed by Benedict (1973). In that strategy, each decision maker lists the goals that he wishes to achieve through the evaluation. The decision makers' goals are analyzed into individual goal statements which are subjected to extensive tests of completeness wherein each decision maker reviews the ideas of the others with the

option of modifying their own original goals if they so desire. Similar tests of completeness are carried out for other components of the enterprise such as anticipated activities, student and teacher populations, instructional materials, and institutional settings.

Another method for developing goals (job analysis) is used by the military, business, industry, and in the development of vocational instruction. The job analysis approach permits a structured, comprehensive gathering of data pertaining to the skills, knowledge and attitudes which persons close to the work deem to be important and necessary. Such an analysis results in a categorical outline of subject content which initially serves as instructional goals, and subsequently may serve as a taxonomy for deriving and classifying behavioral objectives. The United States Department of Labor (1972) developed a comprehensive handbook for analyzing jobs. Also, the Center for Vocational and Technical Education at Ohio State University is developing a set of procedures to aid developers of occupationally related curricula in generating performance-based goals and content.

ESCOE used the job-analysis technique for describing the broad goals of instruction in occupational education, and called the resulting taxonomies Block and Unit Breakdowns (samples of which may be seen in Appendix C). The job-analysis technique worked well to identify the skills and knowledge necessary for successful practice of the various occupations, especially because all vocational teachers have had extensive training in analyzing their own occupations. However, the Benedict strategy would accomplish a more thorough analysis, so it has been proposed in recommendation number eight in the final chapter of this study as an adjunct to the Block and Unit process.

Specifying Objectives

Although broad goal statements are useful in the early stages of evaluation, they are usually too general to describe learner behavior which is observable and measurable. For such a purpose, more specific statements of learner performance are needed, and behavioral performance objectives are well-defined statements that clarify precisely the intended outcomes of instruction. Behavioral objectives provide a vehicle by which the general goals of instruction may be specified further to all interested persons--students, teachers, parents, school administrators, state departments of education, and prospective employers. Statements about the desirability for specification of learning goals abound in recent educational literature. Mager (1962) states, "If you are interested in preparing instruction that will help you reach your objectives, you must first be sure your objectives are clearly and unequivocally stated. You cannot concern yourself with the problem of selecting the most efficient route to your destination until you know what your destination is [p. 1]."

Banathy (1968, p. 39) contends that specificity in formulating objectives is necessary for three reasons: first, a description of terminal performance becomes a basis upon which to construct the criterion test; second, objectives must be stated in operational terms if they are to be useful; and third, he agrees with Mager in stating that objectives must be formulated in such a way that they will communicate clearly and unmistakably what we are trying to achieve to all who are served by the system--primarily to the learner and the teacher, but also to any others who have a function in or an influence on the system.

Although Eisner (1971) acknowledges, as do the other authors, the need for specific instructional objectives which "emphasize the acquisition of the known [p. 101]," he points out the importance of other learning dimensions that are not so easily quantified. One such dimension--the expressive objective--describes educational encounters, i.e. situations in which children are to work, problems with which they will cope, tasks in which they will engage, but it does not specify precisely what is to be learned from that encounter. The expressive objective is intended to serve as a "theme" around which skills and understandings can be expanded, elaborated, and made idiosyncratic. An expressive objective demands not homogeneity but diversity of response according to the author. Eisner recommends that we study curriculum to determine the degree to which these two types of objectives are used by instructors, and what types of relationships between them are most productive for various types of students, subject matter, and learning situations.

It is easy to agree with Eisner that educational objectives must contain dimensions that encourage the student and the instructor to explore issues that initially may be obscure, but which allow the learner to construe his own interpretation to the situation he encounters. Learning outcomes must not be limited to preconceived, easily measured goals.

ESCOE was in close agreement with the need for specific instructional objectives as discussed above, but how does one go about deriving such objectives from the broad goals of the evaluation or instructional enterprise? ESCOE used a method which was simple and limited in scope. Teachers in participating LEAs were asked to identify learning tasks for their instructional programs by the further breaking down of the Block and Unit taxonomies. Such smaller learning tasks, either singly or

combined, became the basis for writing behavioral objectives.

A more introspective method was developed by Hutchinson and Benedict (1970) who point out that, "we all have goals, but getting from goals to verbalized or explicit statements of what these goals mean not only to others but to ourselves is the problem [p. 1]." General or broad goals, by their nature, express concepts which are often ambiguous or "fuzzy" as perceived by different persons. Since systematic evaluation must be based upon clearly defined, unambiguous goals, the authors devised a strategy--Operationalization of Fuzzy Concepts--which produces, " . . . objectives as operationalized goals, not simply objects in behavioral terms [p. 6]." Their strategy is particularly useful in clarifying goals which are not easily stated in behavioral terms. Briefly, the strategy is a process of hypothesizing situations in which the goal is present, and deriving from the mental scenes behavioral statements that represent various dimensions of the goal. In the first step you hypothesize the goal (fuzzy concept) in its positive state, and you make a list of all the things which you observe mentally in the situation that indicate that the fuzzy concept is present. Next, you hypothesize the same concept, but in a negative state, and again list your mental observations. After a series of tests of completeness and prioritization, the fuzzy concept emerges as observable, measurable objectives which are useful for instruction, evaluation, problem solving, and other important enterprises.

Another strategy for transforming general goals into behavioral statements was developed by Thiagarajan (1974, pp. 17-21) as a game for the analysis of attitudinal goals into observable indicators or behavior. Several players cooperatively develop an abstract and global goal statement,

and each player writes down his perception of five observable indicators of achievement for that goal. The players read their lists of indicators as an editing and consolidating process takes place. Then each player selects from the combined list the indicator that he believes to be the most widely acceptable. The indicator selected by the most players during the first round is assigned the first rank and eliminated from subsequent rounds. The game continues with the same procedure until all indicators have been ranked. The game ends with a set of behavioral objective statements related to the goal. The game also includes a scoring scheme whereby the player with the highest reliability in identifying acceptable indicators is rewarded.

Characteristics of Behavioral Objectives

The structure used by ESCOE for constructing a behavioral objective was consistent with the general format espoused by most authors on the subject, i.e. a well-written objective contains three basic elements:

1. Performance - Exactly what it is that a student who has mastered the learning should be able to do. The performance stated should be directly observable and measurable. Ambiguous verbs such as "knows," "understand," etc., should be avoided.

2. Conditions - description of the environment (givens and restrictions) under which the performance will take place; and a list of all equipment, materials, and instructions which the student will use to perform the objective.

3. Extent - The criteria by which the performance is measured; a statement of acceptable minimum standards of achievement.

Although Huffman (no date, p. 1-2) does not delineate the need for specific measurement standards in presenting five basic characteristics which performance objectives must contain, he agrees with ESCOE that

performance must be observable and measurable, and that the conditions of the objective must be specified:

1. A description of performance in concrete terms which is measurable and observable, including tolerance levels.
2. Specification of most conditions under which performance takes place: methods, materials, equipment, and supplies.
3. Specification of the steps in proper sequence, when appropriate, showing what the student does first, second, third, etc.
4. Be universally understandable.
5. Be relevant in order to motivate the student.

Huffman's characteristic for specifying the proper sequence for performing the objective (number 3), was considered by ESCOE as a phase of the instructional process, and was not included in the objectives except as a standard of judgment in the extent portion of the objective. Characteristics four and five are well conceived, but apply more to the context in which the objectives are used rather than to the structure itself.

Craik (1971, pp. 14-21) agrees with ESCOE's three components of an objective in stating that: (1) the expected performance should be stated clearly; (2) conditions under which the behavior occurs should be specified; and (3) the level of proficiency should be stated. However, the author adds a dimension which, as with some Huffman characteristics, is more appropriate to the use of the objective than to its structure. The additional guidelines suggested by Craik for writing [or using] objectives are:

1. Objectives should be realistic and fit the grade level for which written.

2. Objectives should be attainable by instruction and should be measurable.

3. List only those objectives which are developed entirely.

4. Write as many objectives as are necessary or appropriate.

Writing or Selecting Objectives

Gorth, et al. (1973) stress that the behaviors which will be accepted as evidence of goal achievement must be specified by the decision maker who has the choice of either analyzing his goals into specific performance objectives, a process described in detail by Allen (1972), or selecting appropriate objectives from an available source.

The issue of who should write or assign objectives for instructional programs can, at times, be extremely controversial. In Chapter IV of this study, the issue is analyzed as it relates to the independence of local school districts in making decisions which effect their own instructional programs. The basic issue asks: Should the writing, selecting or assigning of objectives be carried out by teachers or other curriculum specialists? Do the local school personnel make all the decisions or does the state educational agency have some authority? ESCOE's answer was that local school districts have absolute autonomy in managing their own instructional programs, but that the state agency must have pertinent data based on learning outcomes in the local schools if state-level decision making is to be consistent with and supportive of local needs.

Some authors believe that the writing of objectives should be performed by specially trained technologists and that the teacher should only have to select the objectives appropriate to his instructional program. Another school of thought holds that teachers should have at least

a basic training in constructing objectives, so that they would have a better understanding of how to use them, and also to be able to modify, for their own needs, objectives which were prepared by others.

Popham (1970) contends that " . . . although many educators become enthusiastic about stating objectives behaviorally, few of them do it. Teachers are already too burdened to find the time to develop operationally-stated objectives for their classes [p. 175]." He suggests, in agreement with recommendation number three in Chapter V of this study, that the teacher be the selector rather than the generator of objectives, and would generate only those objectives which are not already available from other sources. The suggestion allows for local autonomy which Popham feels should be an integral part of any objective strategy. He also believes that students could be taught to generate properly stated objectives which could beneficially affect their interaction with an instructional system designed to promote such goals.

The underlying assumption in the ESCOE project was that the teachers from all the participating schools in Massachusetts and New York should write the objectives, initially, for the project and subsequently the process would be more of a selection from the existing supply. It was well into the second year of the project when the feasibility and economics of the original assumption was questioned. The analysis of the data in this study suggests that the bank of behavioral objectives could have been developed more efficiently and economically by a team of paid teacher-experts. However, whether or not the local instructors would have reacted favorably to such a plan poses a significant question, but one which was not treated in this study.

Objectives banking. For educational agencies who prefer selecting objectives rather than writing them, sources (banks) of objectives are available for many educational programs. Commercially prepared objectives are presently available from two sources known to the investigator: (1) the Instructional Objectives Exchange (IOX), P. O. Box 24095, Los Angeles; and (2) the CO-OP at the School of Education, University of Massachusetts, Amherst, Massachusetts. Also, a guide to over 50 sources of behaviorally stated objectives is available from Project SPOKE, 37 West Main Street, Norton, Massachusetts 02766. The guide contains information on sources, prices and descriptions.

Criterion-Referenced Testing

Behavioral objectives as described above provide an integral component to systematic instruction and evaluation by clarifying the broad goals of the enterprise to the decision makers. Usually, however, the objective must be specified further, so that it can be used as an important means of measuring the achievement and progress of individuals and groups of learners. To illustrate the need for further specificity in behavioral objectives, a typical objective in the House Carpentry program of study is used as an example:

> Given a roof to shingle and access to necessary materials and equipment, the student will apply the roofing to trade standards.

Such an objective would be adequate in specifying one type of skill needed to be learned in the broader unit of instruction called "Roofs." However, to actually test a student on his knowledge and skill in applying roof shingles, the test must specify: (1) the type of shingles and fasteners

to be used; (2) the style and pitch of the roof to be shingled; and (3) the method of scaffolding to be used. Since there are differences in roof shingles and fasteners, roof styles and pitches, and methods of scaffolding, each objective of that kind would yield several similar, but different, test items to measure the student's ability to apply roofing. Such specificity is unwanted at the objectives level of clarifying goals, because it would create an unmanageable number of objectives. However, in the actual testing situation, there should be no ambiguity as to the precise performance that must be exhibited to satisfy "trade standards" or whatever criteria has been established for the test.

An important goal of ESCOE was to develop strategies and instruments which would measure the performance of learners on specific instructional objectives. This type of measurement is termed criterion referenced, because it reports the test results in terms of how the student performed on the objective (criterion), rather than the traditional report which compares the student's performance to the performances of his peers. The latter use of educational testing has dominated the measurement scene for the past half century in the form of commercial, standardized tests. A perusal of educational and psychological measurement textbooks published prior to 1965 offers, if at all, only brief references to the inadequacies of standardized tests for evaluating instructional effectiveness, according to Thorndike and Hagen (1961, p. 451). However, with the advent of instructional systems methodology a little over a decade ago, the need emerged for measurement strategies which fitted the needs of the new technologies--needs which were not met by use of the tests available at that time.

Gorth, et al. (1970) recognize the need for diversity in collecting

data for making decisions, "There is no limitation on what type of technique should be developed to measure each objective [p. 1.27]." The authors believe that data useful to the decision maker may be collected by such means as observation, questionnaire, interview, psychophysical instrument, or achievement test items which are related to specific behavioral objectives.

The idea that measurement procedures should be varied and designed to fit the information requirements of the particular system is supported by Glaser and Nitko (1971). According to the authors the fundamental task of educational testing is to provide information for making basic and essential decisions with respect to the instructional design and operation. They believe that four activities of instructional design influence measurement requirements, " . . . analysis of the subject matter domain under consideration, diagnosis of the characteristics of the learner, design of the instructional environment and evaluation of learning outcomes [pp. 625-626]."

Although, as discussed above, there is a need for various techniques by which to gather data for evaluation, the ESCOE project was concerned primarily with developing strategies for criterion-referenced measurement in occupational education. Particular attention was given to the development of performance testing in the domain of psychomotor skills because of the scarcity of testing materials for that purpose.

The next section discusses the fundamental differences between norm-referenced and criterion-referenced testing, including the views of contemporary authors in the field of educational measurement.

Norm-Referenced vs. Criterion-Referenced Measurement

Norm-referenced tests. Many types of tests have been developed to measure student learning. The most common tests used initially for classroom instruction were teacher-made tests. However, during the twentieth century an effort was begun to develop standardized tests that could be used with different groups of persons and which would give comparable results across the groups being tested. Standardized tests were developed to measure such characteristics as aptitude, interest and intelligence. These were followed by commercially prepared achievement tests which measure learning from school programs, and whose results are used by most schools to judge their educational efforts.

Standardized tests, whether they measure achievement or aptitudes, are referred to generally as norm-referenced tests. A simple definition of norm-referenced tests is offered by Merrill (1971), " . . . measurement which shows relative achievement of an individual when compared with other individuals [p. 328]." Glaser and Klaus (1971) agree in stating that, " . . . norm-referenced measures convey information about the capability of an individual compared with the performance of other individuals along an underlying skill continuum [p. 332]." Such measures tell us that one individual is more or less proficient than another, but they do not tell us how proficient either of them is with respect to the job or task involved.

Norm-referenced measures of achievement in education are often used to grade on the curve. Glaser and Klaus (1971) suggest that, "perhaps the prevalence of this method of grading owes its existence to the difficulty encountered in attempting to specifically itemize the criterion

behaviors being aimed for in the instruction [pp. 340-341]." Based on his experience with ESCOE, the investigator agrees with the authors that specifying criterion measures can be an expensive and time-consuming process and particularly difficult if attempted by each teacher. That is why the study recommends that selected specialists should construct the major part of objectives and test item banks for use by teachers across schools and across states.

Norm-referenced tests have distinct and valuable uses in the educational system such as testing aptitudes, interest, personality, and achievement. Standardized tests can be particularly useful in counseling and selecting individuals for placement in educational programs and/or jobs. In order to succeed in any particular learning situation, the individual must demonstrate certain types of abilities or behaviors. If a test is developed to measure with accuracy the abilities necessary for success in a particular discipline, then the test becomes a useful tool to predict success in that discipline and also it serves in helping the individual to select a program of study within his ability, interest, or whatever the test measures.

However, indiscriminate use of standardized test data can be harmful, as Glaser (1971) points out, "Prevailing norms necessarily assume prevailing learning conditions; however, new learning environments can change the norms. Recent trends in research and development recommend adjusting the learning environment to pre-instructional behavior capabilities and then to study the maturational limitations of the individual [p. 26]."

Criterion-referenced tests. Two fundamental differences distinguish

norm-referenced from criterion-referenced tests. One of the differences involves the manner in which the test items are derived, and the other difference is evident in the way that the test scores are reported and interpreted. First, the criterion-referenced test item is always derived from a specific behavioral objective and directly measures that objective; while the norm-referenced item is usually drawn from the broad goals or content of a subject. Second, the criterion-referenced test score indicates the student's ability to complete successfully the specific performances in the test; while the norm-referenced test score indicates how well the examinee faired on the test in comparison to others who took the same test.

Glaser and Nitko (1971) define a criterion-referenced test as, " . . . one that is deliberately constructed so as to yield measurements that are directly interpretable in terms of specified performance standards [p. 653]." Criterion-referenced testing is not concerned with ranking individuals on a continuum. Rather, the focus is on the proficiency exhibited by an individual or a group of learners on the test item, i.e. did the examinee(s) complete the item(s) successfully? Individualized learning relies on criterion-referenced testing to assess the individual's mastery of skills and knowledge at short intervals throughout the learning process. In this reference, criterion-referenced measurement is also called mastery testing.

Hambleton and Novick (1972) agree that criterion-referenced tests must emerge from specific behavioral statements, "A common thread running through the various approaches to criterion-referenced tests is that the definition of a well-specified content domain and the development of procedures for generating appropriate samples of test items are important [pp.3-4]."

Mager (1962) concurs with both of the fundamental characteristics of criterion-referenced measurement discussed above, i.e. that test items must be derived from specific objectives and that the criterion-referenced test score should match the student's performance against the predetermined criterion. In Mager's words, "The criterion exam is constructed solely from the course objectives. The object is to determine how well the student's performance at the end of instruction coincides with performance called for in the objectives. . . . the concern is not with comparing students against each other, but with a comparison of each student against a predetermined criterion [p. 52]."

Domain-referenced testing. Recently, a new theory for constructing criterion-referenced tests has appeared. The theory is called domain-referenced testing and is presented from various perspectives in the June 1974 issue of Educational Technology. In the issue, Hively (1974) describes the goal of domain-referenced testing, " . . . to create an extensive pool of items that represents, in miniature, the basic characteristics of some important part of the original universe of knowledge. . . . construct the pool in such a way that a student who has learned to respond correctly to its items could generalize easily to the field [p. 6]." Hively describes a technique for generating domains, " . . . ask what parts of an item can be changed to create other items that test the same ability. The permissible replacements for the variable elements are then listed, . . . enabling the test maker or even a computer to generate this set of related items [p. 8]." The author's strategy for generating related items by changing variable elements in the original item is similar to the method for synthesizing behavioral objectives which was developed

by ESCOE and described in Chapter IV of this study.

Another author (Baker, 1974) distinguishes between criterion-referenced and domain-referenced testing, "Rather than measuring a single point [criterion-referenced item or objective] within the vast universe of knowledge, . . . domains for teaching and testing represent an attempt to find a reasonable compromise between vagueness and over-precision [p.11]." Thus, Baker believes that domain-referenced theory represents a necessary compromise between the vagueness of norm-referenced measurement and the excessive precision of criterion-referenced testing.

Uses of Criterion-Referenced Measurement

Evaluation and decision making in education have traditionally dealt with such matters as the number of books that have been purchased, the number of children in the program, the achievement level of the sixth grade, and the percentage of students who went on to higher education. There is seldom any mention of how well students performed on the program objectives for the year or how much it costs to increase the reading level of the slow learner. Evaluation must also focus on the not-so-easily-measured achievements of the educational system, such as determining which instructional techniques and materials are most effective with different students and in different learning environments.

If the purpose of education is to foster beneficial change in the individual, the intention of any educational program should be to have the individual emerge from the program with knowledge, skills and attitudes which were not present before instruction began. Decision making at all levels must promote and support the efficiency and effectiveness of instructional programs. Evaluation of student performance on

stated program objectives provides valid information for making educational decisions, and criterion-referenced testing is the technique by which the learning outcomes may be assessed. Thus, the determination of the actual characteristics of learning is the very broad and significant purpose for criterion-referenced testing.

The ESCOE project was created to develop an evaluation system for occupational education which would provide criterion-referenced data on the outcomes of local instructional programs for decision makers at the state and local agency levels. Supplementing the analysis of ESCOE's experience, this section presents the ideas of notable authors on the uses of criterion-referenced data.

State department uses. As long as the local school districts receive financial assistance from state and federal governments, they should expect that with the funds there will be some regulatory provisions. Traditionally the funding agencies have specified: (1) basic curricular content such as English language, U.S. History, and Physical Education; (2) categorical expenditures for programs such as special education and vocational education; and (3) follow-up information such as the numbers of students in college, in jobs for which trained, and out of work. However, the recent trend toward educational accountability holds important implications for the determination of the efficiency and effectiveness of educational programs. State and federal agencies are now seeking specific information pertaining to the effect that their funds are having on the outcomes of the instructional programs for which the funds were earmarked.

Criterion-referenced evaluation can provide objective and relevant data to the funding agencies through the systematic methodology

developed by the ESCOE project and others. The state department becomes an active decision maker whose specific goals are articulated and integrated into a total evaluation design which serves the needs of the local school district as well as the state and federal agencies.

Criterion-referenced evaluation data can provide the state department with a profile of a funded program, such as vocational education, which would indicate: (1) the number and types of programs operating in the state; (2) the curricula content in the programs in terms of local goals and specific objectives; (3) the instructional methodology being used; and (4) the learning outcomes in terms of student performance on locally selected objectives.

State department assessment programs, because of the magnitude of the task, should not be concerned with testing every student who is enrolled in a particular program. ESCOE's plan for statewide evaluation was to utilize the technique of sampling, whereby a broad sample of test content and student population may provide reasonably accurate and useful estimates of the characteristics of the total evaluation population. Thorndike (1971) agrees stating, "If the tasks are assigned to students in some random manner so that each task is attempted by a random subsample of examinees, it is possible to estimate item parameters and from them, the parameters of total scores based on groups of items [p. 10]."

Local school uses. If improvement of instructional environments is to be both relevant and valid then the instructional/learning environment must be organized in a way which demands a clear definition of purpose, a logical planning of learning experiences, and a determination of the effectiveness of the total effort. Mager (1967) describes guidelines

for the systematic development of instruction as involving, " . . . detailed specifications of the desired result (in the form of a course graduate); development of an instrument by which success can be measured; development of procedures, lessons, and materials designed to achieve the specified result; and steps to insure the continual improvement of course effectiveness [p. 1]."

Mager's guidelines are evident in contemporary instructional models which individualize the learning process. Some of the contemporary instructional models using criterion-referenced measures were described by Hull (1973):

1. Program for Learning in Accordance with Needs (PLAN)
2. Individually Prescribed Instruction (IPI)
3. Individualized Mathematics System (IMS)
4. Individually Guided Education (IGE)

All such learning designs provide systematic procedures for conducting instructional programs. Basic components common to such learning systems are: (1) specific objectives sequenced from simple to complex; (2) criterion-referenced testing; (3) analysis of test data; and (4) immediate feedback of test information to students and teachers.

Comprehensive Achievement Monitoring (CAM) (Allen and Gorth, 1971) offers computer programs for processing evaluation data in a general educational environment. CAM is an evaluation model which is designed to assist in making decisions about instruction, learning, and curriculum. CAM uses criterion-referenced testing in a longitudinal (periodic) testing of group and individual achievement, with each test item directly related to a specific behavioral objective. Testing of

program objectives every two or three weeks allows CAM to analyze student progress in terms of achievement on pretests, immediate posttests, and long-term retention. Thus diagnosis of student performance, according to the empirical evaluation data which criterion-referenced testing provides, becomes the basis for relevant decision making on the part of the instructor, the student, and all others who are interested in the educational program. CAM produces decision-making information on such concerns as: reteaching objectives or units; omitting or adding instruction and/or objectives; altering instructional methods and materials; altering the sequence of course objectives; grouping learners according to needs.

The use of behavioral objectives and criterion-referenced testing has been the backbone of the performance-contracting surge of the last few years. Despite strong resistance from organized teachers' groups, performance contracting is not going to fade away. Although the United States Office of Economic Opportunity (National School Public Relations Association, 1972) concluded recently that performance contracting " . . . is no more successful than traditional classroom methods in improving the reading and math skills of disadvantaged children," school administrators around the country will continue to support experimentation with this method of managing the instructional process.

Criterion-referenced testing can be particularly useful in short-term training programs. The military services have been successful as pioneers in developing and using systematic training programs. Short-term training programs such as those offered by Manpower Training (MPTA) and other federal, state and local agencies are now being designed in terms of instructional systems concepts. Evaluations of such programs

in the past have been almost exclusively in terms of percentage of trainees which "completed" the program, and completion usually meant that the trainee did not drop out.

Behavioral objectives and criterion-referenced testing also may be used to support a data system more useful for the purpose of grading learners than the traditional norm-referenced (A to F) system. The traditional grading system can be extremely misleading. It purports to compare a student to his peers in subject mastery. The varying abilities and aptitudes necessary for mastering the multitude of objectives in the subject preclude the validity of comparing one student to 150 other students over any period of time. A much more useful and valid method of expressing student achievement in any subject would be a record system, which becomes a dossier for each learner, and shows the objectives for the program, the objectives which the learner attempted, and the objectives successfully completed.

The shortcomings of norm-referenced grading methodology are elaborated further by Anderson (1971) whose research indicates that, "Ratings of on-the-job performance of . . . teacher college graduates by their superintendents or principals correlated only .12 with high school grades and .19 with college grade-point average [p. 277]." Yet despite their low predictive validity, employers continue to use grade referents as their criteria for selecting prospective employees. How much more useful if the employer could look at the candidate's dossier and search for indications of successful performances in those activities and aptitudes which have been determined to be accurate indicators of success on the job. The essential features of such a report card are suggested by Millman (1970), " . . . a listing of objectives (most likely,

abbreviated descriptions of tasks), space to indicate if proficiency has been demonstrated, and a checking system which identifies objectives achieved since the previous report [p. 227]."

The various uses of criterion-referenced measurement as discussed by the authors in this section support the recommendations of this study to continue the development and use of criterion-referenced test instruments. The next section presents literature which relates to the test development strategies devised in the ESCOE project.

Constructing Criterion-Referenced Tests

The motive behind ESCOE's test development effort was to experiment in designing various strategies for measuring the achievement of vocational students on behavioral objectives which were predominately psychomotor in nature. The intent was to provide data through testing which would assist in making decisions in relation to shop or laboratory learning situations. The majority of literature on test construction deals with pencil-and-paper tests aimed at determining theoretical knowledge rather than hands-on kinds of skills.

One extensive document on performance testing was developed by Boyd and Shimberg (1971, pp. 3-24) as a guide for test makers. The authors advise that the more general job description must be broken down into specific performance objectives for each task, specifying precisely what the examinee is to do and the conditions under which he is to perform. They suggest four phases for a test construction plan. First, a description, through analysis, of the job which the test will measure. Second, a specification of performance objectives including equipment, materials, and procedures. The third phase is to select an evaluation

or grading strategy. The final phase is the preparation of the documents.

The four test strategies developed by ESCOE were based on the idea of direct relationship between objective and test item, a premise held, generally, by experts in the field of test design. Gorth and Hambleton (1972) concur that, "If the content-domain is carefully specified, test items written to measure accomplishment of the objectives should also be carefully specified and closely associated with the objectives [p. 8]."

The derivation of test items from specific objectives is implied in the second step of guidelines offered by Gorth and Swaminathan (1972) for constructing criterion-referenced tests:

1. Define the purpose of the test.
2. Select the objectives to be tested.
3. Prioritize the objectives.
4. Specify the amount of time for test administration.
5. Review the test questions selected.
6. Develop the test format and scoring key.

Precision and specificity in writing test items facilitates the ease of scoring the test and increases the objectivity of the scoring process. Therefore care must be taken to clearly identify all the materials and equipment which will be available (or denied) to the examinee. This should include instructions, specifications, blueprints, machines, tools, stock, manuals, models, parts, etc. If a <u>particular</u> piece of equipment or material (different styles or manufacturers) is significant, then it is critical to identify the specific type or brand being assessed. If the specificity of equipment or material is incidental, or if knowledge

thereof is considered prerequisite behavior, then a reference to the generic classification of the object would be sufficient. For example, if the objective is to "bevel the edge of a plastic laminate, using a router," then the type of router would be identified, if at all, only in terms of the "type" of routers which are used in that kind of work. Specificity of brand-name equipment would have a derogatory effect on the validity of the test item if the student was asked to use a router whose appearance and operating parts were strange to him.

Care must be taken, also, to limit each test item to only one statement of performance. One item to measure one skill or specific knowledge must be the rule. A comprehensive objective which has several skills could be measured by combining test items to measure each specific behavior which is implied within the terminal objective. These items could be combined into one test form, but the specific behaviors must still be assessed in terms of each specific performance element.

A student should not be asked to perform complex skills such as the forming of steel parts on lathes and milling machines without first learning to interpret the instructions and drawings which indicate the shape and size of the object. Therefore, proficiency in reading blueprints should be evaluated in terms of that skill only, prior to being incorporated as a prerequisite behavior in subsequent, more comprehensive objectives, and would not need to be re-evaluated each time it appears in other objectives throughout the testing program. It might be desirable to build into the test a check item that will determine early in the test that the student actually has mastered the prerequisite skills needed to perform on the test at hand.

Considerations for test construction. Because of the constraints inherent in test administration, one cannot proceed directly from specification of objectives to test item writing. Issues such as the following must be considered before item writing can proceed:

What purpose(s) will the test serve?
Will we measure each task?
Will the evaluation be objective or subjective?
How will the test be scored?
Will the test be standardized?
Where and under what conditions will the test be administered?

Sampling procedures. Ideally, if time and money allowed, we would determine the examinee's proficiency on each task within the job domain by writing and administering an item for each objective. Glaser and Klaus (1971) state that, "The greater the degree to which the test requires performance representative of the defined universe, the greater is its content validity [p. 340]." However, usually it is not possible to test each objective because of the great range of situations and conditions found in relatively complex behaviors. We must then resort to "sampling" procedures which are used to select the content of the test which reflects the domain from which the sample was selected. The selection of representative objectives for a domain, however, has certain hazards which are referred to as sampling errors. Glaser and Klaus (1971, p. 341) warn us of some of the shortcomings of sampling. The first is the undue inclusion of test content selected because of ease of measurement--i.e., items which were chosen principally because of their simplicity of preparation, presentation, or scoring. Second is the error in sampling which occurs when the test instrument is derived from the content of the training course or developed from course materials, rather than from the (actual) objectives of training. Third is the error that results

from sampling a universe of behaviors which fails to represent the behaviors required on the job. A common example of this third error is the use of pencil-and-paper tests to determine actual task performance.

An important prerequisite, then, to writing test items is to determine the content or selected objectives for the particular test. A sample must be large enough to be representative of the subject or job domain if the test is to yield high content validity. If the test attempts to measure comprehensive or global proficiency in a job rather than skills on individual component tasks, then the sampling technique becomes more critical and more susceptible to error influence.

Process/Product testing. Another significant consideration before converting objectives to items is determining to what degree the test will measure product and process. Instructors' opinions vary greatly on the weight assigned to each in the instructional program. However, all instructors would agree that adherence to safety procedures is critical in any job task which involves dangerous machinery, tools, and materials. Thus, it would seem mandatory that at least processes such as safety procedures would have to be specified and evaluated. The importance of assessing product and/or process often is determined at the objective-writing phase. However, it is emphasized here because the significance of process is often overlooked when defining program objectives but comes to mind when envisioning the test situation.

ESCOE's four performance tests focused mostly on product measurement, although there were minor implications for process measurement in the Auto Mechanics and Woodworking tests. The issue is treated in Chapter IV of this study.

Test scoring. The consideration of objective versus subjective scoring is extremely important in criterion-referenced testing. In performance testing, the product is usually tangible and its quality should be determined as objectively as possible. However, even when evaluating performance-type tasks, there is some degree of subjectivity. Boyd and Shimberg (1971, pp. 26-27) refer to a study wherein four instructors assessed the quality of thirty "samplers," which were machined by students in a machinist course. Using appropriate instruments (probably micrometers and/or vernier calipers), the judges' ratings intercorrelated from .11 to .55. Then by using fixed, taper gauges and caliper guages, the ratings correlated .93 on one set of samplers and .96 on another set. Thus, the more objective the scoring the higher the reliability potential. Even when assessing process variables such as safety procedures or procedural steps, the subjectivity should be minimized by defining only the essential elements of the process and by specifying very clearly the manner in which these elements are to be observed. If process evaluation is the intent of the test, or at least a critical segment therein, then reliable methods of observation must be developed. One such technique which has entered the scene recently is the use of video-tape. The test performance is filmed, and later more than one observer can view and review the tape at their convenience.

There were two strategies proposed in the ESCOE test development effort which were aimed at providing objectivity in scoring criterion-referenced, product-oriented tests. The Machine Shop test consultants recommended a technique for the central scoring of test products which would utilize fixed gauges, either numbered or color coded and which would disguise the correct response (dimension) by providing several

gauges but not identifying the correct size. The scorer would try the various gauges and record the number or color of the one that fit. The technique tried in the Auto Mechanics test used color coding in conjunction with photography. Various parts of an auto test-chassis or other automotive mock-ups were painted in a color-coded scheme. The examinee performs the appropriate repairs, according to instructions and using color-coded parts. When the repairs are finished, Polaroid color photos were taken and used for later scoring and to provide a permanent record of the test result.

Objectivity in rating tests is one of the concerns which influence item writers, while another is the method of grading the performance. Usually, behavioral objectives specify a minimum attainment level for successful completion of the task, such as--four out of five words must be spelled correctly. Emrick (1971) holds, "For each of these skills, mastery will be a binary (all or none) variable. Thus, for an educational objective to be mastered, all component skills must be mastered. Further, the degree of level of mastery of the objective will be determined by the proportion of number of these component skills which are mastered [p. 322]." However, in grading the smoothness of a piece of wood after sanding, the pass/fail method seems to be inadequate even if a matching sample were provided, because the texture and grain will vary somewhat even with the same kind of wood. There seems to be a need for alternative methods of grading criterion-referenced test items. Probably a three- or four-point scale would offer some flexibility for grading certain types of items. Being able to determine levels of proficiency might be helpful in diagnosing a student's abilities in order to plan for subsequent learning activities beyond the minimum course requirements.

Validity in Criterion-Referenced Testing

In general, the validity of a test is its ability to measure what it purports to measure. For performance testing, according to Fitzpatrick and Morrison (1971), " . . . validity is the degree of correspondence between performance on the test and ability to perform the criterion activity. It is often assumed that the perfectly valid test is the one that has complete fidelity and comprehensiveness [pp. 239-240]." The authors add that the fidelity of a test, i.e. its degree of realism, ranges from total artificiality to the actual, real-life situation. Thus, a critical concern for writers of criterion-referenced test items is to create items that are direct measures of the performance as stated in the objective which is to be tested. Popham and Husek (1969) state that, "If the objectives are substantially different, the items measuring them should be considered as different tests, not a single all-encompassing measure [p. 5]."

Pencil-and-paper tests are valid instruments for determining knowledge of job theory, but they are poor indicators of actual performance on predominately psychomotor skills in many situations. Glaser and Klaus (1971) hold that "Correlation between tests of job knowledge and actual job performance is apparently related to the amount of perception and motor-practice required for skilled performance, and to the extent to which verbal-practice has accompanied instruction in the motor task [p. 352]." Hill, Buckley, and Older (1969) report that their pencil-and-paper test which included sections on job information, trouble shooting, and tool knowledge, correlated .63 with ratings on proficiency in a job sample involving representative tasks carried out with actual equipment.

On the other hand, in a study by Johnson (1971) which correlates psychomotor skill proficiency with job knowledge, he concludes that, "since 3,407 out of 3,836 correlations were below the .5 level--that theoretical tests alone are invalid predictors of performance of a psychomotor skill [p. 44]."

The shortage of time and financial resources precluded a validation study on the four test packages developed by ESCOE. A recommendation of the study encourages future research for validating criterion-referenced performance tests.

Importance of clarity in test construction. Care must be exercised, also, to present the test in a form that is easily understood by the examinee. A test which purports to measure achievement of skills and knowledge in a particular occupational program might actually, because of its verbal directions, be a valid indicator only of the examinee's weakness in reading comprehension. If the test in no way intends to assess reading skills, then the written material should be kept simple and short. Instructions to the examinee should be presented via as many different media (senses) as is feasible. The test writer should maintain an awareness of this problem and might build check items into the test format for assessing the examinee's ability to comprehend the instructions.

The importance of writing skills is emphasized by Menzel (1970), "The linguistic theory not only provides the user of the testing theory with explicit definitions of the various types of questions he can ask the student concerning the instruction materials; it also provides the user of the testing theory with explicit rules--for deriving the various

types of questions [p. 94]." Faulty usage in verbal expression can create ambiguity to the extent that the item or test becomes highly invalid. Semantic ambiguities arise from the fact that most words have more than one meaning. Menzel offers as an example, "Harry wore a light suit." Does one know that the suit was light in weight or light in color? Some other examples of structural ambiguity offered by Menzel [p. 95] are:

a. Mary saw the boy walking to the railroad station.
b. The police stopped drinking at midnight.
c. John knows a taller man than Bill.

Focus of test construction. If a criterion-referenced test is being constructed for a particular use, then before writing test items one must consider issues such as those discussed above; i.e. use of the test and constraints of the testing situation. If, however, one is generating items to develop a bank of objective-related criterion measures, then the writer may proceed without the constraints imposed by a particular test situation. The item writer's primary concern is always to maintain a high degree of content validity. To insure the content validity of a criterion-referenced item, the item writer must be careful to maintain the intent as specified in the performance objective. A judgment on the degree of content validity could be made by a panel of subject experts working in unison. Such a team effort would be useful, also, in validating the sampling effort in constructing tests for particular situations.

Availability of Criterion-Referenced Test Items

The four occupational performance tests developed by ESCOE are

available from the sources listed in Appendix F of this study. For additional criterion-referenced test item banks, the reader is referred to the following sources:

The CO-OP
School of Education
University of Massachusetts
Amherst, MA 01002

Instructional Objectives Exchange
P. O. Box 24095
Los Angeles, CA 90024

CHAPTER III

PROCEDURES OF THE STUDY

Too often research and development projects have no formal evaluative component, or at best have a superficial, subjective interpretation of the extent to which the project achieved its purpose. Unfortunately, ESCOE had no plan to assess the two-year endeavor either during its operation or at its termination. The investigator initiated this study to evaluate the outcomes of the project systematically, in such a manner that the results would be useful to those who participated in the project and to others in occupational education who are planning similar or related activities.

Phases of the study. The study had two separate but related phases. The first phase determined, partially, the extent to which ESCOE achieved its goals by examining the documentary evidence of the project. The strategy for this phase was to identify ESCOE's goals and the project outcomes (activities and products). An analysis was conducted of the documentary evidence in terms of how well the activities and products represented an achievement of the goals which were pursued by ESCOE. The second phase of the study, a questionnaire survey, provided additional, supporting evidence to ascertain what factors affected the achievement, or non-achievement of the goals. The questionnaire gathered information and opinions from the persons who participated in ESCOE.

In this chapter, the agencies and persons involved in the study are described, first according to the total project setting and second in terms of the response to the evaluation survey. The nature of the study is defined, also, according to the instrumentation and procedures used in collecting and analyzing pertinent data.

Setting of the Study

To enhance a broad perspective of the setting in which ESCOE operated, a description is presented of all the agencies and persons who were involved during the two-year project. Although the main focus of the ESCOE research was on activities at the local school level, the involvement of other persons and agencies was a critical factor in the total project effort.

Local Educational Agencies (LEAs)

The schools participating in ESCOE were typical of institutions throughout the nation which offer programs in occupational education. Represented were vocational high schools, comprehensive high schools, post-secondary technical institutes, and community colleges. LEAs participating in ESCOE served large cities such as New York City, Buffalo, and Boston; smaller cities such as Binghamton, New York and Northampton, Massachusetts; and suburban districts such as Nassau County, New York and the Greater Lawrence Regional Vocational School District in Massachusetts.

In all, 30 LEAs participated in the ESCOE project. Involvement came about either through selection by the Research Coordinating Units (RCU) in the New York and Massachusetts state departments of education,

or by an expressed interest on the part of the LEA to participate in the kind of research with which ESCOE was concerned.

All of the schools participating in the project were located in either Massachusetts or New York State. Also, the ESCOE schools, with only one exception, may be described as being secondary (high school) and/or post-secondary (community college or technical institute). While most of the LEAs offered either secondary grade-level programs or post secondary; three of the Massachusetts schools offered programs in both of these grade-level categories (see Table 1). The only exception to the secondary/post-secondary nature of the project was the inclusion of a regional opportunity center, herein classified as "other," which offered short-term occupational training courses for school dropouts. Occupational training in that LEA was comparable to typical vocational high school courses. However, related, verbally-oriented subjects were often at a basic, functional level usually found below the secondary level. The primary goal in the opportunity center was to develop job skills for immediate employment, rather than to offer longer-term diploma programs.

Table 1 shows the distribution of LEAs to be nearly equal according to state affiliation, with New York having only two LEAs more than Massachusetts. However, a noticeable difference between the states appears in terms of the grade levels taught in the ESCOE LEAs. In Massachusetts, 11 out of the 14 LEAs, (79%) were either wholly or partly secondary; while in New York only 6 out of 16 (38%) taught high school level courses. These figures show that participation in Massachusetts occurred primarily in high schools, while in New York the emphasis was in the community colleges.

TABLE 1

Distribution of LEAs According to State and Grade Level

State	Grade Level								Row Total	
	Secondary		Post-Secondary		Both		Other			
	No.	%	No.	%	No.	%	No.	%	No.	%
Massachusetts	8	57	3	25	3	100	0	0	14	47
New York	6	43	9	75	0	0	1	100	16	53
Column Total	14	100	12	100	3	100	1	100	30	100

Student and teacher characteristics. There were differences between the secondary and post-secondary schools according to particular characteristics of the teacher and student populations. The ages of the students in the secondary schools ranged, usually, from 14 years to 18 years; while the enrollees in the post-secondary LEAs were predominantly in their early twenties, but there was no upper age limit. Another difference between secondary and post-secondary students comes from the attendance laws requiring minors to attend school until age 16. Thus, approximately half (14 years to 16 years) of the secondary school enrollments are mandatory while there is no legal requirement for post-secondary school attendance.

The qualifications for teachers of occupational subjects varies between secondary and post-secondary LEAs. In Massachusetts and New York, although teachers at both levels are required to have adequate

work experience in their trade, the secondary teachers of occupational subjects are not required to have more than a high school diploma, while the post-secondary instructors are required to have a college degree.

In addition to the occupational work experience required for teachers of occupational subjects as stated above, there are similarities worth noting between students in the secondary and post-secondary LEAs. One similarity is that the primary goal of most students at both levels is training for immediate employment, rather than preparation for higher education. Related to the vocational nature of that primary goal, the secondary and post-secondary students have two other less prominent similarities: (1) generally, they score low on standardized tests of scholastic aptitude; and (2) generally, they come from low socioeconomic backgrounds.

LEA Personnel

Functionally, there were two types of local school persons involved with ESCOE--the administrator and the facilitator. Each had specific responsibilities and had signified a commitment to support fully the pursuit of ESCOE's goals as expressed in the project documentation.

Administrators. Such titles as superintendent, director, principal, supervisor, and coordinator identified the LEA administrators. In any case, he or she was the highest administrative authority with which the project communicated directly. The function of the administrators was to support the activities of all personnel employed in their LEAs who were involved in ESCOE activities. Such persons included local facilitators, instructors, and clerks who were engaged in preparing and

submitting behavioral objectives and related materials. Specifically, each administrator was to encourage his instructional staff to describe all the occupational curricula of the school in behavioral terms.

Although the function of the administrators was more passive than that of the facilitators, they attended particular ESCOE conferences and received periodic memoranda from ESCOE. Approximately the same number of administrators participated from each state, as may be seen in Table 2.

Facilitators. Each LEA provided one or more of its staff to serve as the liaison between itself and the ESCOE project, namely, the facilitator. The function of the facilitators was to develop knowledge and skills in behavioral objectives technology through ESCOE's training conferences, and then to assist instructors in their schools in such tasks as writing objectives and analyzing curricular content. Most facilitators also had teaching assignments, although the group included some full-time supervisors and administrators.

Table 2 shows that the distribution of facilitators was closely balanced between the two member states. Considering that 30 LEAs participated in the project, it may be noted that, on the average, each LEA provided just over one administrator, and slightly less than two facilitators.

ESCOE Staff

The ESCOE project employed five professional staff members whose responsibility was to plan and carry out activities in pursuit of ESCOE's goals. The investigator for this study served as the director of the

ESCOE project, and came from a background of instruction and administration in vocational and adult education. His responsibilities encompassed the supervision of all project activities, including training conferences, LEA workshops, in-house planning and development, and coordination with the New York and Massachusetts state educational agencies.

TABLE 2

Number of LEA Participants
by State and Group

State	Group				Row Total	
	Facilitators		Administrators			
	No.	%	No.	%	No.	%
Massachusetts	27	49	16	49	43	49
New York	28	51	17	52	45	51
Column Total	55	100	33	100	88	100

Two of the staff persons had the major responsibility for coordination of the field services which entailed, primarily, conducting workshops and supportive services in the LEAs. Each coordinator had extensive background in industry and in teaching vocational education, and both had been LEA facilitators during the first six months of the project. The two coordinators came to ESCOE on leaves-of-absence from their school systems; one from a vocational/technical high school in Massachusetts, and the other from a New York State community college.

The other two staff members were involved mainly with the in-

house work of ESCOE, i.e. preparing training materials and reporting forms, editing LEA objectives, and carrying on the flow of data between ESCOE and other agencies such as LEAs, state departments, and computer centers. The two in-house members were research assistants, and were employed part-time while conducting graduate studies at the University of Massachusetts.

Test Design Consultants

A contract was negotiated for carrying out the responsibility of developing tests which would measure directly the achievement of objectives as submitted by participating LEAs. The test construction task was assigned to a faculty member at the University of Massachusetts who, in collaboration with three colleagues, proceeded to design strategies for and construct four different types of tests for measuring behaviors as specified in occupational education objectives.

Research Coordinating Units (RCU)

The ESCOE research project was conceived in and financed through the Research Coordinating Units of the State Divisions of Occupational Education in Massachusetts and New York. Although operating as a research project within the University of Massachusetts, ESCOE was in continuous communication with the two state departments, receiving guidance and assistance as well as financial support. Actively involved with the project were three state department persons: the director of the Massachusetts RCU and the director and his assistant at the New York State RCU.

The Documentary Phase

Soon after the investigator chose to conduct a study to analyze the success of the ESCOE project, it became obvious that the initial task for collecting data was to examine carefully the project's documents in a search for indications of ESCOE's goals. Often in developmental research, original goals are modified or even replaced by different goals in the light of newly acquired feedback. Thus, it was necessary to clarify and define the goals of the project as the initial phase in gathering data. The clarification search was conducted during April 1972, prior to the preparation of a survey questionnaire. Clarification of precise goals was the initial evaluation activity, and its importance is emphasized because all other phases of the study bear directly upon the attainment of these goals.

Identification of ESCOE's goals. Analysis of the ESCOE documents began with a search for unequivocal statements of project goals as established initially, and as later modified if such were the case. The procedure for identifying the explicit goals was to review the ESCOE Planning Document (Conroy & Cohen, 1970) wherein the concept of the project was described, and also other project documents such as memoranda to participants and ESCOE training publications. The review found explicit statements of goals and described these goals with appropriate quotations from the documents. Separate searches were carried out individually by the five members of the investigator's staff who contributed their experience on the project in furthering the tie of each goal to one or more specific quotations. The findings were then grouped by the investigator according to general relationships such as: behavioral

objectives development, training, and testing. In such a cooperative effort, the total staff, under the supervision of the investigator, contributed to identifying the explicit goals which formed the bases for ESCOE's initial activities. The participation of the five staff members focused on partially removing experimental bias in this phase of the analysis.

Implicit goals. The second stage of clarifying ESCOE's direction was a search for goals that may not have been explicated in the documents of the project. There may have been goals which either emerged during the implementation of ESCOE or were implied by statements in the Planning Document. It was felt that the analysis of such goals might add significant data to support the other findings of the study.

The procedure used to document implicit goals was to review ESCOE literature, including training materials and memoranda. Here again, to minimize experimental bias, the five ESCOE staff members participated in the search. The process involved reading the literature of the project and searching for statements or project outcomes which could not be attributed to the explicit quotations previously documented. Any data collected in this manner was to be compiled by the investigator for further analysis.

Particular attention during both stages of the documentary search was given to identifying goals aimed directly at developing products for use by local and state educational agencies. Such a focus was justified since the project consisted of a joint local and state effort in developing an evaluation system which would serve the needs of both levels and which could be utilized as a model for continued development.

Identification of project outcomes. A separate and subsequent search of the documents provided evidence of specific activities and products which served as one kind of criteria for determining the extent to which the project goals were achieved. The search for evidence of project outcomes began soon after the identification of goals, and the resulting information served two separate purposes. First, it offered documentation of goal achievement by matching the specific project outcomes to ESCOE's goals; and second, the information was useful in the preparation of items for the survey questionnaire. Under the coordination of the investigator, all members of the ESCOE staff participated in this search, again to minimize experimental bias.

The initial search for documentation of ESCOE project outcomes took place toward the end of the project. The results of the search produced information useful in constructing the survey questionnaire which was administered during the last few weeks of the project. Because some outcomes were not finalized until later, the investigator continued the search of ESCOE documents beyond the termination of the project until all project activities had ceased and the final report for the project had been completed.

The Survey Phase

The first phase of the study as described above was an analysis of documentary evidence that shed light on clarifying the ESCOE goals and whether or not the goals were achieved. This section of the chapter describes the second phase of the study which gathered information by means of a survey, to supplement the documentary analysis. The personal opinions of the participants and additional information

derived through the survey, strengthened the objectivity of the evaluation and provided a broader perspective of the issues.

For the survey phase of the study, a descriptive research method was used. Best (1970) describes this method as, " . . . conditions or relationships that exist; practices that prevail; beliefs, points-of-view, or attitudes that are held; processes that are going on; effects that are being felt; or trends that are developing [p. 116]." He adds that research is never complete until the data are organized and analyzed, and conclusions are derived.

Survey Procedures

The survey focused on collecting information and opinions from the participants, primarily in terms of the major goals that were pursued by ESCOE and the activities and products that resulted. The survey also gathered data on related, secondary issues with which the project was concerned, so that such information would be available for analysis if it were found to be relevant to the major focuses of the study. A printed questionnaire, to be submitted anonymously, was selected as the type of survey which would prove nonthreatening, thereby deriving candid replies from the participants. The importance of deriving opinions which were true indicators of the personal feelings and beliefs of the respondents was a key factor in determining the kind of survey utilized. Because of the assurance of confidentiality offered through the questionnaire medium, it was assumed that the information and opinions gathered from the respondents were accurate and were an indication of the genuine attitudes held by the group.

Survey preparation. The survey for this study followed closely the principles espoused by Bowley (1937, pp. 20-23). He stated that questions in a survey should: (1) ask for the minimum information needed for the purpose at hand; (2) be those which the informant is able to anwer; (3) require an answer of a "yes" or "no," or a simple number, or something equally definite and precise; (4) be such as will be answered truthfully and with bias; and (5) be not unnecessarily inquisitorial.

Using the goals, activities and products of ESCOE established in the documentary analysis, the five members of the ESCOE staff, working independently but under the supervision of the investigator, prepared questions to elicit information and opinions from the participants of the project. The questions were related to specific issues of the project such as behavioral objectives and testing, and were designed to gather data which would: (1) help in analyzing the success of the project; and (2) provide useful information for future research and development. The direct relationship of each question to a specific goal or outcome provided a degree of content validity to the survey instrument.

The specific questions generated by the ESCOE staff effort were grouped by the investigator according to their cohesiveness, and following an analysis of the perspectives represented in the collection of questions, the investigator wrote tentative items for the survey. In a further attempt to remove personal bias and increase the content validity of the survey, the items were checked by the five ESCOE staff members prior to the final preparation of the items by the investigator. This check verified that the items on the questionnaire were directly related to the goals and outcomes of the project.

The Questionnaire

The survey items were aimed at gathering these basic types of necessary data. First, questions were designed to obtain descriptions of the participants and of the institutions they represented. Response to this type of question provided descriptions of the individuals, such as the type of position they held in the LEA and whether or not they wrote objectives for ESCOE. Also, data were gathered on such LEA characteristics as: grade levels of the LEAs, types of communities served by the LEAs, and other useful descriptive information.

Second, questions were designed to collect information pertaining to the process which engaged the participants in the activities of the project. An illustration of this type of item is one which asked the test design consultants if they had searched for existing performance-type tests; and if they had, whether or not the information was utilized in developing tests for ESCOE.

Third, questions were designed to collect opinions toward ESCOE's goal achievement and toward the future use of project outcomes. Such a question asked the participants' opinions about ESCOE's attention to developing objectives in the affective domain.

The questionnaire format. The survey instrument was comprised of five separate but similar questionnaires for the five participant groups; i.e. LEA facilitators, LEA administrators, ESCOE staff, state RCUs, and test design consultants. The survey questions are presented in Appendix B on a chart which specifies each question and indicates the groups on whose survey form each question appeared. The chart lists 80 questions which appeared variously across the five questionnaires.

Twenty of the questions were asked across all five participant groups; eight questions were asked across four of the groups; only two questions were posed to three separate groups; eight of the questions appeared on two of the survey forms; and there were 42 specialized questions which appeared singly on one or another of the five questionnaires. The greatest number of questions, 57, appeared on the facilitators' questionnaire, while the survey forms for the other four groups contained 35 questions each.

Each questionnaire was tailored to yield distinctive information and opinions from each of the five survey groups. For example, only the test consultants were asked technical questions pertaining to the design of test instruments; and only the facilitators were asked if the teachers in the participating LEAs were satisfied with the ESCOE Block and Unit taxonomies.

A question was asked of all groups whenever it was felt that each group had sufficient knowledge of the issue, and when the broad perspective obtained would provide a comprehensive analysis of the data. Such a question was posed to all groups when they were asked if they believed that a need existed to train persons in occupational education to become specialists in evaluation.

The survey items were predominately selection-type questions such as yes-no, ranking and Likert-type scales, thereby restricting the answers to check marks or numerical ranks. However, some open-ended questions were included so that the respondents could express their personal thoughts freely and more completely.

Administration of the questionnaire. The questionnaire was ad-

ministered at the final conference of ESCOE in May 1972, and was mailed or handed personally to all members of the five survey groups (LEA facilitators, LEA administrators, ESCOE staff, RCU directors, and test design consultants) who did not complete the questionnaire at the conference. A follow-up mailing was made during June 1972 in conjunction with the dissemination of a programmed, instructional textbook which had been developed by ESCOE for use in training instructors to write behavioral objectives.

Analysis and Interpretation

Using the documentary evidence of project outcomes, along with information collected by the survey, an analysis was conducted that concentrated on determining the extent to which ESCOE achieved its goals. The analysis was conducted to produce information which would indicate to the participants the results of their endeavors and to provide useful data to decision-makers in occupational education who are involved with the development of systematic instruction and evaluation. The analysis was carried out subsequent to the termination of ESCOE. By that time the project activities about which data were collected had ceased, and the responses to the survey had been tabulated.

Analysis of documentary evidence. The initial step in the analysis process focused on the documentary evidence of goals and resulting activities and products. Relationships between ESCOE's goals and outcomes were identified, and became the link for establishing evidence of goal achievement. In this manner, the success of ESCOE was viewed in light of appropriate criteria, i.e. the goals which were pursued and

the activities and products which ensued. The specific goals were grouped within broad goal categories. For example, all goals involving the development of behavioral objectives were grouped in one category, while any goals specifying an aspect of developing and using tests were placed in another category. This format allowed for separate analysis of specific goals, while cumulatively it provided a perspective of the broad category in which the specific goals were grouped.

Analysis of survey data. The survey questionnaire provided additional supporting evidence of ESCOE's goal achievement, including the opinions of persons involved in the project. The analysis of responses to the survey items focused on detecting relationships between variables and hypothesizing trends which indicated the achievement or nonachievement of project goals.

The survey data were summarized descriptively, with each response analyzed in terms of variation among the participating states, the respondent groups, and the school settings. Joint frequency distributions of the survey variables were examined in tabular form in order to analyze their relationships in light of the goal statements. When appropriate, the variables were grouped to reveal consistencies in the data and to strengthen hypotheses which emerged.

A simple kind of descriptive analysis was chosen for the study because the data were not collected according to the strict procedures of experimental design. Demands made by inferential statistical methods were defined by Glass and Stanley (1970). The authors point to four assumptions which must be made by the researcher who utilizes inferential statistical methodology:

1. The scores are sampled at random
2. from normal populations
3. with equal variances,
4. and the different samples are independent.

Neither the persons nor the schools participating in ESCOE were selected randomly from the larger populations of occupational education in New York and Massachusetts. Therefore, it was determined that there was no justification for the use of inferential statistics such as analysis of variance or covariance. Consequently, the two-way frequency distribution was used for analysis because it represented a method which would accurately portray the data collected for the study.

Computerizing the survey data. Because of the large amount of data produced by the five survey questionnaires (80 questions and 154 variables), it was determined to use computer capability to effect speedy and accurate calculations of the numerous data, and to present the results in a manner which would facilitate the descriptive analysis conducted in the study.

The computer program selected was the Statistical Package for the Social Sciences - SPSS (Nie, Bent, & Hull, 1970), which was an integrated system of computer programs for analyzing data produced in social science projects such as ESCOE. The authors designed SPSS to " . . . provide the social scientist with a unified and comprehensive package enabling him to perform many different types of data analysis in a simple and convenient manner [p. 1]."

A computer card format (see Appendix D) was designed to assist a careful, thorough processing of the survey data. The first step in preparing the data for computer analysis was to give all survey questions,

or in particular cases the answers to the questions, unique code names. The code names were referred to as the variable names, because the questions and/or answers represented measurements in the survey which contained the characteristic of variance among the survey groups and respondents. The variable names were no longer than eight characters in order to conform to SPSS requirements, and each name was composed so that its spelling suggested the nature of the variable being named. For example the variable name STUENROL was given to survey question number five which asked the LEA-based respondents to indicate the student enrollment in vocational programs in their LEAs. The importance of the variable name is emphasized because all processing of the data was accomplished by reference to the variable names which were permanently stored in a SPSS system file.

The second step in computerizing the survey data consisted of describing each variable with a label. Each label represented a contracted (up to 40 characters) version of the associated survey question/answer. The variable labels were stored permanently in the SPSS file and appeared next to the variables on the frequency table printouts to aid in understanding the data depicted.

The third step in preparing the survey data was to assign numeric values to the answers for each survey variable. In this manner, the values and associated value labels were stored permanently in the file and appeared on the printed output to help document the data presented in the crosstabulated frequency distributions. An example of the procedure for assigning value labels was the coding of answers to survey question number 16 which asked whether or not writing behavioral objectives required special talent: 1 = No; 2 = Yes; 3 = Don't know.

The fourth step in processing the data was recording the data on computer cards. For each of the five questionnaires, each variable was assigned a computer card column and each answer (response) was coded according to the value system described above. The value code numbers on each questionnaire were transferred to computer card coding forms, and from these forms the values were punched on to computer cards. The keypunching was verified by machine process and a further verification was conducted by visually checking the computer card data against the original questionnaires.

Because the arrangement of the survey questions varied across the five questionnaires, the data were rearranged so that responses to the same questions by the five groups were coded in the same computer card columns. The rearrangement was carried out through the capability of the SPSS program. To verify the accuracy of the transformation, two checks were conducted. The first check verified the data between the original computer cards and the rearranged deck. The second check verified that the data appearing on the computer printout (cross tabulation frequency distributions), which was run from the rearranged cards, checked with the same data on the original questionnaires. This check was done by sampling variables in various locations on the printout and by sampling questions from each of the five questionnaires. Upon establishing the accuracy of the data on the computer printout, the data were considered ready for analysis.

Limitations of the Study

Any research has inherent limitations; consequently, the shortcomings of this study were defined.

A first limitation was that the requirements for utilizing inferential statistics were not met because of the absence of randomization; therefore, any inferences implied in this study should not be interpreted as statistical in nature. It is left to the discretion of the reader to determine the extent that he wishes to generalize to schools other than those described in this study.

A second limitation resulted from the ex post facto nature of the data gathering. The absence of the opinions of the participants prior to ESCOE involvement precluded inferring that resulting knowledge and attitudes were caused by the project experience alone.

A third limitation resulted from the intent to respect anonymity in collecting survey data. To solicit truthful and accurate information, the identity of the respondents and their LEAs was deliberately omitted. Thus, the opportunity was lost to correlate the nature of participating individuals and schools with the quantitative and qualitative characteristics of particular outputs.

A fourth limitation was a result of the personal involvement of the investigator in the ESCOE project. Such a closeness to the project represented a strength to the study in terms of the data collected through personal observation; however, the involvement of the investigator in ESCOE also created an experimental bias factor which must be recognized as a weakness in the study.

A fifth limitation was caused by the nature of the family-type involvement of the staff members in ESCOE and the bias which would be inherent in their assistance in gathering the data for the study.

A sixth limitation was that no resources were provided for a follow-up study of how the participants viewed the same issues at a later time, and to what extent they have used the knowledge or the products which they gained from the ESCOE experience.

Summary of the Procedures

The study had two distinct but associated phases. The first phase was an enumeration of ESCOE's goal achievement by means of examining documentary evidence of the project's outcomes, i.e. the activities and products of ESCOE. The second phase, through a survey questionnaire, provided additional supporting information and opinions gathered from those who were involved in the activities of the project.

The project setting was typical of agencies which conduct occupational education programs. Mainly, the participating schools were secondary schools and post-secondary technical institutes or community colleges. Representative schools, characteristically, were large and small, and served individual towns as well as regional school districts. In all cases, however, the participating schools were located in New York or Massachusetts, the two states from which funding was received.

Documentary and survey data were gathered that were relevant to the selected goals of the ESCOE project. Analysis of the evidence was conducted with the focus on the achievement of ESCOE's goals. A critical factor in interpreting the data was the insight of the investigator, who relied on personal observations taken while serving as director of the project.

Caution was expressed toward misuse of the resulting information. The study was descriptive in nature, so inferences made beyond the project setting are at the risk of the user.

C H A P T E R I V

FINDINGS

The meanings of the data collected during the documentary search and the opinion survey were drawn out by the analyses reported in this chapter. These data were the basis for identifying relationships among ESCOE's goals and the resulting outcomes of the project.

The descriptions of goals and project outcomes were presented concisely but without hindering a clear definition of the important issues. For further information, the reader should write to either of the following:

New York State Department of Education
Bureau of Occupational Education Research
Albany, New York 12224

Massachusetts Department of Education
Division of Occupational Education
Research Coordinating Unit
Boston, Massachusetts 02111

ESCOE's Goals

Often the verbiage in the Planning Document tended to obscure a clear distinction between several important goals of the ESCOE project. However, four major goal categories were identified as the primary operational components of the project: (1) development of behavioral objectives; (2) development of testing strategies; (3) training of participants; and (4) maintenance of local autonomy. These categories were used to organize specific goal statements in a logical plan for analysis.

The fourth goal category, the intent to maintain local autonomy, was a distinct and well-documented aim to assure the independence of local school boards from state department control in making decisions about local goals and management of instruction. Such a goal was evident because of numerous remarks scattered throughout the documents guaranteeing that the states would not impose standards on the local schools. The autonomy issue was closely related to the behavioral objectives and testing issues; however, it was determined that a separate analysis would yield a more cohesive interpretation of the concern for local independence without losing the nature of its association to other goals.

Table 3 presents an outline of ESCOE's goals as defined for the study and their related outcomes, i.e. the activities and products of the project. The first two major goals (Behavioral Objectives Development and Test Development) were subdivided into more specific goals and a separate analysis was conducted for each specific goal. In all cases, however, the same format was followed throughout the analysis: First, the evidence of the existence of each ESCOE goal was presented by quotations from ESCOE literature; second, the activities and products of ESCOE were described in terms of their relationship to the goal; third, information and opinions from the survey were integrated with the outcomes, and the resulting relationships became the bases upon which interpretations were formed.

In addition to the goals identified in Table 3 an analysis was conducted of ESCOE's budget allocations.

TABLE 3

ESCOE's Goals and Related Project Outcomes

ESCOE's Goals	Project Outcomes (Activities and Products)
1.0 Behavioral Objectives Development	
1.1 Develop Behavioral Objectives for Occupational Education	1.1 Approximately 12,000 behavioral objectives
1.2 Develop a Classification Scheme for Computer Storage	1.2 All objectives classified, coded and stored in computer bank
1.3 Process, Publish and Share Objectives	1.3 All objectives available to LEAs in Massachusetts and New York
1.4 Synthesize Behavioral Objectives	1.4 Over 700 synthesized objectives
2.0 Test Development	
2.1 Develop Criterion-Referenced Tests for Occupational Objectives	2.1 Four test strategies developed and four tests printed
2.2 Administer, Analyze and Feedback Test Data	2.2 None
3.0 Train LEA Staffs to Develop ESCOE Components	3.0 Over 1,000 LEA personnel trained in behavioral objectives procedures
4.0 Maintain Local Autonomy	4.0 Autonomy in writing and selecting objectives maintained absolutely

Response to the Survey

In Table 4, data are displayed showing the distribution of questionnaires to the 100 persons in the five separate groups of participation in ESCOE; the overall return of the questionnaires was 71%. Apart from the follow-up mailing to all participants who did not complete a questionnaire at the final ESCOE conference, a personal follow-up in terms of nonrespondents was impossible because of the anonymous nature of the survey. However, subsequent to the termination of the project, the investigator was contacted by two participants who did not return their forms. They stated that their failure to return the survey form was not due to distrust, but rather that their involvement in ESCOE was minimal due to staff apathy in their school; they believed that they did not have sufficient knowledge of the project and the survey issues to offer adequate responses. Perhaps the same was true in other LEAs whose involvement was also minimal, thus accounting for the fact that all 29 participants who did not return a form were from LEA groups.

Noteworthy, however, is the fact that 83% (59 out of 71) of the respondents were based in participating LEAs. This datum emphasizes the local orientation of the activities and products of the project.

The Survey Respondents

The first item on the survey questionnaire (see Appendix B) identified the respondents in four of the survey groups (ESCOE staff, LEA facilitators, LEA administrators, RCU directors) according to their educational employment either in New York State or Massachusetts. This item was omitted from the questionnaire of the test consultants because their

jobs were not tied directly to either an LEA or a state education agency (SEA) in the context of ESCOE's operation. The response to the first survey item (see Table 5) shows little difference in the distribution of respondents between the two states, either categorically or in total.

TABLE 4

Questionnaire Returns by Participant Groups

Group	Number Distributed	Returns		
		No.	% of Group	% of Total Distributed
ESCOE Staff	5	5	100	5
LEA Facilitators	55	36	65	36
LEA Administrators	33	23	70	23
Research Coordinating Units	3	3	100	3
Test Design Consultants	4	4	100	4
Column Total	100	71	---	71

Survey item number six asked the LEA facilitators to indicate the staff positions which they held in their LEAs. Of the 36 responses to the question, 72% were either full-time instructors or they combined instructional duties with department head tasks. The statistic emphasizes the basic, instructor-level focus of ESCOE activities. The remaining 28% of the facilitators had primary responsibilities in administration, supervision or counseling.

TABLE 5

Distribution of Respondents by Groups and States

State	Group								Row Total	
	ESCOE Staff		LEA Facilitators		LEA Administrators		RCU			
	No.	%	No.	%	No.	%	No.	%	No.	%
New York	1	20	17	47	11	48	2	67	31	46
Massachusetts	4	80	19	53	12	52	1	33	36	54
Column Total	5	100	36	100	23	100	3	100	67	100

An additional description of the facilitators was collected by survey item number seven which showed that the 36 respondents had subject matter expertise in 21 different occupational programs. The subject areas reported in the item spanned the gamut, including subjects in business education, trade and industry, technical, health, and liberal arts. Except for Auto Mechanics and Electronics which had four facilitators each, the other 19 subject areas were represented by no more than three facilitators in each area.

The descriptive data displayed in Tables 6 through 9 depict the LEA respondent categories in relation to important characteristics of the schools which the respondents represented. The response to survey item number two (see Table 6) indicated that the greatest number of LEA-based respondents represented secondary vocational schools. The one respondent reporting in the "other" category represents a regional opportunity center

described in setting of the study in Chapter III. A comparison of the distribution of LEA respondents according to LEA grade levels (as seen in Table 6) with the distribution of the grade levels of LEAs who participated in ESCOE (see Table 1) shows the two distributions to be proportionate. Therefore, it appears that the ESCOE participants who did not return their questionnaires were equally divided among the different types of LEAs as described by grade level.

TABLE 6

Distribution of Facilitators and Administrators by LEA Grade Level

	Group				Row Total	
	LEA Facilitators		LEA Administrators			
LEA Grade Level	No.	%	No.	%	No.	%
Secondary	19	53	8	35	27	46
Post-Secondary	9	25	10	44	19	32
Secondary and Post-Secondary	7	19	5	22	12	20
Other	1	3	0	0	1	2
Column Total	36	100	23	100	59	100

Survey question number three provided data for describing another characteristic of the participating LEAs, i.e. the number of communities served by the schools. Table 7 shows that two-thirds of the 54 respondents represented LEAs which served more than one city or town. Such a

distribution was expected because the trend in recent years has been to regionalize vocational/technical education. Thus, the community college and the suburban vocational high school, by design, serve more than one town.

TABLE 7

Distribution of Facilitators and Administrators by Type of Community Served by LEA

	Group				Row Total	
	LEA Facilitators		LEA Administrators			
Type of Community	No.	%	No.	%	No.	%
One City or Town	10	32	7	30	17	32
More Than One	21	68	15	65	36	67
Other	0	0	1	4	1	2
Column Total	31	100	23	100	54	100

The types of curricular offerings in the participating LEAs fell into two broad classifications: (1) schools where curricula are primarily for occupational preparation; and (2) schools with diverse curricula such as general, college preparatory and vocational. Fifty-five ESCOE participants responded to survey item number four which asked the LEA-based participants to identify which of the two classifications best described the curricula in their schools. The figures in Table 8 show that nearly two-thirds of the respondents were employed in schools that offered

primarily vocational education.

TABLE 8

Number of LEA Respondents
by Type of LEA Curricula

Type of Curricula	Group				Row Total	
	LEA Facilitators		LEA Administrators			
	No.	%	No.	%	No.	%
Primarily Occupational Curricula	25	76	10	46	35	64
Diverse Curricula	8	24	12	55	20	36
Column Total	33	100	22	100	55	100

To describe the participating schools further, the facilitators and local administrators were asked in survey item number five to choose one of three categories indicating the student enrollment in their LEAs. Of the 58 respondents only 10 percent represented LEAs whose enrollment was 500 or less; while the distribution between medium-sized schools (501-1000) and large schools (over 1000) was similar (see Table 9).

The next section of this chapter begins analyzing the data collected for the study. Each of the four major goals is analyzed separately beginning with the goal to develop behavioral objectives. For the two major goals which were subdivided into specific subgoals (Behavioral Objectives Development goal and Test Development goal), a separate analysis was conducted for each subgoal. The procedures for analyzing the data were

consistent for each goal. First, evidence of the existence of the goal being analyzed was presented by quotations from ESCOE documents which clearly established the goal as an important factor of the project. Second, evidence of associated project outcomes was presented. These were the activities and products that resulted from pursuing the particular goal. In some cases, where clarification was necessary, examples were given of ESCOE products. For the most part, however, the reader should refer to the Final Report (1972) of ESCOE for greater details.

TABLE 9

Number of LEA Respondents
by LEA Enrollment

	Group				Row Total	
	LEA Facilitators		LEA Administrators			
LEA Enrollment	No.	%	No.	%	No.	%
500 or less	2	6	4	17	6	10
501 - 1000	16	46	9	39	25	43
Over 1000	17	49	10	44	27	47
Column Total	35	100	23	100	58	100

The third step of the analysis procedure was to analyze the survey data for the goal. Analyses were conducted according to relationships between the opinions expressed on the survey and the information on project outcomes. Interpretations formed on these analyses became the bases for

the conclusions and recommendations of the study.

Behavioral Objectives Development Goals

The initial focus of the analysis for the study was on the development of behavioral objectives, a concept which permeated ESCOE's total activities and consumed more time and effort than any other goal category. The first goal considered in the behavioral objectives goal category concerned developing behavioral objectives for occupational programs in the participating LEAs. Four explicit statements from the original ESCOE Planning Document (Conroy & Cohen, 1970) established the development of behavioral objectives as a primary goal.

Goal 1.1: Develop Behavioral Objectives for Occupational Education

A. "The Massachusetts and New York Evaluation Service Center for Occupational Education is comprised of three operational components: Component 1 - Behavioral Objective Development Component; . . . [p. 10]."

B. "A major purpose of the Behavioral Objective Development Component (BODC) is to assist LEAs in the task of describing occupational education curricula by behavioral objectives, i.e. precise and measurable statements which describe what students should be able to do as a result of instructional programs. During the initial phase of the project, pilot schools will be expected to develop most behavioral objectives for their occupational education programs [p. 11]."

C. "The evaluation facilitators then become resource people in each of the participating schools, assisting with the writing of behavioral objectives in each of the occupational programs [p. 17]."

D. "by June 30, 1971--. . . All occupational education programs in each school described by behavioral objectives [p. 37]."

Succinctly, the primary goal of the project was to assist participating LEAs during the first year of ESCOE in describing their occupational

curricula in terms of precise, measurable objectives. Three vocational/technical teachers in each LEA were to serve as facilitators and assist the instructional staff in the task of writing behavioral objectives; the LEA was to provide necessary staff time to carry out the planned writing activities.

Activities and Products of Goal 1.1

The development of behavioral objectives for occupational education began with the first facilitators' conference in November 1970 when the LEA facilitators joined the ESCOE staff in the mutual planning of strategies, procedures and schedules. Cooperative activities for developing objectives continued throughout the project up to and beyond June 30, 1972, the date on which ESCOE terminated. As the project drew to a close, the input of objectives increased greatly and continued for several weeks beyond the official closing day. Objectives submitted after June 30, 1972 were forwarded to a New York ESCOE project, which represented New York State's effort to continue the work begun by the original two-state project.

During its two-year term, ESCOE produced over 12,000 behavioral objectives, which was the most significant quantitative outcome of the project. This bank of objectives represented most of the occupational curricular offerings in the 27 ESCOE LEAs in Massachusetts and New York (see Table 10) and each objective in the bank represented a discrete segment of a course-of-study in one of the participating schools.

The number of objectives written for each subject area varied greatly as shown in Table 10: from six objectives in Small Engine Repair to 1085 objectives in Machine Shop Training. The contribution of objectives

by participating LEAs also varied considerably; one of the LEAs submitted 2557 objectives, while another contributed only 12 (see Table 11).

TABLE 10

Index and Tally of Behavioral Objectives
in the New York ESCOE Data Bank
as of March 1973

Subject	USDE Code	Number of Objectives
Accounting & Computing Occupations	14.0100	261
Accounting Principles	03.0101	482
Agricultural Electrification	01.0307	20
Agricultural Mechanics Skills	01.0305	9
Agricultural Power & Machinery	01.0301	15
Agricultural Products	01.0400	17
Agricultural Resources	01.0600	8
Air Conditioning, Cooling	17.0101	36
Air Conditioning, Heating	17.0102	21
Air Conditioning, Other	17.0199	23
Algebra, 1st Year	11.0301	59
American Government	15.1101	31
American Literature	05.0301	7
Automotive Industries, Other	17.0399	59
Automotive Mechanics	17.0302	748
Automotive Technology	16.0104	17
Bank Operations	14.0105	129
Body & Fender	17.0301	175
Calculus, 1st Year	11.0601	19
Carpentry	17.1001	404
Child Development	09.0102	86
Civil Technology	16.0106	59
Clerical Occupations, Filing, Office Machines, General	14.0300	120
Clerk Typists	14.0901	276
Commercial Art Occupations, Other	17.0799	135
Commercial Photography Occupations, Other	17.0999	57
Communications	17.1501	11
Composition, Literary, Other	05.0499	6
Cook/Chef	17.2902	416
Cosmetology	17.2602	148
Data Processing, Scientific	16.0117	8
Data Processing Systems, Business Occupations	14.0200	42

TABLE 10--Continued

Subject	USDE Code	Number of Objectives
Data Processing Systems, Peripheral Equipment Operators	14.0202	13
Dental Assisting	07.0101	10
Drafting Occupations	17.1300	334
Electrical Appliances	17.0201	81
Electrical Occupations, Other	17.1499	131
Electrical Technology	16.0107	109
Electrician, Industrial	17.1401	400
Electricity	17.1002	318
Electronic Technology	16.0108	163
Electronics, Industrial	17.1502	721
Electronics Occupations, Other	17.1599	149
Engineering Related Technology, Other	16.0199	18
English, Grammar	05.0202	39
English, Language Arts	05.0000	17
English, Literature	05.0304	7
English, Literature by Source, Other	05.0335	6
Food Distribution	04.0600	15
Food, Occupations (Quantity), Other	17.2999	38
Food Products	01.0401	10
Foods & Nutrition	09.0107	9
Forestry, Production, Processing, Marketing & Service	01.0700	11
Foundry	17.2301	29
Geometry, Plane & Solid	11.1203	27
Graphic Arts, Other	17.1999	163
Gymnastics, Stunts & Tumbling	08.0308	22
Health Occupations, Other	07.9900	55
History, United States	15.0805	105
History, World	15.0807	106
Homemaking or Home Economics	09.0101	71
Humanities	05.0369	10
Library Assistant	20.0405	32
Lithography, Photography & Platemaking	17.1903	59
Machine Shop	17.2302	1085
Machine Tool Operation	17.2303	27
Mathematics, General, 1st Year	11,1101	74
Mathematics, General, 2nd Year	11.1102	16
Mathematics, General, 3rd Year	11.1103	30
Mathematics, General, 4th Year	11.1104	30
Mechanical Technology	16.0113	650
Medical Assisting (in Physician's Office)	07.0904	38
Medical Laboratory Assisting	07.0203	22

TABLE 10--Continued

Subject	USDE Code	Number of Objectives
Medical Laboratory Technology, Other	07.0299	18
Merchandise, General	04.0800	111
Metallurgical Technology	16.0114	42
Metal Working Occupations, Other	17.2399	74
Millwork & Cabinet Making	17.3601	339
Modern History	15.0803	36
Nursing Assistance (Aide)	07.0303	46
Nursing, LPN	07.0302	1131
Nursing, RN (Associates Degree)	07.0301	443
Painting & Decorating	17.1005	13
Physics	13.0302	28
Plumbing & Pipefitting	17.1007	141
Printing Press Occupations	17.1902	86
Product Design	17.0703	67
Reading	05.0101	16
Rhetoric & Public Address	05.0501	15
Science, General	13.0100	39
Science, Physical (Including General Physical Science)	13.0300	40
Sheet Metal	17.2305	337
Small Engine Repair (Internal Combustion)	17.3100	6
Soil	01.0603	12
Sports, Individual & Dual	08.0306	19
Sports, Team	08.0309	18
Surgical Technician (Operating Room Technician)	07.0305	111
Textile Production & Fabrication, Other	17.3399	20
Trade & Industrial Occupations, Other	17.9900	9
Trade, Retail	04.2000	9
Typesetting, Composition, Make-up	17.1901	53
Upholstering	17.3500	27
Welding & Cutting	17.2306	345
Woodworking Occupations, Other	17.3699	152
Writing	05.0402	28
Total		12,989

TABLE 11

Behavioral Objectives in Computer Bank
at the New York ESCOE, July 1973

Source		Grade Level						Row Total	
		Secondary		Post-Secondary		Other[a]			
State	LEA No.	No.	%	No.	%	No.	%	No.	%
Mass.	1	2,132	15	423	3	2	0	2,557	18
	2	973	7	513	4	232	2	1,718	12
	3	1,223	9	0	0	1	0	1,224	9
	4	667	5	0	0	1	0	678	5
	5	421	3	0	0	1	0	422[b]	3
	6	404	2	0	0	1	0	405[b]	3
	7	238	2	123	1	1	0	362	3
	8	317	2	0	0	0	0	317	2
	9	265	2	0	0	1	0	266	2
	10	176	1	0	0	5	0	181[b]	1
	11	148	1	0	0	0	0	148	1
	12	80	1	0	0	0	0	80[b]	1
	13	26	0	0	0	0	0	26	0
	14	0	0	25	0	0	0	25	0
Mass. Column Total		7,080	51	1,084	8	245	2	8,409	60

Source: New York ESCOE, Hudson Valley Community College, Troy, N.Y.

Note: All cell percentages express the ratio to the grand total.

[a]The "Other" column quantifies objectives in remedial, pre-entry, and short-term training programs.

[b]Objectives from MIFS project, rewritten by the ESCOE staff and entered into the bank.

TABLE 11--Continued

Source		Grade Level						Row Total	
		Secondary		Post-Secondary		Other			
State	LEA No.	No.	%	No.	%	No.	%	No.	%
N.Y.	15	976	7	0	0	0	0	976	7
	16	0	0	774	6	0	0	774	6
	17	0	0	704	5	0	0	704	5
	18	0	0	0	0	618	4	628	4
	19	371	3	130	1	0	0	501	4
	20	444	3	20	0	0	0	463	3
	21	0	0	442	3	0	0	443	3
	22	393	3	0	0	0	0	393	3
	23	177	1	0	0	0	0	177	1
	24	0	0	163	1	0	0	163	1
	25	0	0	142	1	0	0	142	1
	26	0	0	125	1	0	0	125	1
	27	12	0	0	0	0	0	12	0
N.Y. Column Total		2,373	17	2,500	18	618	4	5,491	40
Combined Total		9,453	68	3,584	26	863	6	13,900	100

Analysis of Data on Goal 1.1

The objectives bank. The production of over 12,000 objectives in a large number of subjects represents a reasonable quantity of objectives for a project which had many other goals and activities. However, the contribution of the individual LEAs fell considerably short of the expectations expressed in the Planning Document, i.e. that all programs in each school would be described by behavioral objectives. The only school which submitted over 2000 objectives may have approached the ESCOE goal as stated; but since only three LEAs submitted more than 1000 objectives, the input from individual schools did not fulfill the goal for the total development of local objectives. The documentary evidence of such a shortcoming was supported by the facilitators' responses to survey question number 54 in which 65% of the 35 facilitators estimated that objectives were written for no more than 25% of the occupational programs in their schools (see Table 12). A difference between New York and Massachusetts responses on the same question also appears in Table 12, with 83% of the New York facilitators reporting the program input from their schools in the 0% and 25% categories, as opposed to 50% of the Massachusetts facilitators reporting in the same low categories. Such a difference corresponds to the indication of a greater effort in Massachusetts as shown in Table 11, i.e. Massachusetts LEAs produced 60% of the objectives in the bank.

Question 52 asked if ESCOE had achieved its goals in training LEA staffs and developing behavioral objectives; of the 67 respondents 70% were in agreement, while only 15% disagreed as may be noted in Table 13. Thus, in a general sense there was a positive feeling of accomplishment

toward the outcomes of the project pertaining to the development of behavioral objectives as well as to the training activities.

TABLE 12

Two-State Distribution of Facilitators According to the Approximate Percentage of Their LEAs' Occupational Programs Written in Behavioral Objectives

	State				Row Total	
	New York		Mass.			
Percent of Programs	No.	%	No.	%	No.	%
0%	4	24	1	6	5	14
25%	10	59	8	44	18	51
50%	2	12	1	6	3	9
75%	0	0	4	22	4	11
100%	1	6	4	22	5	14
Column Total	17	100	18	100	35	100

LEA support. Explicit statements in ESCOE documents clearly established the commitment of participating LEAs to provide facilitators and teachers adequate time to support the activities of the project. Survey questions provided data: (1) to determine whether or not the LEAs actually provided adequate staff time; and (2) to analyze the relationship between such a provision and the output of the participating schools.

When asked in question 61 to rank the reasons why their LEAs did not produce more objectives, 39% of the facilitators responded that the

TABLE 13

Perceptions of Participants Regarding ESCOE's Achievement of Goals in Training and Developing Objectives

	Group								Row Total	
	ESCOE Staff		Facilitators		Administrators		RCU			
Response	No.	%	No.	%	No.	%	No.	%	No.	%
Strongly Agree	1	20	5	14	1	4	2	67	9	13
Agree	4	80	22	61	11	48	1	33	38	57
Neutral	0	0	3	8	7	30	0	0	10	15
Disagree	0	0	4	11	4	17	0	0	8	12
Strongly Disagree	0	0	2	6	0	0	0	0	2	3
Column Total	5	100	36	100	23	100	3	100	67	100

lack of time was the primary reason, 21% attributed the lack of administrative support as being the most significant handicap, and only 9% of the 36 respondents indicated that the lack of faculty cooperation ranked highest. Additionally, the results of questions 64 and 65 showed that 80% of the facilitators volunteered to participate in the project and 65% of the teachers who wrote objectives volunteered to do so. Thus, although the school faculties volunteered to write objectives and were viewed as being cooperative, they were not provided adequate freedom from their instructional duties to carry out the ESCOE job. There was general agreement between the participating states that a need existed for greater administrative support and more staff time to write objectives.

The response to survey question number 62 provided additional evidence that lack of time was a factor contributing to the disappointing output of objectives in certain schools. This question asked facilitators if released time was provided for instructors and facilitators who wrote objectives. Of the 36 respondents only 19% reported that teachers in their schools who wrote objectives received free time, and only 39% of the facilitators themselves were given released time for the same task. In response to this item, however, a difference appeared between the two states which corresponds to the fact that Massachusetts outproduced New York in submitting objectives by 60% to 40%. The figures in Table 14 indicate that released time to write objectives was provided to Massachusetts teachers to a greater extent than New York teachers. Only 6% of the New York facilitators reported that teachers in their schools received released time, whereas 32% of the facilitators from Massachusetts responded positively to the question. Therefore, although the provision of time for writing objectives was inadequate as perceived by facilitators from

both states, the lesser support in the New York schools seemed related to the smaller quantity of objectives produced by that state.

TABLE 14

Two-State Distribution of Facilitators According to Released Time Received by Their Teachers for Writing Objectives

Released Time Received	State				Row Total	
	New York		Mass.			
	No.	%	No.	%	No.	%
No	16	94	13	68	29	81
Yes	1	6	6	32	7	19
Column Total	17	100	19	100	36	100

A further indication of the association between the production of objectives in the LEAs (Question 54) and the provision of released time during the school day for the writers (Question 62) is shown in Table 15. As to percentage of LEA programs written, a noticeable difference appears between facilitators whose schools provided released time and facilitators whose schools did not. Responding in the 0% and 25% categories of production were 72% of the facilitators whose LEAs did not free teachers as compared to 43% whose LEAs provided the time. On the other end of the production scale, 43% of the facilitators whose schools provided released time for the teachers estimated the program coverage in their schools to be in the 100% category; while only 7% of the facilitators from schools

who did not free teachers responded in the same high-production category. These data support further the indication that the greater production of objectives occurred in schools which released teachers from regular duties.

TABLE 15

Association of Facilitator Responses According to: (1) Percentage of Programs in Their LEAs for Which Objectives Were Written (Question 54); (2) Whether or not the Teachers Received Released Time for the Task (Question 62)

Percent of Programs Written	Released Time				Row Total	
	Yes		No			
	No.	%	No.	%	No.	%
0%	0	0	5	17	5	14
25%	3	43	16	55	19	53
50%	1	14	2	7	3	8
75%	0	0	4	14	4	11
100%	3	43	2	7	5	14
Column Total	7	100	29	100	36	100

Quality of ESCOE objectives. An in-depth assessment of the quality of ESCOE objectives was beyond the scope of this study. However, certain data in the study pointed to problems concerning the manner in which the objectives were stated, so a brief analysis of the information was conducted. An attempt at editing the technical content of the objectives by the ESCOE staff proved a failure for two reasons: (1) lack of subject

knowledge by editors toward many different occupational disciplines; (2) the great quantity of objectives received.

A limited amount of editing which was performed dealt almost exclusively with written expression as distinguished from technical content. Generally, the technical content was adequate but the instructors often had problems in expressing their ideas correctly. The major problems for the writers of objectives were locating the information in the proper section of the objective and describing the exact criteria by which the performance would be judged. The criteria were often nebulous or stated in general terms, such as: (1) "80%"; (2) "all answers correct"; and (3) "evaluation based on neatness and speed." Because criterions such as "80%" and "all answers correct" mean different things to different people, the inherent vagueness in such standards made those objectives useless in terms of communication among teachers, between teacher and student, and for preparation of related test materials.

In response to survey question number 68, the facilitators indicated a problem in generating objectives that were "meaningfully and completely stated." The responses showed that 85% of the facilitators believed the objectives could have been improved. In the same question, the facilitators were asked to identify ways in which the development of better objectives could have been achieved. Their written answers, in order of frequency, centered on the following suggestions: (1) more free time; (2) more training workshops; (3) financial compensation; and (4) better administrative support. Such a response by the facilitators placed additional emphasis on the issue of inadequate administrative support in many LEAs.

Despite the problems with written expression and lack of time, all

of the objectives in the ESCOE bank were written by instructors and facilitators in the participating LEAs. Each objective in the bank conformed to the three-part format espoused by Mager (1962) and Esbensen (1971) and adopted by the ESCOE project: (1) expression of the behavior to be performed by the learner; (2) description of the conditions under which the performance takes place; and (3) specification of the standard, or the extent to which the objective must be completed correctly. Although some writers experienced difficulty in expressing their ideas, the ESCOE bank of objectives represents an excellent source of behavioral statements for occupational instruction.

Goal 1.2: Develop a Classification Scheme for Computer Storage

A second goal of the behavioral objectives category was to produce a computer-assisted classification system to facilitate access to the objectives bank and subsequently to include other related materials such as test items and learning resources. Three statements in the Planning Document established the need for a classification system:

A. "Some of this activity will involve developing models . . . from several hierarchical levels of more than one of the so-called learning domains, i.e. cognitive, affective, and psychomotor [p. 11]."

B. "The MIFS determined that many behavioral objectives for occupational education could be displayed within a matrix, since most occupational courses can be described as a summation of divisions as a function of units [p. 12]."

C. "By June 30, 1971 . . . Computer-assisted coding, filing, and retrieval system developed and operationalized [p. 37]."

Activities and Products of Goal 1.2

Although some minor revisions were made during the second year of

the project, the classification and coding system was in operation by June 1971, the end of the first year. By that time, objectives from the local schools were being received, coded and entered into the computer bank. In addition to the textual content of the objective, the computer system accommodated classification information for each objective in terms of:

1. I.D. Number--discrete identifier for each objective
2. Field of Study--USOE classification categories for educational disciplines such as: trade and industry; health occupations; and technical education
3. Block and Units--scheme for identification of instructional content
4. Level--the grade level at which the objective was normally taught
5. Number Taking--approximate number of students instructed on the objective during the year it was submitted to ESCOE
6. Psychomotor Classification--significance of muscular activity in the performance of the objective
7. Cognitive Classification--placing the objective in one of four levels of mental knowledge
8. Related-subject Discipline--identification of other subjects which are related to the performance of the objective

In addition, each objective was coded according to the state and school from which it came and the year during which it was received by ESCOE. The identities of the instructor who wrote the objective and the facilitator who supervised were kept on file with the original objective form but were not entered into the computer system.

Initially, the computer system for ESCOE data storage was designed by ESCOE staff and developed at the University of Massachusetts Graduate Research Center on a Control Data Corporation computer system. By the

termination of the project, the ESCOE data system had been transferred to the two participating state departments where it was operational on a Honeywell system in Massachusetts and on a Burroughs system in New York State.

A reporting form was developed by ESCOE for writing and classifying objectives and served several purposes: (1) it provided a simple, practical (evolved from facilitators' suggestions) format by which LEAs could submit and retrieve objectives from a central location; (2) it provided a source of locally written objectives from which to prepare test materials; and (3) it provided the state departments with a model for a computer-based information system with data such as program identification, subject content, and number of students participating in local programs.

Analysis of Data on Goal 1.2

Blocks and Units. The block and unit breakdowns in various occupational programs were developed by ESCOE from input acquired from participating LEAs. Teachers from the schools forwarded course outlines to ESCOE, who in turn synthesized the outlines for each subject so that the final breakdown (classification) accommodated the peculiarities of each school program. The block and unit classification provided an index (see Appendix C)--a common language by which LEAs could share the fruits of the total project development. Block and unit lists were always open-ended so that if the existing list did not accommodate an objective as written, the writer submitted his own descriptive term and ESCOE considered the suggestion for possible modification of the existing breakdown.

Block and unit classifications were developed in 12 occupational

programs and were used for purposes other than simply indexing objectives. One participating facilitator adopted the ESCOE block and units in his subject area as a progress record chart for his students. In another participating LEA, the ESCOE classification scheme and objectives bank were used to replace an already existing behavioral objectives system.

The response to question 56 on the survey showed that 55% of the 33 facilitators responding indicated complete satisfaction with ESCOE's block and unit outlines; 36% reported only minor reservations. Question 55 asked facilitators if blocks and units were developed in occupational programs for which their LEAs wrote objectives, and 54% of the responses indicated "all" or "mostly," while 31% said "partly." However, the figures in Table 16 show that one-third of the nine post-secondary facilitators who responded to question 55 signified that no blocks and units were developed for the programs in which their LEAs wrote objectives--a noticeable difference from secondary facilitators where out of 18 respondents only 6% made the same negative reply. The apparent lower coverage of post-secondary programs in terms of blocks and units for classifying objectives may be related to the fact that only 26% of the total objectives in ESCOE's bank were submitted by instructors in LEAs which had only post-secondary programs (see Table 11). Initially, blocks and units were developed for programs with large enrollments which were common to both the secondary and post-secondary levels such as Machine Shop, Auto Mechanics, Electronics, Woodworking, and Drafting. These basic subjects represented a large majority of typical secondary vocational school subjects, but they ignored certain subjects which are common to post-secondary LEAs such as Accounting, Nursing and various types of Engineering. It is possible that the block and unit outlines provided the extra incentive

for instructors in the selected programs to write objectives according to the outlines developed by ESCOE.

TABLE 16

Secondary and Post-Secondary Facilitator Responses to the Development of Blocks and Units for Programs in Which Their LEAs Wrote Objectives

Program Coverage by Blocks & Units	LEA Grade Level						Row Total	
	Secondary		Post-Secondary		Both			
	No.	%	No.	%	No.	%	No.	%
None	1	6	3	33	1	14	5	15
Partly	7	39	3	33	0	0	10	29
Mostly	3	17	1	11	3	43	7	21
All	7	39	2	22	3	43	12	35
Column Total	18	100	9	100	7	100	34	100

USOE codes. By utilizing the standard terminology for curriculum and instruction published by the United States Office of Education (USOE), the project not only saved having to develop a method for classifying subject matter related to each objective, but also it had adopted a common, state/federal scheme which was already familiar to educators at the local level. Being able to check related mathematics and science subjects such as Geometry, Business Arithmetic, Anatomy, and Mechanics greatly simplified this task for the objective writer. An important and fundamental

use of the related-subject information was to provide instructors with prerequisite subject-matter indicators and cues toward subsequent instruction. The related-subject data were collected, also, to provide useful information for interdisciplinary curricular planning, particularly where instructors were coordinating their endeavors such as in team-teaching situations.

Related subjects. The facilitators were asked in question 58 if they considered the related-subject information useful, and of the 34 facilitators responding 74% responded affirmatively while 21% were uncertain. Question 59 asked the affirmative respondents to identify to whom such information would be most useful, and the highest rank went to teachers (40%), coordinators (32%), and students (28%). Thus, although the use of such data at the local level was, at the time of the survey, a task of the future, the facilitators' attitudes toward its usefulness in the schools were predominantly positive.

Classification by domains. An early attempt to code objectives according to comprehensive, complex classification schemes such as those of Bloom (1956) and Krathwohl, Bloom and Masia (1964) proved to be an effort too great for the fledgling project. A simpler classification scheme was developed for the learning domains which brought a more favorable response from the writers. A complex scale for classifying objectives according to physical dexterity was replaced with a simple indication of whether or not the performance as stated in the objective required significant muscular activity. Such information allowed psychomotor objectives to be retrieved separately for use in vocational shop instruction.

Developmental work in classifying occupational objectives in the

affective domain was minimal. The attitude of the participants was that ESCOE should learn to walk before attempting to run. A form was developed, however, which sought identification of ideas, objects or persons toward which occupational education seeks to establish positive attitudes. There was only token response to this form and further development was postponed.

Although the feeling was evident that classifying objectives by domains should have been delayed until the objectives bank was more fully developed and teachers were more knowledgeable, 63% of the 35 facilitators responding to question 57 agreed that taxonomies were an essential component of the project, while 20% had no opinion and 17% disagreed. The uncertainty of the facilitators toward ESCOE's work with the educational taxonomies appears in their response to question number 60 which asked if ESCOE had paid too little attention to the affective domain. Thirty-four responses showed that 41% agreed, 32% disagreed and 27% had neutral feelings.

Goal 1.3: Process, Publish and Share Behavioral Objectives

The dissemination of ESCOE products was a critical factor if the project was to have a beneficial effect across all types and levels of occupational education. If local educational agencies and state departments were to participate successfully in ESCOE's information feedback system, they had to be made aware of the information available and the manner in which their agencies could utilize such information. Several statements in the Planning Document focused on the cooperation between LEAs and states in the mutual development and sharing of strategies and

materials which might be beneficial to vocational education. Quotations from the Planning Document follow:

A. "The BODC [behavioral objective development component] will not only be concerned with assisting staffs in developing behavioral objectives, editing behavioral objectives, synthesizing and processing behavioral objectives, and publishing behavioral objectives . . . [p. 16]."

B. " . . . as the project develops and the pool of objectives expands, permitting schools to select many of their program objectives [p. 11]."

C. "For example, the entire machine shop curricula for the state can be described, schools and districts can obtain comparative and criterion-referenced information feedback, and can choose and pick these objectives which should be taught . . . [p. 25]."

Activities and Products of Goal 1.3

The initial activity for processing objectives received at ESCOE was to assign a discrete identification number to each objective and to log the I.D. numbers along with information pertaining to the occupational program represented and the LEA from which the objective was submitted. Each objective was then reviewed by the ESCOE editorial staff, a process which proved difficult as stated earlier in this chapter. If the objective appeared to be well written it was forwarded to keypunching. However, if the objective needed editing, either it was edited by the staff if the problem was simple or it was returned to the sender with appropriate notation of the problem.

Eventually all objectives received were entered into the computer bank and made available to all participating LEAs via a "Request Form" which allowed the schools to request objectives from the bank, block and unit breakdowns for various subject areas, and other ESCOE publications

such as training manuals and related materials. LEAs could have requested a computer printout of objectives submitted by their own schools or objectives from other LEAs but with the school identification obscured. By the termination of the project, access to the computer bank of objectives was available in each of the two participating states.

Analysis of Data on Goal 1.3

Objectives banking. Sixty-nine of the project participants across all survey groups responded to question 22, and the results indicated a strong approval of ESCOE's strategy for the development and maintenance of a central bank of behavioral objectives. Ninety-three percent of the respondents believed that a central source for storing and retrieving objectives should be available to both the LEAs and the state department, as long as the identity of each LEA was available only for its own purposes. However, such a bank of objectives could be made available without the aid of a computer at a much lower cost. The printing and storing of objectives could have been accomplished at far less cost and more easily with typewriters and printing presses. The eventual use of the computer for analyzing test performance data did not justify using a computer as an expensive filing case.

Sharing information. ESCOE's goal to encourage a sharing of objectives and ideas among schools and states received strong approval across all groups of survey respondents. Of the 68 participants responding to questions 48 and 49, the results were respectively, that 97% approved of sharing information about teaching methods within a state, and 93% approved of sharing across states as well.

Goal 1.4: Synthesize Behaviorial Objectives (SYNOB)

During the Massachusetts Information Feedback System (MIFS) project it was realized that for either LEAs or states to deal with thousands of individually written objectives would be an excessively time-consuming and cumbersome process. A strategy was developed by MIFS and expanded by ESCOE whereby separate but similar objectives would be combined or synthesized into a single, cohesive statement of instructional intent. Two specific statements from the Planning Document advocated the synthesis process as an important goal for ESCOE:

A. "Other development work . . . (2) a model for synthesizing a variety of behavioral objectives submitted from pilot schools [p. 12]."

B. "The second developmental task . . . relative to behavioral objectives was a process to unify or synthesize behavioral objectives from various sources [p. 14]."

Activities and Products of Goal 1.4

The synthesis technique, as employed by ESCOE, provided a compact method of dealing with the sometimes mountainous burden of individually stated instructional objectives. The computerized, synthesis prototype served several purposes. It offered a convenient, checklist display of the various tools, materials, and situations which were used in various LEAs to exhibit proficiency in performing a specific task. In such a manner instructors could view the different ways in which an objective is taught in other schools and in different situations. The synthesized objective format also allowed the state department to survey specific instructional aims throughout the state in a speedy and efficient fashion,

and according to a method that was developed by the instructors themselves. Also, the synthesized objectives provided the criteria upon which the ESCOE test development was based.

By the termination of the ESCOE project, 12 occupational programs had been synthesized and the computer bank contained over 800 synthesized objectives which represented approximately 5,000 individual behavioral objectives as submitted by the participating schools. An example of a synthesized objective in Woodworking is given below. The SYNOB was compiled from 15 individual behavioral objectives submitted from various ESCOE schools and represents the many different ways that the unit of Sawing Tools is taught in those schools

1.0 Conditions

Given stock, marking gauge, dimensions, and
- 1.11 Handsaw
- 1.12 Crosscut saw
- 1.13 Rip saw
- 1.14 Miter box

2.0 Performance

- 2.11 Crosscut
- 2.12 Rip
- 2.13 Miter

- 2.21 Ends
- 2.22 Edges

- 2.31 Remove weather checks

3.0 Extent

- 3.11 Teacher's discretion
- 3.12 Trade standards

Analysis of Data on Goal 1.4

The synthesis activities involved the mutual cooperation of the

ESCOE staff and the school-based subject experts. The initial design and materials preparation was carried out by the ESCOE staff members who subsequently trained and assisted selected instructors in participating LEAs who actually carried out the synthesis work. The instructor-synthesizers received either monetary compensation or university credit for the training they received and for the synthesized-objective project which they produced. These inducements appeared to promote a diligence in the synthesis endeavor which was not apparent in the effort to generate locally written behavioral objectives. The quality of the synthesized objectives far surpassed the quality of the behavioral objectives prepared by teachers who generally received neither extra pay nor released time from regular teaching duties.

The synthesized objectives represented a more complete picture of local instructional goals because as the synthesizers proceeded with their task, they wrote objectives to fill obvious gaps in subject content due to inadequate coverage by the individual objectives submitted by the participating schools. There were two or three synthesizers for each subject area, and to increase the objectivity of the task the synthesizers were selected from different LEAs.

The idea of local schools describing their instructional programs to the state department by selecting elements of synthesized objectives seemed not to threaten the LEA facilitators. In survey question 75, the facilitators were asked which computer printout they received from ESCOE was most useful in their LEAs. Of the 28 facilitators responding, 32% indicated that the printout of synthesized objectives was most useful. The other choices were: individual (raw) objectives and block-unit breakdowns, 25% each; block-unit matrices of raw objectives I.D. numbers in

each subject area, 11%; block-unit matrices of SYNOB I.D. numbers in each subject area, 7%.

Question 75 also provided an open-ended opportunity for the facilitators to state reasons why they found the ESCOE printouts useful. Several uses for the synthesized objectives were identified in the responses: (1) easy selection procedure for program planning and testing; (2) validate local objectives; (3) see what other schools are doing; (4) analyze course of study; (5) gives an overview of entire program; (6) helps in eliminating unnecessary wording in individual objectives.

Another indication that the synthesis concept was approved by the facilitators was their response to survey question 80 which asked them if the synthesis model was valid for an information feedback system. In response, 38% replied "yes"; 38% "yes, but with some alteration"; 15% "didn't know"; and only 9% answered "no, unless refined considerably."

Test Development Goals

Goal 2.1: Develop Tests for Occupational Objectives

The purpose of ESCOE's test development component was to develop strategies and tests for evaluating the performance of students in occupational programs based on the behavioral objectives of those same programs of study. The initial use of the testing program was to be a statewide sampling of classes of students in selected LEA programs conducted by ESCOE with the resulting information analyzed and fed back to the state department and participating schools. The purpose of the information was to improve decision making in occupational education by providing a vehicle to describe in terms of performance criteria the impact of selected program

alternatives.

Statements from the Planning Document which defined the test development goal are as follows:

A. "The purpose of the testing component (TECO) is to develop measures for behavioral objectives specified by the LEAs, to design appropriate testing format, to analyze the data generated by test administration and to report the information in a usable form to LEAs and to state departments of education on a regular basis [p. 20]."

B. " . . . the TECO will not restrict its activities to cognitive and psychomotor outcomes of occupational education, but will attempt to treat affective objectives as they occur [p. 26]."

C. "by June 30, 1972 . . . Tests keyed to objectives in coding, storing, and retrieval system [p. 38]."

D. "Also, staff members in various trade and technical area must be made available to the Evaluation Service Center on an infrequent basis to consult on test and behavioral objectives development. The highly specialized curricula in occupational education dictate this need [p. 33]."

Activities and Products of Goal 2.1

The activities for developing criterion-referenced tests for ESCOE objectives began during the summer of 1971. An agreement was negotiated with four members of the faculty in the Center for Educational Research at the University of Massachusetts who were to serve as test development consultants in designing and constructing tests for four different occupational programs. The tests were to measure the performances as defined by the synthesized objectives in the four occupational programs; the test items were to be related to objectives that were predominantly psychomotor rather than cognitive. The four test packages were to contain the following:

1. Synthesized objectives were to be prepared by ESCOE with

assistance from a selected member of the test developers to insure compatability

2. Conceptualization of test strategies to begin August 1, 1971

3. During September 1971, test consultants working with teacher-specialists would develop materials for the test kits

4. First draft of tests would be cleared by another teacher-specialist

5. Validity and reliability studies to be conducted in October and November

6. Administrative procedures would be developed by February 1972, including the training of ESCOE staff to administer the tests

7. Tests were to be finished, packaged and turned over to ESCOE by March 30, 1972

By the termination of ESCOE (June 30, 1972), tests had been developed in Auto Mechanics, Electronics, Machine Shop, and Woodworking (see ESCOE Final Report, Appendices G, H, I, and J). Each test package was printed and bound; in addition to the test items, each package contained supporting information such as measurement theory, test development procedures, administration and scoring procedures, and analyses of field test experiences. In total the four tests represented 358 separate test items: (1) Auto Mechanics - 47 items; (2) Electronics - 114 items; (3) Machine Shop - 28 items; and (4) Woodworking - 169 items. While the tests utilized four distinct strategies for developing criterion-referenced test items from behavioral objectives, each test item was coded according to the appropriate ESCOE block and unit taxonomy; and all of the tests evaluated primarily the product of the test rather than the process which was employed by the examinee.

An informal field test was made on the Woodworking test with 60 students participating in three schools, but no data were reported. It

was observed, not surprisingly, that testing smoothness was related to teacher preparation and to informing the students on the purpose of the test.

The Machine Shop test was field-tested with 38 students in three schools. Data reported in the test package included analyses of: (1) testing time across items; (2) item difficulty; and (3) test-retest reliability.

Analysis of Data on Goal 2.1

Certain aspects of the test development component were developed further than others, and some were not achieved at all. This study treated important elements of developing the ESCOE tests first by analyzing separately each of the four test packages according to the intent of the test development agreement; and second, by interpreting the survey data which collected the opinions of the project participants on the issue of testing students in occupational education.

Probably the most significant and potentially useful result of the test development endeavor was the emergence of four distinct strategies for the construction of criterion-referenced test instruments which measured psychomotor-oriented, performance-type learning objectives. Compared to norm-referenced, standardized testing, the development of criterion-referenced measurement is in its infancy; and the little research and development that has been carried out over the past few years has been predominantly in the cognitive domain. The ESCOE project focused on testing psychomotor skills for two reasons: (1) the scarcity of strategies and materials for measuring psychomotor skills and (2) the importance of skill-training in occupational education.

Woodworking test. The Woodworking test produced the greatest number of distinct test items (169) and each item represented a valid configuration of the various element-options available in the synthesized objectives. Five woodworking instructors under the direction of the test consultant combined compatible elements in each synthesized objective to form discrete performances which essentially took the form of individual behavioral objectives. Figure 1 illustrates the one-to-one relationship between the performance statement of five test objectives (items) and the corresponding elements of the synthesized objective from which they were derived. For each objective defined, a description of the final product was formulated to serve as the focus of the evaluation component of the item. Additionally, the operations involved in the performance were described; in many test items the operations sections could have been utilized as the bases for evaluating the process followed by the examinee in carrying out the performance.

A sample test item for Woodworking follows:

Objective--Sharpen a chisel, given a ground chisel, oilstone, and oil.

Final Product--Chisel to razor edge.

Evaluation--Cutting edge is razor sharp. Bevel is flat and not rounded.

Operation--Put film of oil on oilstone. Hone cutting edge to remove wire edge, until sharp.

A test item such as this may be used merely by providing the instructions and the materials listed. However, some of the Woodworking items could not be used until specific drawings or details were provided. For example, if the test item required making a rod-layout from

Synthesized Objective	Woodworking Test		
Block 01 Bench Work Unit 01 Maintenance SYNOB 173601/001	Block 01 Unit 01		
	Objective No.	Performance Stated	SYNOB Element Codes
Conditions: Given a ground 1.11 Plane Iron 1.12 Chisel 1.13 Knife 1.14 Hand Scraper 1.15 Circular Blade	1	Sharpen plane iron	2.11/1.11
	2	Sharpen a chisel	2.11/1.12
	3	Sharpen a knife	2.11/1.13
	4	Sharpen a hand scraper	2.11/1.14
Performance: 2.11 Sharpen 2.12 Joint	5	Joint a circular saw blade	2.12/1.15

Fig. 1 Comparison of Woodworking test objectives with the synthesized objective from which they were derived.

a sketch, a particular sketch would have to be provided in order to administer the test; and such was not the case in the Woodworking test package.

Also included in the Woodworking package were two sample test forms and evaluation sheets which were constructed from the objective and test item bank described earlier. The test form provided the specific performance to be carried out by the examinee; the evaluation sheet offered explicit direction to the persons who judged the final product.

Machine Shop test. The Machine Shop test represented a design which was begun during the MIFS project and which proved useful in another research study (Johnson, 1971). The test was conceptualized from the synthesis model and each test item was created directly from synthesized objectives (see Figure 2).

The test consisted of specifications and blueprints to produce two finished products called piece #1 and piece #2. Twelve test items in the first half of the test focused primarily on measuring skills on the machine lathe in manufacturing piece #1; while 14 items for piece #2 concerned, predominantly, the operation of the milling machine. Additionally, the Machine Shop test package contained several materials for test administration. First, an item-selection form allowed the teacher to designate the items to be taken by selected groups of students, and provided the information needed to prepare the test site in terms of tools, machines, stock, and space. Also provided in the Machine Shop test package were supporting materials for: (1) teacher and student orientation; (2) recording testing times and evaluations; and (3) developing student test profiles.

Synthesized Objective	Machine Shop Test
Block 03 Drill Press Unit 04 Drilling SYNOB 172302/053 Performance: Set up in 2.11 Vise 2.12 Vee Block 2.13 Drill Jig 2.14 On Table with Straps 2.15 Angle Iron Drill and Deburr	Block 03 Unit 04 Item No. — Test Item 9 — Drill (for tap) Note: Drilling for a tap was the ninth operation in a series of 12 operations on piece #1 of the Machine Shop test.

Fig. 2 Comparison of a Machine Shop test item with the synthesized objective from which it was derived.

Each Machine Shop test item could be found within a synthesized objective. However, most of the test items could be performed in different ways with various tools and machines because the test form did not specify a particular tool or machine. Therefore, the examinees had a choice among various methods of performing the test, and the determination of the specific test items would require further specification. Figure 2 offers an example wherein the test item states only to "drill a hole for a tap," while the synthesized objective indicated five different methods of holding the stock to be drilled, each of which may be considered as a different item.

To illustrate the problem further, the second operation on piece #1 in the Machine Shop test states "center drill both ends" of the stock. There is no verbal statement that the operation was to be performed on the lathe. The only hint to that effect was the block and unit coding numbers which, if sought out in the taxonomy, indicated drilling to be performed on the lathe. However, the teachers in at least one test site were not aware that the number codes on the test form served any purpose in the test administration, so the examinees used any appropriate machine which was available at the time. Thus, the test item being discussed may have been performed by various students on the lathe, the milling machine or the drill press, which actually would have represented performance of three different skills. Even the performance of drilling on a lathe offers several options in terms of the various holding devices which may be used to secure the stock during the drilling operation. Different holding devices such as three-jaw universal chucks, spring collets, and between-centers require different knowledge and skills, and the particular device must be specified if all examinees are to be tested on the

same skill. If the intent was to allow flexibility in administration, the scoring of the test should have provided for identification of the specific machine and/or tool which was used for each item, thus allowing for a separate analysis of the various ways in which a specific item was performed.

Field testing for the Machine Shop test was conducted in three ESCOE schools across three grade levels of students. However, no data were reported pertaining to student achievement by grade levels although three different grade levels in one of the schools participated in the test. Statistics were reported on: (1) estimates of required testing time for each item; (2) estimates of item difficulty; and (3) estimates of test-retest reliability. The analysis of these data is ambiguous because of the possible variation in the mode of responding to several of the test items as described above. For example, the possibility exists that a given item was not performed using the same type of machine or tool at the two test administrations, thus making useless reliability estimates for that item.

The basic design for the Machine Shop test, however, appeared to be functional and worthy of continued development. Comments from teachers involved in the field test generally were favorable and included positive suggestions for improvement. One noteworthy comment was that the test uncovered weaknesses in the instructional program, i.e. the students were strong in certain areas and weak in others, indicating possible emphasis in the curriculum by the instructors or the need to reteach particular objectives.

The Machine Shop test consultant recognized the need for improving the instructions for timing and grading the test. Also, alternate

methods for scoring the test were offered to facilitate both on-site and after-examination centralized scoring.

Auto Mechanics test. This test package contained a report on test development procedures which indicated difficulty in using the synthesized objectives as a source from which to derive test items. One statement in the report (Fortune, 1972) stated that an analysis of the synthesized objectives, " . . . was not as fruitful as had been hoped, . . . and after attempting to begin with the objectives, a move was made toward standard mechanics tasks as a beginning point for test development. Using one standard task as a test item . . . [pp. 2-4]." The implication was that the synthesized objectives for Auto Mechanics were not directly useful for the derivation of test items, although a comparison of items from the package to the synthesized objectives revealed a relationship as evidenced in Figure 3.

A distinct manner for scoring performance test items in Auto Mechanics by the use of photography and color-coded parts was conceived by the test developers. A sample item from the test package is used to illustrate the format:

Test Item: Remove and replace fan belt

Unit Section: Engine on chassis/stand

Actual Task: Color-coded part must be installed to replace opposite color-coded part

Time: 1/2 hour

Scoring: Instructor inspects
(1) Bolts for correct tightness
(2) Belt for correct tension

Record: View from top showing installation of fan belt

Record Scoring: Color-coded part has been correctly installed

Synthesized Objectives	Auto Mechanics Test	
Block 04 Chassis & Body Unit 09 Tires	Block 04 Chassis & Body Unit 09 Tires	
SYNOB 170302/040	Test Item	Page Number
Performance: Remove tire ( ) Test and Repair Tube ( ) Install ( ) New	Repair inner tube	46
Change ( ) Valve Assembly	Replace tire valve assembly	47
SYNOB 170302/041 Performance: ( ) Rotate 5 Wheels ( ) 4-Wheel Rotation	Rotate four wheels	48
SYNOB 170302/042 Performance: Balance Front Wheels ( ) Off the Car ( ) On the Car	Balance wheels, off the car	49

Fig. 3 Matching of ESCOE test items and synthesized objectives components in Auto Mechanics.

The Unit Section designation allowed for the test item to be performed on an engine actually in an automobile, or on an engine which was mounted on a stand in a laboratory simulation. The Scoring section lists the specific criteria for on-site scoring by the instructor or by other persons. The Record notation describes the angle from which the final product should be photographed to allow for central scoring at a later time, and the Record Scoring entry defines the criteria for the central scorer.

Photographing the color-coded parts followed further scoring of the test any time subsequent to the actual test. This scoring technique provided the opportunity for the instructors or others to make a judgment at a time more convenient than during the test performance. Also, it allowed for more objectivity in scoring the final product because it could be viewed by any number of interested persons including the student himself. Of course there are some limitations to such a scoring method, but it could be used to enhance on-site observation. One shortcoming of the photographic method is its inability to determine the accuracy on criteria such as the tension on a fan belt or the efficiency of a patch in sealing a leak in an inner tube.

The photographic technique for evaluating Automotive testing provides a promising model for future development. Although it does not seem useful by itself to evaluate performance-type objectives, it offers a supplement to traditional on-site scoring procedures. However, much more time must be devoted to refining the technique itself, including the establishment of validity and reliability of such a scoring method.

No field testing was reported for the Automotive test, but subsections of the test were described to a group of five vocational educators

who expressed satisfaction. It was suggested by the test developers that each school build its own set(s) of test equipment. Having one's own test equipment would: (1) increase test validity since the students would be tested on equipment familiar to them; (2) in the case of statewide testing, elimiate moving either students or equipment to test sites; (3) provide additional equipment which could be used for daily instruction.

Electronics test. Construction of the Electronics test was coordinated by two research faculty members at the University of Massachusetts with four Electronics instructors, one of whom was an ESCOE staff member. The consortium of educational measurement specialists and subject matter specialists focused not only on developing a bank of criterion-referenced test items in Electronics, but also on a clearly defined documentation of procedures for the systematic scoring and retrieving of objectives and related test items.

Three major products resulted from the Electronics test developers. First, a set of clearly defined behavioral objectives were written, each containing one observable behavior which allowed for development of directly associated test items. Each of these objectives was derived from and coded to each one of ESCOE's synthesized objectives (SYNOB) in Electronics. Second, a set of criterion-referenced test items were written, each related and coded to the discrete objective which it measured. Third, a detailed, concise guide was prepared to enable Electronics instructors to utilize the objectives and items for instructional programs.

In addition, some useful by-products were produced including: (1) detailed steps for developing objectives and related test items; (2) a set of specific model test items in Electronics; (3) procedures for the

production of a card system to facilitate filing and duplication of individual objectives and test items; and (4) a critique of the SYNOB model as a means of deriving test items.

A review of the test developers' critique of the synthesis concept revealed several issues for consideration in this analysis. First, the test developers were to be commended on their coding of objectives and test items to the SYNOBs from which they were derived. Such coding not only allowed easy storage and access in a file drawer, but it was compatible with ESCOE's computer data system. Also, the procedures used in reviewing and revising the SYNOBs appeared to be carefully planned and their documentation in the test package greatly facilitated a review for this study.

The multiple behaviors which appeared in the SYNOBs emerged as a major concern of the Electronics test developers. Their decision was to extract from each SYNOB the "central" performance and combine it with appropriate conditions and criteria to form a discrete "test objective." The new test objective was characterized as terminal, because the test developers chose what they deemed the most "difficult" performance listed in the SYNOB and assumed that the testing of that performance also gathered information on all other performances stated in the SYNOB. Finally, one test item was written for each test objective using generic names for tools and equipment rather than specific brands so that each school could use its own familiar resources. The specification of genres for tools and equipment in the Electronics test avoided the problem prevalent in the Machine Shop test where the tools or machines to be used were not clarified.

Most of the Electronics test design appears valid for generating

a bank of specific objectives and related test items, a product which, in addition to evaluation uses, serves the more comprehensive purposes of instructional systems. However, the strategy seems to have gone beyond the intent of the test development goals, and in doing so it may have developed a problem in addition to creating some unexpected rewards. Figure 4 shows an Electronics test objective and the SYNOB from which it was derived. For simplicity, the complete SYNOB was not duplicated--only the elements that are relevant to this discussion were included. The SYNOB listed all possible combinations of specific performances as submitted by ESCOE LEAs and represented one phase of their instructional programs in Electronics (Block: Passive Circuits-AC; Unit: Impedance). The associated test objective represents the test developers' concept of a single performance which describes the skills and knowledge compiled in the SYNOB.

The synthesized objective in Figure 4 was compiled from seven separate behavioral objectives submitted by four different LEAs. It specified that the student should determine the impedance and phase-angle by one of three methods: (1) experiment; (2) measurement; or (3) computation using any of a variety of materials and test equipment available for the task. On the other hand, the test objective measures the student's ability to choose from a list the correct impedance and phase-angle for a circuit diagram. The investigator questioned two assumptions of the rationale used by the Electronics test consultants: (1) that the test objective described the most difficult of the various performances in the SYNOB; and (2) that the test objective was representative of all the performances in the SYNOB.

The investigator discussed the problem with an Electronics teacher who reviewed the synthesized objective and the test package prior to

SYNOB No. 48	Test Objective No. 48
Conditions: Resistors 1.11 Inductors 1.12 Capacitors 1.13 Examples of Impedance 1.21 VOM 1.22 VTVM 1.31 Impedance Bridge and Signal Generator	Conditions: Given a parallel, RL&C circuit (all combinations).
Performance: 2.11 Determine Experimentally 2.12 Measure 2.13 Compute The impedance and phase-angle in a: 2.21 Series RL 2.22 Series RC 2.23 Parallel RL 2.24 Parallel RC 2.25 Complex AC Networks Circuit	Performance: The student will choose the impedance and phase-angle of the network from the alternatives presented.

Fig. 4 Comparison of a synthesized objective and a test objective in Electronics.

expressing his opinion. He contended that the test objective in Figure 4 represented the computation performance expressed in the SYNOB, since choosing successfully from alternatives implies that some manner of computation must be exercised. The teacher-expert added that measuring with instruments and making experimental determinations required different skills and knowledge and should not be inferred from the performance expressed in the test objective. Also, he expressed a doubt that computing was the most difficult of the performances in the SYNOB, adding that what is difficult for some students may not be difficult for others. The teacher-expert was emphatic, however, that if the test developers were intent on presenting the most difficult of the SYNOB elements in the test objective, they should have selected the "Complex AC Network Circuit" rather than a parallel, RL&C circuit, because the complex circuit includes both parallel and series circuits.

Thus, test objective number 48 deals with the students' ability to compute impedance and phase-angle in parallel RL&C circuits only. To test a student's ability to determine experimentally or measure the impedance and phase-angle in series or complex circuits, additional test objectives must be constructed. Perhaps an experimental study would be useful in investigating the correlation between the test results of such test objectives and test items derived from each specific SYNOB performance statement.

Meanwhile, it appears that the package of test objectives and related test items for Electronics provided an excellent model for constructing test objectives and items from synthesized objectives, but each test objective represented only a singular indication of the different skills specified in the SYNOB with the focus predominantly on selected response items.

Although no field test was conducted with the Electronics test, subsequently it was used by the Massachusetts Division of Occupational Education as a proficiency examination in testing candidates for the Vocational Teacher Program. The instructors administering the test reported excellent results with no serious problems in either preparing the test materials or in the on-site administration.

Synthesis in test development. Probably the synthesized objective should be limited to only one statement of performance, which was the original intent, rather than synthesizing all the objectives within a unit, which is what actually happened in Electronics and other subjects as well. The latter tactic resulted from a desire to keep the SYNOBs to a reasonable quantity and save the test developers from handling numerous objectives. However, the intention may have been self-defeating since it appeared to have caused problems across all four test programs. Certainly before continuing ESCOE-type test development, an in-depth, critical analysis of the synthesis concept must be conducted to determine its usefulness for deriving test items.

Much of the confusion and many of the problems with the synthesized objectives could have been averted had a representative(s) of the test consultants been involved with the synthesizers (subject-specialists) as the synthesis proceeded. Such involvement was agreed to, but it never transpired. Had such interaction occurred, problems and misunderstandings could have been resolved and the work would have progressed with mutual agreement and clearer definition. Regardless of the format from which test items are derived, i.e. from synthesized objectives or single-performance objectives, there must be close communication and cooperation between test-construction specialists and subject-experts. Usually, the principal

contribution of the subject-expert has been to supply information pertaining to the content of the course of study, whether the information was in the form of topical outlines or specific objectives. However, a more comprehensive involvement of teachers in the total planning and constructing of test materials should produce tests which are more practical, especially for use in instructional systems. Collaboration between the teachers and the test specialists is extremely important in resolving such issues as: (1) Will each task be measured? (2) Will product and process be measured? (3) Will the evaluation be subjective or objective? (4) What purposes will the test serve? (5) How many examinees can be tested at one time? (6) How will the test be scored?

Analysis of survey data on tests. The test development component of the ESCOE project caused more anxiety than any other issue. New York participants were particularly opposed to a statewide testing program which made the resulting data available to the state department of education. Such concerns created an uncertainty of direction during the second year of the project because the original purpose of ESCOE was to measure the performance of students in local schools, analyze the test data and feed back the results to the LEAs and the state departments of education. Thus, a split-personality complex permeated the second-year activities of the project, with the Massachusetts RCU holding to the original purposes of the feedback system and the New York RCU rejecting its own right of access to the test results.

Although the two participating states disagreed as to who should receive the test results, there was no significant difference between Massachusetts and New York according to survey responses on other testing

issues. Question number 38 asked all the survey groups except the test consultants if it was important that their states were involved in ESCOE's test development activities; of the 61 responses 85% indicated a positive attitude. The response to question 45 by 70 respondents across all five survey groups supported the positive attitude towards the test development component of ESCOE. The question asked if there was a need to train persons from occupational education as specialists in evaluation, and 91% of the responses were affirmative.

A preference for tests which are tailor-made by measurement specialists was shown across all survey groups in response to question 35. Table 17 shows that of the 64 participants who responded, nearly two-thirds preferred tailor-made tests for use in their schools. However, a noticeable difference appears in Table 17 between the LEA administrators. The facilitators, most of whom were teachers, preferred to have a specialist agency prepare tests for evaluating student achievement, whereas slightly more than half of the administrators in those same schools preferred that the teachers prepare their own tests. Perhaps the facilitators, since they were actively involved with instruction and evaluation, recognized shortcomings in terms of test construction capabilities on the part of instructors, or they may have been more acutely aware of the lack of time which most vocational teachers have to devote to the design and preparation of testing materials.

Goal 2.2: Administer, Analyze and Feedback Test Data

Ultimately, ESCOE's goal in developing criterion-referenced tests for occupational programs in participating LEAs was to administer the tests,

TABLE 17

Preferences of Participant Groups
Toward Types of Tests for
Measuring Student Performance

Type of Test	Respondent Groups										Row Total	
	Facilitators		ESCOE Staff		Administrators		RCU		Testers			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Standardized	0	0	1	20	0	0	0	0	0	0	1	2
Tailor-Made	21	68	4	80	10	46	3	100	2	67	40	63
Teacher-Made	10	31	0	0	12	55	0	0	1	33	23	36
Column Total	31	100	5	100	22	100	3	100	3	100	64	100

analyze the results and report the evaluation information to the participating state departments and LEAs. The systematic feedback of such information would become the basis for making decisions to improve occupational education at all levels. Documentation of the test administration goal was evident in the ESCOE Planning Document:

A. "Therefore, the Evaluation Service Center not only feeds back information which describes the degree to which LEAs achieve their objectives, but the degree to which the state achieves its objectives in occupational education [p. 9]."

B. "Diagnosis--both the criterion and norm-referenced measurement allow diagnosis at the local and state levels. The meaningfulness of the scores emerges from an analysis fo specific items or performances [p. 21]."

C. "At this point the Evaluation Service Center is not conceived as providing achievement monitoring for individual students, but annual feedback on classes within schools [p. 20]."

D. "by June 30, 1971--Test administration conditions treated. Analysis of test." "by June 30, 1972--Information feedback of objectives and test data [p. 38]."

Activities and Products of Goal 2.2

Because the development of the four tests was not completed until the end of the ESCOE project, there were no activities pertaining to administering the tests and reporting the information back to the state and the LEAs. Prior to test administration, the test would have to have been finalized, field tested, analyzed and revised to establish an acceptable quality in terms of test materials and equipment, and also in terms of validity and reliability estimates. Since these goals were not achieved, no data was collected through a statewide administration of the ESCOE testing strategies.

Analysis of Data on Goal 2.2

Support for one of the basic concepts of ESCOE was apparent in the response to question 43 which asked all the survey groups except the facilitators if a statewide evaluation system based on behavioral objectives would be beneficial for occupational education. Of the 35 respondents only 3% rejected the concept, while 71% approved and 26% chose the don't-know answer. There was no noticeable difference between the New York and Massachusetts response on the same question, which seems to indicate that the greater anxiety in New York toward a statewide evaluation is not a disapproval of the concept, but rather a preference for local instructional use of the feedback data as opposed to use by the state department. Such a hypothesis is supported in the evidence gathered by question 37 which asked all survey groups to identify the kind of feedback

which would benefit the LEAs most. Ninety-three percent of the 28 New York respondents and 84% of the 31 Massachusetts replies indicated that information on individual student performance would be most useful to the schools, while other choices in the question dealt with comparison of students within schools, and across schools and states.

Thus, although there was strong support in both states for a statewide evaluation system, it was viewed more as a school-oriented function with focus on the achievement of the individual in relation to his own needs and progress. Such a trend, i.e. away from state use of the test data, emerged as a strong force during the second year of the project. Particularly in New York the fear was expressed that if the state departments received the test data, there would be potential for the creation of state-imposed standardization. This issue is discussed later in a section titled Local Autonomy Goal.

Training Goal

The third major component was aimed at training the ESCOE participants at the state and local levels to carry out activities necessary to develop strategies and materials for generating an evaluation system for occupational education. First, the training was to assist LEA personnel in describing their instructional programs in behavioral terms, and subsequently the training would focus on the utilization of the resulting test data by decision makers at the state and local levels.

Goal 3.0: Train LEA Staffs to Develop ESCOE Components

Statements in the Planning Document provided explicit definition of the training goals:

A. "The training component (TRCO) . . . is concerned with providing training services to the staffs of LEAs and state departments of education, so that the product of the Center can be effectively used at all levels . . . In the initial phases of the project, a major goal . . . is to provide support to the staffs of schools offering occupational education in attempting to describe . . . curricula by behavioral objectives [p. 17]."

B. "It should be anticipated that the TRCO will be characterized by workshops within the LEAs and in central locations during the two-year test period . . . [pp. 19-20]."

C. "A second global goal of the TRCO would be to assist staffs of LEAs and state department personnel in interpreting the information feedback . . . within the context of the program evaluation process supported by the Center [p. 17]."

Thus, the predominant vehicle for achieving the training goals was to be the workshop or conference conducted by the ESCOE staff.

Activities and Products of Goal 3.0

As with other ESCOE activities, those under the training umbrella were viewed in light of in-house activities and field services. The development of strategies for training the project participants and the preparation of training materials occupied a considerable amount of in-house time on the part of the ESCOE staff, while implementation of the strategies resulted in eight formal facilitator/administrator conferences as well as numerous teacher-training workshops in the LEAs. Since conferences and workshops spanned the length of the project, the training activities were essentially a continuous concern of the staff. Aims of these activities were directed toward an understanding of the purpose and benefits of systematic instruction and evaluation, as well as toward the description of local occupational curricula in behavioral terms.

Complete products of the training goal may be found in the appendices of the ESCOE Final Report. They consisted of: (1) two behavioral-

objective training packages; (2) a programmed text for writing behavioral objectives in occupational education; and (3) a synthesized-objective training package. Supplementing such textual materials were a set of illustrated overhead transparancies and two color filmstrips with audio tape which was created to ESCOE's specifications.

Some side-effects of the training were less noticeable, but no less important than the more concrete products produced. One such product is the experience and knowledge which was carried away by all the participants as a consequence of the ESCOE experience. There were 55 LEA facilitators who received intensive training at the eight conferences which ESCOE conducted in central locations throughout New York and Massachusetts. Additionally, it was estimated that more than 1,000 teachers received training at workshops conducted throughout 30 participating LEAs, and more than 25 local administrators attended various conferences which oriented them to the purpose of ESCOE and to administrative responsibilities in supporting the project. Also, 35 facilitators and teachers received specialized training in the process of synthesizing behavioral objectives, and 10 of these received further tutorial training in the development of strategies for criterion-referenced testing.

Another by-product which grew out of the need to induce greater productivity, as well as to reward active participation, appeared to rank as an important result of the training component. Such a by-product was the University of Massachusetts credit which was earned by certain facilitators and teachers who chose to enroll in formal courses offered through the university's Continuing Education Division. The credit was granted for successful participation in attending ESCOE training conferences, conducting job analyses, writing objectives, and conducting teacher-training

workshops in their LEAs.

Analysis of Data on Goal 3.0

Opinions gathered by the survey pertaining to ESCOE field services were not easily interpreted. Question 69 asked the facilitators if field visits by ESCOE staff were satisfactory. Of the 36 responses, 70% stated satisfaction, but 17% signified that no visits were made even though ESCOE encouraged the LEAs to request such visits. Satisfaction with ESCOE visits to participating schools apparently bore no relationship to the percentage of occupational programs for which objectives were written in those schools as revealed by contingency tabulation; nor was there any significant difference between the responses from a two-state perspective. Thus, the facilitators from the state and the schools who produced least, seemingly were as satisfied with ESCOE's visits as were those who produced to a greater extent.

However, another perspective was evident in the data gathered by question 71 which asked the facilitators if they thought that regularly scheduled visits to their schools by ESCOE staff would have been helpful. There was a noticeable difference between the New York and Massachusetts respondents on the question as revealed by the data in Table 18. The stronger feeling in New York State (81%) as opposed to only 35% in Massachusetts toward the need for regular visits by ESCOE staff appeared associated to the smaller output in New York in terms of behavioral objectives submitted to the project.

Further indication that the facilitator attitudes toward regular visits by ESCOE staff were related to production of objectives by LEAs is depicted by the figures in Table 19. Eighty-four percent of the

TABLE 18

Comparison of Facilitator Responses by State Affiliation According to Preference for Regular Visits by ESCOE Field Staff

Regular Visits Preferred	State				Row Total	
	New York		Massachusetts			
	No.	%	No.	%	No.	%
Yes	13	81	6	35	19	58
No	3	19	11	65	14	42
Column Total	16	100	17	100	33	100

facilitators who indicated a need for regularly scheduled visits represented LEAs in the low (0% and 25%) end of the scale according to the proportion of the curricula in their schools which were described via behavioral objectives. Conversely, the figures in Table 19 show that 54% of the facilitators who indicated no need for regular visits were from schools who wrote objectives for a majority of their programs. Apparently the LEAs who produced more, either had more visits or believed that the facilitators by themselves were able to conduct the teacher-training workshops in their schools.

TABLE 19

Distribution of Facilitators According to Their Preference for Regular ESCOE Visits (Question 71) and to the Percentage of LEA Curricula for Which Objectives Were Written (Question 54)

Percentage of LEA Curricula Written	Regular Visits Preferred				Row Total	
	Yes		No			
	No.	%	No.	%	No.	%
0%	3	16	1	8	4	13
25%	13	68	4	31	17	53
50%	2	11	1	8	3	9
75%	1	5	2	15	3	9
100%	0	0	5	39	5	16
Column Total	19	100	13	100	32	100

Local Autonomy Goal

The issue of local autonomy, i.e. independence from state control in local decision making, was clearly established as the prevailing tenet of ESCOE's philosophy. Although a strict adherence to that principle was maintained throughout the project, the effect was not totally positive as may be seen in the analysis.

Goal 4.0: Maintain Local Autonomy in ESCOE Activities

A. "The Evaluation Service Center . . . holds that program objectives should be determined by LEAs and not prescribed by central authorities . . . [p. 4]."

B. "The Evaluation Service Center is purposefully designed to avoid imposing any constraints on operating programs, either directly or indirectly . . . It is not the purpose of the Center to contribute to the standardization of instructional practices or objectives . . . [p. 9]."

C. "ESCOE is a neutral agent, designed to feedback program evaluation information on a continuing basis to managers of occupational education on all levels within each participating state, from state director to teacher and lay citizen [p. 7]."

D. "In reporting, all LEAs receive all objectives and test data for their school and state averages. State to receive data by individual school, as well as state averages [p. 37]."

The implications in quotations A and B were that local school districts would have complete independence in determining all or part of the local curricula, i.e. writing, selecting and using instructional objectives. However, although quotations C and D imply that the same independence holds for evaluation decisions by local personnel, it is clear that the state educational agency would be one of the recipients of the data resulting from testing students in local schools.

Activities of Goal 4.0

Autonomy in local schools was adhered to absolutely throughout the duration of the project. All behavioral objectives in the ESCOE bank were written by active teachers in participating schools. Other than minor editing to improve the written expression, all objectives submitted from LEAs became part of the data bank. There was no attempt by ESCOE to change the meaning of the objectives, nor to alter the objectives for any purpose.

All objectives in the bank were available to participating schools and state departments, but when schools requested objectives other than their own the identification of the school which submitted the objective

was obscured. Thus, the local autonomy concept applied not only to the selection of objectives on which students would be tested, but also to the independence of the schools in submitting objectives to the ESCOE bank.

Particular concern for autonomy focused on the dissemination of test data from individual schools. As stated earlier in the analysis, there was a strong feeling, particularly in New York State, that the state department should not receive test data which identified each school even though such feedback of test data was documented explicitly in the Planning Document. The issue was never resolved during the tenure of the project because the test materials were not completed in time for a test administration in the schools, so there was no subsequent feedback of test results to anyone.

Analysis of Data on Goal 4.0

In responding to questions 19 and 20 across all survey groups, nearly two-thirds of the 70 respondents expressed a preference for each individual teacher as opposed to department heads or subject specialists to write and select objectives (see Table 20). The response, however, was not surprising since that is precisely the process which was practiced and preached throughout the ESCOE project. An alternative procedure, which would have teacher-consultants write the basic core of objectives for each program, was considered during the early part of the second year, but the idea was viewed by ESCOE staff and participating LEAs as being too drastic a change from the original plan.

Earlier in this chapter while analyzing the goal for processing, publishing, and sharing objectives, it was stated that the survey respondents

TABLE 20

Distribution of Participant Responses as to Preference for Who Should Write/Select Objectives for Occupational Education

Preference	Group										Row Total	
	ESCOE Staff		LEA Facilitators		LEA Administrators		State RCU		Test Consultants			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Department Heads	0	0	0	0	2	9	0	0	0	0	2	3
Subject Specialists	1	40	12	33	4	17	2	100	2	50	21	30
Each Teacher	4	60	24	67	17	74	0	0	2	50	47	67
Column Total	5	100	36	100	23	100	2	100	4	100	70	100

indicated a strong support (over 90%) for sharing objectives between schools within a state and across states as well. Survey question 76 asked the facilitators to identify potential results if ESCOE were expanded to other states thereby broadening the base of the sharing concept. Of the 36 responses, 72% ranked highest the choice "a broader base of objectives and test items"; "sharing of costs" was ranked highest by 14%; "more confusion" was the choice of 11%; and only 3% indicated a fear of "standardization."

Thus, with the assurance of local autonomy in determining instructional objectives, the LEA participants believed that it would be beneficial to be involved in a broadly based information exchange system. However, when the facilitators and administrators were asked, in question 24, who should finance a central information system such as ESCOE's, of the 58 responses, 59% believed that the state should bear the financial burden; only 5% responded that the LEAs should finance it; and 36% favored LEAs and state departments sharing the cost.

It was unfortunate that no testing was accomplished, because it would have been interesting to observe the opinions of the participants toward the actual testing process. The absence of the real testing experience notwithstanding, 58% of the 68 respondents across all groups expressed the opinion, in question 40 that the LEAs themselves should administer tests aimed at LEA accountability, while 32% favored that such testing should be done by a neutral agency such as ESCOE. On the same question only 1% believed that the state should conduct the tests, and 9% expressed a preference for no testing at all. The weak support for state involvement in testing characterizes further the anxiety of most participants toward the possible loss of local autonomy in a statewide

testing program.

It was apparent that local autonomy was an extremely sensitive issue, particularly in New York, and yet the primary purpose of the project was to develop a statewide evaluation system which would provide accurate and relevant information from which both state and local authorities could formulate decisions. The rationale for a broad based, statewide evaluation and information system appears to be well grounded in theory. A cooperative effort among separate school districts could be beneficial in many ways: (1) by sharing manpower and financial resources; (2) by cooperating in articulating and validating curriculum goals and objectives; (3) by cooperating in developing and field testing measurement strategies and materials; and (4) by analyzing performance test data and disseminating the results to decision makers in a format that is easily understandable and usable.

Testing learner achievement by random sampling techniques in such a broadly based evaluation and information system as described could provide objective data to all appropriate decision makers according to their unique goals and needs. Objectivity in test administration and test scoring is crucial if personal bias is to be minimized in evaluation strategies, especially as it pertains to the measurement of psychomotor skills which are prominent in occupational training. It is difficult to envision accurate and objective data forthcoming from testing situations wherein each school administers its own tests for its students in order to gather and analyze information for making important decisions by all the persons concerned with the system. The subjectivity inherent in administrating and evaluating performance skills in such a manner would seem to render the resultant data invalid for comparative purposes, thereby negating the

usefulness of the information beyond the confines of the individual schools.

Budget Analysis

It would be very difficult to separate ESCOE's budget expenditures for each of the major components of the project, i.e. (1) behavioral objectives; (2) testing; and (3) training. Particularly difficult, if not impossible, would be an attempt to distinguish and separate distinct aspects of the activities in training and in the development of objectives. Those two components were so closely interwoven and mutually supportive that, essentially, they were one activity. So for this analysis it was determined to estimate first the proportions of the budget and expenditure of time which were devoted to the development of the tests as opposed to the other two activities collectively.

Figure 5 illustrates the activities and related expenditures which occurred during the two fiscal years of ESCOE's operation. As may be seen, the test development did not begin until the second year, and its $37,000 cost represents a small part of the total expenditure over the two-year duration of ESCOE. In terms of the nature of the ESCOE project, the small amount of funds which supported the testing component seems out of proportion to the total cost of ESCOE. Also, in light of the four test packages and their potential usefulness in future development, the test development component appears to be outstanding from a cost-product analysis.

Another perspective on the budget was formulated by estimating that the training component and the component for developing objectives consumed the same amount of financial support. Table 21 depicts the sizable difference between the expenditures for test development and each

ESCOE Budget Chart

November 1970 thru June 1971		
Training and behavioral objectives development:		
1. Develop strategies for training and objectives		
2. Develop training materials		
3. Conduct facilitator conference		
4. Develop reporting forms and collection procedures		
5. Carry out field services		
6. Develop computer system		
Expenditure	75,650.00	
July 1971 thru June 1972		
Training and behavioral objectives:		
1. Continued training and development of objectives		
2. Synthesize objectives		
3. Continued computer development		
4. Dissemination of final objectives bank		
Expenditure	179,350.00	
Test Development		
1. Test contract ($32,000.00)		
2. Estimated project overhead for test development ($5,000.00)		
Expenditure	37,000.00	
Total expenditures		$292,000.00
End-of-project balance		20,000.00
Total budget		$312,000.00

Fig. 5 Listing of ESCOE activities and related expenditures.

TABLE 21

Comparison of Estimated Costs
of the Three Major Components
of the ESCOE Project

ESCOE Components	Cost	Percentage of Total Cost
Training: materials, conferences and workshops	$127,500.00	43.7
Behavioral Objectives: 12,000 objectives and 800 synthesized objectives	127,500.00	43.7
Tests: test packages for four different occupational programs	37,000.00	12.7
Total	$292,000.00	100.0

of the other two major components. Unfortunately the training process seemed to evolve as an entity in itself, rather than a vehicle for the development of objectives and test items.

Summary of the Findings

This chapter described the data gleaned from the study and the manner in which it was interpreted. Each major goal of the project--(1) Behavioral objectives development, (2) Test development, (3) Training, and (4) Local autonomy--was analyzed in terms of its distinct characteristics. However, whenever relationships between goals appeared to be significant and relevant, such findings were included to clarify or strengthen the interpretations being formulated.

A concise statement of each goal was presented initially and was followed by documentation of the goal through quotations extracted from the original ESCOE Planning Document. Next in the analysis for each goal was a description of the activities and products which resulted from pursuit of the goal. Such outcomes of the project offered one kind of criterion for the assessment of ESCOE's goal achievement. Another kind of criterion included in the analysis was in the form of opinions and additional information collected from the project participants through a survey questionnaire. These criteria, added to the personal observations of the investigator, formed the bases upon which the interpretations of the data were established.

Throughout the analysis, the data were treated in such a manner as to derive conclusions which were valid and would be useful in future research and development. Although the survey questionnaire collected data on all the activities which occupied ESCOE during its two year period

of operation, only those data which were associated with the major goals selected for the study were used in the analysis.

The conclusions and recommendations presented in Chapter V were based on the analyses conducted in this chapter and no new data was introduced beyond this point in the study.

CHAPTER V

REVIEW, CONCLUSIONS AND RECOMMENDATIONS

Although the intent of the study was to assess the extent to which ESCOE has achieved its goals, the value lies in the use to which it will be put by educators designing state and local evaluation and instructional systems. Low achievement of some goals by ESCOE was carefully considered in terms of the constraints imposed by the shortage of time, money and other important resources.

This chapter begins with a review of the earlier chapters, including: the purpose for undertaking the study, the methodology used in the evaluation, and the analysis of the data; and ends with conclusions and recommendations which are based on the data collected.

Review

The study conducted an analytical assessment of the outcomes of the Evaluation Service Center for Occupational Education (ESCOE), a research project which was planned to develop a statewide evaluation system based on locally written behavioral objectives. The ESCOE project was conducted over a two-year period and carried out by the cooperative effort of the New York and Massachusetts state departments of education and participating high schools and community colleges within the two states. Three major components formed the nucleus of the ESCOE research: (1) training participants; (2) developing behavioral objectives for local instructional programs; and (3) generating tests to measure the successful

performance of learners on specific objective statements. The principle of local autonomy was explicated in the philosophy of the project and was evident in all the activities and products resulting from the research.

Phases of the study. The first phase of the study entailed a comparison of stated and implicit goals of ESCOE with the outcomes of the project. That assessment focused on the analyses of project outcomes and their meaning in relation to associated goals. A search of ESCOE documents produced graphic evidence of the most important goals of the project and evidence of the activities and products which resulted from pursuit of the goals.

The second phase of the study provided additional evidence in analyzing the factors that affected ESCOE's performance. Such data were gathered by a questionnaire which solicited opinions and information from the participants of the project, i.e. the facilitators, the school administrators, ESCOE staff, the state department research directors, and the test consultants. These data were subjected to contingency analysis to reveal associations and trends in the responses across the participating states, the respondent groups, and the institutional settings.

Because of the absence of randomization in the collection of questionnaire data, caution should be exercised in generalizing the results of this study beyond the institutions and persons who participated in the ESCOE project.

Conclusions

When interpreted in a broad frame of reference, ESCOE achieved its goals. In terms of the training goal, ESCOE trained over 50 LEA

personnel (facilitators) to serve as liaisons between the project and the schools. The facilitators, in turn, were responsible for training approximately 1000 local school teachers to analyze their instructional courses and to write behavioral objectives for the ESCOE bank. ESCOE's bank of 12,000 behavioral objectives represented at least a quantitative achievement of the goal to produce objectives which describe instructional programs in occupational education. Four distinct strategies for the direct measurement of instruction and learning resulted from ESCOE's test development goal. The criterion-referenced test strategies offered excellent prototypes for futher development, while one test package was useful immediately in measuring performance-type skills and knowledge in an occupational education setting.

Conclusions derived from the data analysis are presented hereafter under the same major goal headings used for the findings, i.e. conclusions relating to: (1) developing behavioral objectives; (2) developing associated tests; (3) training participants; (4) maintaining local autonomy; and (5) budget. The conclusions focus on the outcomes of the project and the extent to which they represent adequate indicators of toal achievement.

Goal 1.0: Behavioral Objectives Development

Conclusions for Objectives Development (Goal 1.1):

1. ESCOE achieved its goal to produce a bank of behavioral objectives for the complete spectrum of occupational programs in New York and Massachusetts. However, the goal that all the schools were to describe all of their occupational programs in behavioral terms fell far short of

its mark. Evidence that only a few of the LEAs met their commitment in writing objectives is shown by the figures in Table 11, and also in the response to survey question number 54 which shows that two-thirds of the facilitators reported production of objectives in their schools to be at a level of 25% or lower.

2. The production capacity of LEAs in terms of quantity of objectives written appeared related to the amount of released time provided by the schools. Evidence of this trend was found in several sources. First, Table 14 depicted that the amount of released time provided for writing objectives was lower in New York than in Massachusetts, and Table 11 shows that New York LEAs produced fewer objectives. Second, another indication of the trend emerged from the responses to survey questions 54 and 62 which were tabulated in Tables 12 and 15. The data indicated that the LEAs and the state that produced most objectives were the same ones which were given the most released time. Third, the response to question 62 showed only 19% of the facilitators reported that teachers in their schools received released time and only 39% of the facilitators themselves received released time to write objectives. Fourth, 60% of the facilitators indicated in question 61 that more objectives were not written because of limited time or adequate administrative support.

Conclusions for Development of a Computerized Classification Scheme (Goal 1.2):

1. The block and unit breakdowns were adequate for classifying and coding objectives for systematic storage and retrieval as suggested in the responses to two questions. Ninety-two percent of the facilitators

responding to question 56 expressed satisfaction with the blocks and units; the data from question 55 showed that 84% of the facilitator respondents had a positive view of the extent to which the blocks and units represented the occupational curricula in their schools. The presence of blocks and units may have provided some incentive to write objectives as indicated by the figures in Table 16 which portray that block and unit coverage of curricula was higher in secondary schools; Table 11 shows that secondary programs produced 68% of the ESCOE bank.

2. Classifying objectives as they relate to various subject matter such as mathematics, science and English gained approval of the facilitators as evidenced in the response to question 58 which showed that 74% of the respondents believed that related-subject classification of objectives is useful.

3. Even though ESCOE's treatment of classifying objectives in the three domains--cognitive, psychomotor and affective--the facilitators believe that such classification is essential as suggested by the 63% of agreeable responses to question 57.

4. Use of a computer for storing and disseminating objectives proved to be an unnecessarily expensive way to file objectives as discussed in Chapter IV under Goal 1.2.

Conclusion for Publishing and Sharing Objectives (Goal 1.3):

1. The concept of sharing objectives and methods both within the state and across states by means of a centrally located bank of objectives was approved by more than 90% of the respondents in questions 22, 48 and 49.

Conclusions for Synthesizing Objectives (Goal 1.4):

1. The synthesized objective (SYNOB) model developed by ESCOE was approved by the facilitators as suggested by the responses to survey question 80 wherein the SYNOB model was viewed favorably by 76% of the respondents.

2. The discussion of Goal 1.4 in Chapter IV shows that the facilitators found the synthesized objectives more useful than ESCOE information, including the individual objectives which were submitted by the participating schools. Uses of the SYNOBs in the LEAs were compiled from responses to survey question 75.

3. Incentives, such as money or college credit granted to the synthesizers, appeared to have produced greater efficiency and better quality products in synthesis than was true with the production of objectives from local teachers who generally did not receive pay, credit, or adequate time.

Goal 2.0: Test Development

Conclusions for Developing Criterion-Referenced Tests (Goal 2.1):

Each of the four test designs provided a distinct and useful model for the further development of performance testing in occupational education as discussed in Chapter IV under the heading Analysis of Data on Goal 2.1. Following are specific conclusions based on that section:

1. With the addition of supporting drawings and specifications for a few items, the Woodworking test appeared ready for use.

2. Clarification of the tools and equipment being used by the examinee is necessary before the Machine Shop test can gather accurate data on student performance.

3. The Auto Mechancis test needs more time to develop the extensive test equipment and to refine the photographic technique for central scoring before the test is considered useful.

4. The Electronics test items and objectives were ready for immediate use and may be reproduced directly from test package documents for testing and other instructional purposes.

5. The detailed guidelines provided for developing and using objectives and test items in Electronics appeared useful not only for Electronics, but for other subjects as well.

6. The field-testing goals were not totally achieved. The only formal field test (Machine Shop) produced data which were made useless because different tools were used by examinees to perform the same item.

7. Although the synthesized objectives served as the source for most of the test items in all four tests, its structure was deemed as needing improvement by all the test consultants.

8. The test development goals were too ambitious. The money for the purpose was not in proportion to the magnitude of the task in terms of: (1) conceptualizing strategies; (2) generating items for all the skills and knowledge implied in the SYNOBs; (3) preparing test materials; (4) field testing; and (5) analyzing results.

Conclusion for Test Administration and Data Feedback (Goal 2.2):

1. This goal was not achieved because the tests were not constructed before the termination of ESCOE.

2. The concept of statewide testing was approved by 71% of the respondents to survey question 43. However, a trend away from state agency use of the test data and toward local school usage appeared in the answers to question number 37.

Goal 3.0: Conclusions for the Training Goal

1. In question 69 the facilitators viewed ESCOE's performance during visits to their schools as satisfactory.

2. The need for regular visits expressed in question 71 appeared related to the low production of objectives in many schools (Table 19) and in New York State (Table 18).

3. The goal of training participants to interpret test data feedback was not achieved because the tests were not administered.

Goal 4.0: Conclusions for the Local Autonomy Goal

1. Local autonomy in writing and selecting objectives for LEA programs was maintained absolutely.

2. The concept of local independence in writing and selecting objectives received strong support across all survey groups as depicted by the figures in Table 20. Additionally, the survey respondents, in

question 40, believed that either the schools themselves or a central agency should administer tests aimed at LEA accountability.

3. There was a noticeable shift away from the use of the test feedback by the states to an almost total concern with local use. The change was so complete that the original emphasis on state department use of the feedback was almost totally obscured.

Conclusions for Budget Allocations

1. That the total budget was adequate for the project as carried out is evidenced by the $20,000.00 balance at the termination of the project.

2. Less time and money should have been spent on training and on objectives to allow for more test development activities.

Recommendations

Although the study was not designed to generate statistical inferences to larger populations, nevertheless it was deemed acceptable to suggest that particular strategies and products which proved successful in the ESCOE project may be appropriate and useful in similar situations. It was on that premise that the study was conducted and upon which it offered recommendations to decision makers at the state and local levels for continued research and development in occupational education.

Following are recommendations based on the data as collected and analyzed in the study:

1. ESCOE's products and strategies, as discussed in Chapter IV, for training personnel, developing objectives and developing tests should serve as a useful resource for local school districts or state agencies who are planning or developing systematic evaluation and instructional programs.

2. Cooperation among school districts and states, as suggested in the response to survey questions 24 and 74, would provide adequate financing and a broad base of information and expertise. The LEAs could contribute to such a project by sending teachers on sabbatical leaves to be trained in systems methodology, and who in turn would assist the project in generating the products for the total system.

3. The development of objectives, criterion-referenced tests and associated resources should be conducted by selected subject-experts (teachers as well as persons from business and industry) rather than by all the teachers in participating schools such as practiced by ESCOE. The need for curriculum writers and evaluation technicians is supported by Popham (1970, p. 175) and Barry (1974), and also received strong support across all survey groups in question 45. The state divisions of occupational education should make a concerted effort to train evaluation technicians on the local school level so that they can administer criterion-referenced testing programs, evaluate the results statistically, and utilize the data in making decisions to improve the efficiency and effectiveness of the instruction.

4. The select subject-experts should be compensated with money, college credit, or other appropriate rewards; and representation should be

maintained from different types and levels of occupational schools and curricula as well as from different geographical regions of participating states. Analysis of the data on synthesizing objectives indicated that the paid synthesizers produced to a greater extent than the unpaid local teachers who wrote objectives.

5. Persons selected to develop the central data bank, in addition to being experts in the subject, should have adequate writing skills and analytical capabilities as suggested by the discussion in Chapter IV under Goal 1.1.

6. Participation by local school faculty is critical in all phases of design, development and implementation. The strategies and products must be instructor/student oriented or usage by those persons will not be fully realized.

7. Especially in the early stages the information system should be simple enough to be adopted by the typical instructor without the need for extensive training. The teacher must be trained in systems technology, but economic constraints preclude large expenditures of time and money for that purpose. The need for simplicity was expressed by the facilitators in their reaction to the initial inclusion in the ESCOE system of strategies for classifying objectives in educational domains (see Chapter IV, Goal 1.2).

8. ESCOE's block and unit scheme for classifying behavioral objectives and test items should be useful equally in local instructional systems and also for state and federal management information systems. It provides a common language through which vocational educators at all

levels may communicate in terms of instructional goals and specific learning outcomes. However, the identification of instructional blocks and units should be only an initial step in analyzing the broad goals for occupational education. Further analysis, as described in Chapter II (see Benedict, 1973), should be carried out for a more complete perspective of what the goals should be for any instructional or evaluative enterprise. For systems which desire to utilize computer access, the ESCOE scheme would be particularly useful since it was designed for that medium.

9. More attention should be devoted in subsequent research to the development of instructional objectives and related measurement in the affective domain of learning, as indicated by conclusion three of Goal 1.2 and by the response to question 60 which showed that over 40% of the facilitators believed that ESCOE paid too little attention to the affective domain.

10. The synthesis prototype should be continued, as suggested by the conclusions for Goal 1.4. The model needs improvement but that will come as users adapt it to their own needs. The concept of synthesizing objectives has several potential uses. It would be useful for local instructors and coordinators as a compact, time-saving way of storing and selecting objectives which may be performed under varying conditions and standards. Yearly reports to state departments indicating the instructional programs in the LEAs would be accelerated by selecting elements of synthesized objectives. The SYNOB provides a practical and concise format by which objectives could be presented to business and industry for validation purposes. The business and industrial sector should review the instructional objectives bank to verify that the content is not obsolete

and to offer indications of future trends which may not have been apparent to the objectives writers. The uses of synthesized objectives as viewed by the ESCOE facilitators are discussed in Chapter IV under the heading Analysis of Data on Goal 1.4.

11. The synthesis model could be useful also in deriving criterion-referenced test items if the SYNOB is held to only one statement of performance, as discussed in Chapter IV under Analysis of Data on Goal 2.1. The singular performance statement in such a SYNOB would identify the "behavior domain" and the variable elements of the SYNOB would become the bases for generating sets of test items, with each item representing a sample of the domain (see Hively, 1974, p. 8).

12. The four existing tests should be reviewed for possible improvements, as discussed in the conclusions for Goal 2.0, and field tested before developing other tests or test strategies. Particular attention should be given to estimates of validity and reliability for the four tests and for occupational performance testing in general.

13. Because of the scarcity of performance (skills) tests for occupational education, as pointed out in Chapter IV under Goal 2.1, they should continue to be the focus of future development rather than pencil-and-paper (knowledge) tests. The demand for valid and reliable tests of occupational skills is apparent not only in instructional systems, but also for certification examinations for such jobs as Nursing and Auto Mechanics, and for Vocational School teacher certification tests as described in Chapter IV under Goal 2.1, Electronics test.

14. The tests can and should be designed to accommodate both statewide evaluation purposes and uses in instructional systems as conceived in the ESCOE Planning Document and discussed in Chapter I of the study. Evaluation data on local instructional programs which has meaning for decision makers at both the local and state levels must be gathered in the same manner. To have two separate and different systems would be not only more costly, but would be open to suspicion by authorities at both levels. A neutral central agency or consulting service should be responsible for collecting, analyzing and feeding back the information according to well-defined guidelines mutually agreeable to LEAs and state departments. Individual student scores and group scores would be useful within each school, while comparative data across schools and states would be useful to both the state departments and the LEAs when analyzed in terms of socioeconomic and institutional variables.

15. Whenever a choice of equipment is available to perform on a test, either the test form should specify the genre of the equipment to be used or the test results should indicate the genre of the equipment which was used. Without such identification the use of the test data would be greatly limited, as suggested by the discussion in Chapter IV under Analysis of Data on Goal 2.1.

16. Test consultants, local instructors and business/industry should work closely throughout the project to insure not only the validity of the tests, but also the practicality in terms of such important factors as: (1) writing and/or selecting objectives; (2) feasibility of administration; (3) ease of scoring; and (4) total costs.

17. The local educational agencies must make an honest commitment to provide the time and other resources to train their instructional staffs to utilize systematic instructional methodologies. Such a commitment was not totally adhered to in the ESCOE project, as suggested in the conclusions for Goal 1.1.

18. Local autonomy must be maintained in determining local curricular goals and in selecting test items for statewide evaluation studies, as suggested by the conclusions for Goal 4.0. Random sampling of programs across schools could be conducted and the data analyzed and disseminated to the schools and to appropriate state departments without identifying the individual schools except that each participating school would be given the specific results of its own test involvement. Such procedures would provide relevant and accurate evaluation data on which both state and local educational decision makers could rely.

19. A follow-up study should be conducted on the ESCOE project to: (1) analyze the opinions of the participants a few years beyond the termination of the project; and (2) determine to what degree the ESCOE products and/or the experiences gained from the project are being used.

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APPENDIX A

SURVEY LETTERS

EVALUATION SERVICE CENTER FOR OCCUPATIONAL EDUCATION
SCHOOL OF EDUCATION
UNIVERSITY OF MASSACHUSETTS
AMHERST, MASSACHUSETTS 01002

M E M O R A N D U M

TO: ESCOE PARTICIPANTS MAY 1972

FROM: ALFRED R. RIOS, DIRECTOR

The ESCOE project has, for the past two years, been involved with developmental research in occupational education. The ESCOE staff and all ESCOE participants have been carrying out the developmental tasks as outlined in the original proposal, "A Planning Document--Massachusetts and New York Evaluation Service Center for Occupational Education." If our efforts are to be utilized for future development and operations, then we must attempt to evaluate the extent to which our objectives have been achieved.

The attached questionnaire is designed to elicit from you, the people who have been most closely associated with ESCOE, information pertaining to the achievement of our goals and also opinions as to directions for future effort. Your reaction to items on this questionnaire will play an important part in the decision-making of those who want to continue the valuable work that all of us have begun.

It is your opinion, your point of view, your best estimate, that are being asked for on this survey--right or wrong answers are not implied in any way. Anonymity is intended and will be insured, so do not write your name on these forms.

ESCOE will send a report of the data analysis to each participant, so that you may all share in the information gathered.

Thank you very much for your time and consideration.

EVALUATION SERVICE CENTER FOR OCCUPATIONAL EDUCATION
SCHOOL OF EDUCATION
UNIVERSITY OF MASSACHUSETTS
AMHERST, MASSACHUSETTS 01002

June 1, 1972

Dear Colleague,

Hello again! It has been some time since we last had the opportunity to speak with you personally, and we are sorry that you were not able to attend the final conference of the project. We hope that the school year has gone well for you, and that your participation in ESCOE has, in some way, been useful and interesting.

At the recent ESCOE Spring Conference, the enclosed questionnaire was administered. The memorandum attached to the questionnaire explains the purpose for gathering this data. The reaction to this survey is just as significant from participants whose schools have become inactive, as it is from schools presently active, so I would appreciate your cooperation in devoting approximately twenty minutes to complete and return the questionnaire.

As explained in the memorandum, I will send a copy of the questionnaire data, when analyzed, to everyone who participates in the survey. Also, I will send you a copy of a programmed text that is presently being developed for ESCOE. The text concerns "Writing Behavioral Objectives for Occupational Education." It is well illustrated, and uses examples and terminology in occupational programs as well as in the academic subjects. You may reproduce the text for use in your own school. It is a document that ESCOE should have produced long ago for training teachers, but at least we have recognized its value and will have it produced before the project terminates here at the University of Massachusetts on June 30, 1972.

I would appreciate your returning the questionnaire as soon as possible in the enclosed envelope. If you want to receive the questionnaire data and the programmed text, please complete and return the enclosed address sheet, and the documents will be forwarded when completed. Anonymity will be maintained, so <u>do not</u> write your name on the questionnaire.

Thank you in advance for your cooperation and the best of luck in your endeavors!

Sincerely,

Alfred R. Rios, Director

APPENDIX B

SURVEY QUESTIONS

SURVEY QUESTIONNAIRE

The ESCOE questionnaire actually consisted of five different forms which varied across the five groups of respondents, i.e. (1) LEA Facilitators; (2) ESCOE staff; (3) LEA Administrators; (4) State Department Research Coordinating Unit (RCU) directors; (5) Test design consultants.

Appendix B displays a chart of all the survey questions, and identifies the respondent groups on whose questionnaires each question appeared.

CHART OF SURVEY QUESTIONS

FOR THE STUDY

QUESTIONS	Respondent Groups				
	FACILITATORS	ESCOE STAFF	LEA ADMINISTRATORS	R.C.U. DIRECTORS	TEST CONSULTANTS
1. The state in which you work: [ ] New York [ ] Massachusetts	X	X	X	X	
2. Your LEA is: [ ] Secondary [ ] Post-secondary [ ] Both	X		X		
3. Your LEA: [ ] Serves one city or town primarily [ ] Serves more than one city or town (regional)	X		X		
4. Your LEA curricula are: [ ] Primarily occupational [ ] Diverse (college, occupational, general, etc.)	X		X		
5. Approximately how many students are enrolled this year in vocational programs in your LEA? [ ] 500 or less [ ] 500-1000 [ ] over 1000	X		X		
6. Your position in your LEA (you may check more than one item): [ ] teacher [ ] department head [ ] administrator	X				

	FAC.	E. STAFF	LEA ADMIN.	R.C.U.	TEST
[ ] curriculum coordinator					
[ ] guidance counselor					
[ ] other (please specify)_____					
7. Your area of expertise (subject matter): _____	X				
8. P.L. 90-576 money has been allocated, in your state, to support the implementation of behavioral objectives strategies during FY 1973. (Check one)				X	
[ ] in an ESCOE LEA(s)					
[ ] in a non-ESCOE LEA(s)					
[ ] in both of the above					
[ ] in none of the above					
9. ESCOE should have included: (Check one)		X		X	
[ ] Fewer LEAs [ ] More LEAs					
[ ] Other (Specify)_____					
10. ESCOE memorandums were sent to you: (Check one)		X	X	X	
[ ] Too often [ ] Too seldom					
[ ] Just right					
11. ESCOE memorandums were informative, in keeping you aware of the activities and progress of the ESCOE project. (Check one)		X	X	X	
[ ] Not at all [ ] Completely					
[ ] Partly, but needed improvement					
12. Which component, as developed by ESCOE, will be most useful in the future in your state? (Check one)		X		X	
[ ] TrCo (Training)					

	FAC.	E. STAFF	LEA ADMIN.	R.C.U.	TEST
[ ] BODC (Behavioral Objectives)					
[ ] TeCo (Testing)					
13. Which component, as developed by ESCOE will be least useful in the future in your state? (Check one)		X		X	
[ ] TrCo [ ] BODC [ ] TeCo					
14. Who, in your opinion, would benefit most from using behavioral objectives in LEAs? (Please rank all items in order of importance)	X	X	X	X	X
[ ] Teachers [ ] Curriculum coordinators					
[ ] Administrators [ ] Students					
[ ] Department heads					
15. Instruction in LEAs, via behavioral objectives, would improve the effectiveness of training programs so that graduates are better prepared for specific job requirements. (Check one)		X		X	
[ ] Strongly Agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly Disagree					
16. Does writing behavioral objectives require special talent?		X	X	X	X
[ ] No [ ] Yes [ ] Don't know					
17. Check if you have participated in the following:	X				
[ ] wrote objectives for the ESCOE data bank					
[ ] synthesized objectives for ESCOE					
[ ] wrote blocks and units for ESCOE					

	FAC.	E. STAFF	LEA ADMIN.	R.C.U.	TEST
18. Who should write behavioral objectives for occupational programs? (Please rank all items in order of preference) [ ] Teachers [ ] Administrators [ ] Students [ ] Curriculum coordinators [ ] Department heads		X	X	X	X
19. Who, in your opinion should write/select objectives for a particular program in an LEA? (Please rank in order of preference) [ ] Students [ ] Subject area specialists [ ] Teachers [ ] The State board [ ] The local school administration [ ] Other (please specify)_____	X				
20. Who should select objectives for individual student programs? (Rank <u>all items</u> in order of preference) [ ] Students [ ] Subject area specialists [ ] Teachers [ ] State board [ ] Local school administration		X	X	X	X
21. Who should finance the development of describing the curricula in LEAs in terms of behavioral objectives? (Rank <u>all items</u> in order of preference) [ ] Federal government [ ] Local school districts [ ] State government		X	X	X	X
22. Objectives written by LEAs should be available: (Check one) [ ] Only within the LEA that wrote them	X	X	X	X	X

	FAC.	E. STAFF	LEA ADMIN.	R.C.U.	TEST
[ ] From a central source such as ESCOE (but with the anonymity of the LEAs kept intact)					
[ ] Other (Specify)_____					
23. Would a centrally coordinated data bank of behavioral objectives be useful to an LEA? (Check one)		X	X	X	X
[ ] Don't know [ ] No [ ] Yes					
24. Who should finance a central bank of objectives? (Check one)	X	X	X	X	X
[ ] State department [ ] LEAs					
[ ] Both, jointly					
25. In the future, the ESCOE model of developing behavioral objectives should be used to describe and evaluate the following aspects of the education system: (Check those with which you agree)	X	X	X	X	X
[ ] Administrative objectives					
[ ] Extra-curricular activities					
[ ] Parental involvement					
[ ] Industry/business input					
[ ] Only occupational programs					
[ ] The entire curriculum					
26. The test items that you helped develop came directly from:					X
[ ] Raw Objectives					
[ ] Synthesized Objectives					
[ ] Both					
[ ] Other (Specify)_____					

	FAC.	E. STAFF	LEA ADMIN.	R.C.U.	TEST
27. On your test items, students are marked: (Check one) [ ] Pass-fail [ ] Number grades [ ] Letter grades (A-B-C, etc.) [ ] A combination of above [ ] Other (Specify)_____					X
28. Your test items measure: (Check one) [ ] Process [ ] Product [ ] Both					X
29. Performance tests <u>should</u> measure: (Check one) [ ] Process [ ] Product [ ] Both					X
30. You were instructed to measure: (Check one) [ ] Process [ ] Product [ ] Both					X
31. Did you search for existing tests in occupational education in relation to measurement and behavioral objectives? (Check one) [ ] Yes [ ] No					X
32. If yes, did you find such a test(s)? (Check one) [ ] One only [ ] None [ ] Several [ ] Other (Specify)_____					X
33. If you found such a test(s), was it useful in developing your test items? (Check one) [ ] Very much [ ] A little [ ] Not at all					X
34. Performance tests should measure: (Check one) [ ] Degree of performance on test items [ ] Successful performance only (Based on specified minimum standards)	X	X	X	X	X

	FAC.	E. STAFF	LEA ADMIN.	R.C.U.	TEST
35. Which type of tests would you prefer for measuring student performance in LEAs? (Rank all items in order of preference) [ ] Standardized tests [ ] Tests "tailor-made" to your own objectives by such an agency as ESCOE [ ] Tests constructed by each teacher in your LEA	X	X	X	X	X
36. Do objective-based test results provide the best basis for accountability? (check one) [ ] Yes [ ] No [ ] Don't know	X	X	X	X	X
37. What kind of feedback on test data would be most useful to LEAs? (Rank all items in order of importance) [ ] How students compare with students in other LEAs [ ] How one teacher's students compare with another teacher's students [ ] How one state compares with another state in particular programs [ ] How each individual student performed on each test item	X	X	X	X	X
38. How important is it to you that your state be involved in the ESCOE model of test development and test administration? (Check one) [ ] Very important [ ] Important [ ] Not at all important	X	X	X	X	
39. How important is it that active teachers were involved in the ESCOE model of test development? (Check one) [ ] Very important [ ] Important					X

	FAC.	E. STAFF	LEA ADMIN.	R.C.U.	TEST
[ ] Not at all important					
40. Who should administer performance tests aimed at LEA accountability? (Rank all items in order of preference)	X	X	X	X	X
[ ] State departments of education					
[ ] ESCOE or other neutral agency					
[ ] Each LEA on its own					
[ ] There should be no testing					
41. If objective-based performance tests were used to evaluate student achievement, how often should the LEAs receive test results feedback? (Check one or more)	X	X	X	X	X
[ ] Weekly [ ] End of semester					
[ ] Monthly [ ] End of year					
[ ] Quarterly [ ] End of program					
[ ] Mid-semester					
42. The ESCOE model is aimed at evaluating student performance on stated behavioral objectives. What other kinds of evaluation would be useful in LEAs? (Rank all items in order of importance)	X	X	X	X	X
[ ] Evaluation of teaching methods and techniques					
[ ] Cost-effectiveness studies					
[ ] Evaluation of alternative learning activities					
[ ] Success of students in post-secondary education and/or job					
43. Would a state-wide evaluation system based on behavioral objectives be beneficial for occupational education? (Check one)		X	X	X	X

	FAC.	E. STAFF	LEA ADMIN.	R.C.U.	TEST
[ ] Don't know [ ] Yes [ ] No					
44. Who would benefit the most from a statewide evaluation system? (Rank in order of importance) [ ] Teachers [ ] Local school systems [ ] Students [ ] Federal government [ ] No one [ ] Business and industry [ ] State departments of education [ ] Other (please specify)_____	X	X	X	X	X
45. Is there a need to train occupational education personnel as specialists in evaluation? (Check one) [ ] Yes [ ] No [ ] Don't know	X	X	X	X	X
46. If you answered No to question 45, who should design evaluation techniques for occupational education? (Check one) [ ] Non-occupational specialists in educational evaluation [ ] Non-educational experts from business/industry [ ] Other (Specify)_____	X	X	X	X	X
47. A state department certification examination for students in specific occupational education programs is by far the most effective means of measuring student performance and achievement. (Check one) [ ] Strongly Agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly Disagree	X	X	X	X	X
48. LEAs should exchange, systematically, information about teaching methods.					

	FAC.	E. STAFF	LEA ADMIN.	R.C.U.	TEST
(a) In the same state: (Check one) [ ] Strongly Agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly Disagree	X	X	X	X	X
49. (b) Across states as well: (Check one) [ ] Strongly Agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly Disagree	X	X	X	X	X
50. Identify alternative methods which you believe would increase student achievement. (Rank all items in order of importance) [ ] Open campus [ ] Statewide standards [ ] Self-paced learning [ ] Modular curriculum [ ] Non-graded curriculum [ ] Continuous monitoring of student progress [ ] Programmed learning materials	X	X	X	X	X
51. The Evaluation Service Center has been primarily: (Check one) [ ] Student-oriented [ ] Teacher-oriented [ ] Administrator-oriented [ ] Neutral [ ] State department of education oriented	X	X	X	X	X
52. In general, the Evaluation Service Center has achieved its stated goals in the areas of behavioral objective development and training. (Check one) [ ] Strongly Agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly Disagree	X	X	X	X	X

	FAC.	E. STAFF	LEA ADMIN.	R.C.U.	TEST
53. Facilitator(s) from your LEA kept you aware of the activities and progress of the ESCOE project. (Check one) [ ] Not at all [ ] Completely [ ] Partly, but needed improvement			X		
54. For approximately what percentage of occupational education programs in your LEA did teachers write behavioral objectives? (Please circle one) 0% 25% 50% 75% 100%	X				
55. Were blocks and units developed by ESCOE in occupational programs for which your LEA wrote objectives? (Check one) [ ] None [ ] Mostly [ ] Partly [ ] All	X				
56. Are the teachers/facilitators in your LEA satisfied with the blocks (major topics) and units developed for their programs by ESCOE? (Check one) [ ] Yes, completely satisfied [ ] Almost totally satisfied [ ] With minor reservations	X				
57. "Classification of objectives by domains (Psychomotor, Cognitive, Affective) is essential." (Check one) [ ] Strongly Agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly Disagree	X				
58. Is the classification of objectives by related subjects useful? (Check one) [ ] Yes [ ] No [ ] Don't know	X				

	FAC.	E. STAFF	LEA ADMIN.	R.C.U.	TEST
59. If yes, to whom is this most useful? (Rank in order of preference) [ ] To students [ ] To administrators [ ] To teachers [ ] To department heads [ ] To curriculum coordinators	X				
60. Far too little attention has been paid by ESCOE to developing objectives in the affective domain. (Check one) [ ] Strongly Agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly Disagree	X				
61. The main reason(s) more objectives did not get written in your LEA was: (Rank in order of importance) [ ] Lack of financial compensation [ ] Lack of adequate time [ ] Lack of administrative support [ ] Lack of cooperation on the part of the faculty [ ] Other (Please specify)_____	X				
62. In your LEAs did facilitators or teachers who wrote objectives receive any released time to do ESCOE work? [ ] Facilitators received time [ ] Teachers received time [ ] Neither received time	X				
63. If either received time released, how was this time made available to them? Teachers Facilitators [ ] Given one less class than usual [ ] this year	X				

	FAC.	E. STAFF	LEA ADMIN.	R.C.U.	TEST
Teachers / Facilitators					
[ ] Relieved of the responsibility of an extra-curricular activity. [ ]					
[ ] An outside substitute took one or more classes occasionally. [ ]					
[ ] School made provision for curriculum or "free" days when students were not in school. [ ]					
[ ] Other (Specify)_____ [ ]					
64. Did teachers who wrote behavioral objectives in your LEA volunteer to do so? [ ] Yes [ ] No [ ] Don't know	X				
65. Did you volunteer as an ESCOE facilitator? [ ] Yes [ ] No	X				
66. If yes, what were your reasons for deciding to participate? (Rank in order of preference)	X				
[ ] Dissatisfaction with present teaching methods					
[ ] Dissatisfaction with student progress					
[ ] Dissatisfaction with levels of student interest					
[ ] In order to learn about objectives					
[ ] To gain knowledge about devising/using performance measures					
[ ] To gain in-school credits					
[ ] To acquire professional status					
67. For your duties as a facilitator you received:		X			
[ ] Professional Credit					

	FAC.	E. STAFF	LEA ADMIN.	R.C.U.	TEST
[ ] Monetary Compensation from your LEA					
[ ] Other benefits (Specify)_____					
[ ] None of the above					
68. Do you feel that your LEA could have developed objectives that were even more meaningfully and completely stated?	X				
[ ] Yes [ ] Maybe [ ] No					
Could you list some ways in which this might have been achieved?					
_____					
_____					
69. Did the field visits made by ESCOE staff to your LEA satisfactorily meet your needs?	X				
[ ] No, not at all - 0%					
[ ] Not quite - 25%					
[ ] Reasonably well - 50%					
[ ] Very well - 75%					
[ ] Yes, completely - 100%					
[ ] No field visits were made					
70. If ESCOE staff visited your LEA, for what purpose did they come?	X				
[ ] Teacher orientation and training					
[ ] Administrator orientation					
[ ] To edit and code objectives					
[ ] To give you training materials, publications, print-outs, forms, etc.					
[ ] No visits were made					
71. Would it have been significantly helpful to you as a facilitator if ESCOE staff had	X				

	FAC.	E. STAFF	LEA ADMIN.	R.C.U.	TEST
made <u>regular</u> visits to your LEA throughout the year (for instance, once every 2 weeks or once a month)?					
[ ] Yes, significantly helpful					
[ ] No, not significantly helpful					
72. Would you have liked more facilitators' training conferences to have been held during the year?	X				
[ ] Yes [ ] No [ ] No opinion					
73. What were the most useful components of the facilitator training conference(s)? (Rank in order of importance)	X				
[ ] Workshop sessions					
[ ] Visual presentations					
[ ] Small group meetings					
[ ] Informal rap sessions					
[ ] Guest lectures					
[ ] Participant discussions					
[ ] Other (Specify)_____					
74. Which of the following ESCOE publications were found to be most useful in your LEA? (Rank in order of usefulness, if you check more than one.)	X				
[ ] Technical Report #1 (March 1971)					
[ ] Behavioral Objective Training Package (October 1971)					
[ ] Synthesized Objective Instructional Manual (October 1971)					
[ ] Other (Specify)_____					
[ ] None					

	FAC.	E. STAFF	LEA ADMIN.	R.C.U.	TEST
75. How easily were you able to understand the following:	X				
Raw Objective Printouts					
[ ] Very Easily [ ] Fairly Easily [ ] With Difficulty					
Raw Objective Matrices					
[ ] Very Easily [ ] Fairly Easily [ ] With Difficulty					
Block and Unit Breakdowns					
[ ] Very Easily [ ] Fairly Easily [ ] With Difficulty					
Synthesized Objective Matrices					
[ ] Very Easily [ ] Fairly Easily [ ] With Difficulty					
Synthesized Objective Printouts					
[ ] Very Easily [ ] Fairly Easily [ ] With Difficulty					
Of these, which did you find to be the most useful?					
_____					
_____					
Could you please say why?					
_____					
_____					

	FAC.	E. STAFF	LEA ADMIN.	R.C.U.	TEST
76. If the ESCOE project were expanded to include more states, the result would be: (Rank in order of preference if you choose more than one.) [ ] Sharing of costs [ ] More confusion [ ] Broader base of objectives and test items [ ] More standardization [ ] Other (Specify)_____	X				
77. Did you request printouts of raw objectives written by other LEAs? [ ] Yes [ ] No	X				
78. If yes, did you receive these promptly? [ ] Yes [ ] No	X				
79. To what use did your LEA put those raw objective printouts received from ESCOE? [ ] For comparative purposes [ ] To get new ideas for writing objectives [ ] To make sure objectives were received by ESCOE and inserted in the data bank [ ] To build a broader curriculum base [ ] Other (Specify)_____	X				
80. "The model developed by ESCOE for synthesizing objectives, for processing these, and for receiving feedback on them is a valid one." [ ] Yes [ ] Yes, with some alterations [ ] Don't know [ ] No, unless refined considerably [ ] No	X				

APPENDIX C

SAMPLE BLOCK AND UNIT BREAKDOWNS

EVALUATION SERVICE CENTER FOR OCCUPATIONAL EDUCATION

BLOCK & UNIT BREAKDOWNS

Block and Unit breakdowns (taxonomies) are essentially topical outlines of instructional programs. In general, they represent the goals of the curricula as submitted by instructors from various occupational programs across New York and Massachusetts. The breakdowns were not recommended as ideal courses of study. However, it was intended that they would be reasonably inclusive, so that most instructors in the particular fields could classify their own program goals within the framework of the breakdowns. The aim was to provide for the storage and retrieval of information from a central data bank according to mutually agreeable classification schemes for occupational subjects.

EVALUATION SERVICE CENTER FOR OCCUPATIONAL EDUCATION

BLOCK AND UNIT BREAKDOWN

Auto Mechanics

Code	Block	Code	Unit
01	Power Train	01	Engine
		02	Transmission, Standard
		03	Transmission, Automatic
		04	Clutch
		05	Rear End
		06	Driving Line
		07	Cooling
		99	Combination of Units
02	Fuel & Exhaust	01	Carburetor
		02	Fuel Delivery
		03	Exhaust
		04	Exhaust Emission
		05	Pollution Control Valve
		99	Combination of Units
03	Electrical	01	Ignition
		02	Lighting
		03	Accessory
		04	Charging
		05	Starting
		06	Storage Battery
		99	Combination of Units
04	Chassis & Body	01	Front Suspension
		02	Rear Suspension
		03	Steering (power)
		04	Steering (standard)
		05	Windows & Doors
		06	Accessory
		07	Lubrication
		08	Appearance
		09	Tires
		10	Wheel Bearings (front)
		11	Wheel Bearings (rear)
		12	Brakes (power)
		13	Brakes (disc)
		14	Brakes (standard)
		99	Combination of Units

BLOCK AND UNIT BREAKDOWN

Auto Mechanics

Code	Block	Code	Unit
05	Basic Equipment & Tools	01	Jacking
		02	Grinding & Drilling
		03	Housekeeping
		04	Soldering
		05	Torch Work
		99	Combination of Units
06	Record Keeping	01	Billing
		02	Repair Orders
		03	Use of Manuals
		04	Inventory
		99	Combination of Units
07	Automotive Electronics	01	Introduction to Solid State Electronics
		02	Meters
		03	Components
		04	Construction & Repair Techniques
		05	Circuits
		06	Diagnosis & Repairs
		99	Combination of Units

EVALUATION SERVICE CENTER FOR OCCUPATIONAL EDUCATION

BLOCK AND UNIT BREAKDOWN

Practical Nursing

Code	Block	Code	Unit
01	Human Body	01	General Plan
		02	Cells, Tissues, Membranes
		03	Skin
		04	Bones, Muscles
		05	Digestive System
		06	Heart
		07	Blood Vessels
		08	Blood
		09	Lymphatic System
		10	Respiratory System
		11	Urinary System
		12	Endocrine System
		13	Reproductive System
		14	Brain
		15	Spinal Cord and Nerves
		16	Sensory System
		99	Combination of Above
02	Microbiology	01	Definition
		02	History
		03	Characteristics
		04	Classification
		05	Pathogenic Microorganisms
		06	Environment for Growth & Reproduction
		07	Methods of Destruction
		08	Infection
		09	Body Defenses
		10	Environmental Control
		99	Combination of Above
03	Nutrition	01	Balanced Diet
		02	Carbohydrates
		03	Proteins
		04	Fats
		05	Energy Requirements
		06	Minerals
		07	Vitamins
		08	Digestion
		09	Age Group Needs
		10	Planning Menus
		11	Cooking
		12	Food and Health

BLOCK AND UNIT BREAKDOWN

Practical Nursing

Code	Block	Code	Unit
	Nutrition (continued)	13	Cultural Patterns
		14	Care and Protection
		15	Fads and Fallacies
		99	Combination of Above
04	Fundamentals	01	Guides for Action
		02	Environment
		03	Medical Asepsis
		04	Body Mechanics
		05	Beds
		06	Posture and Exercise
		07	Admissions and Discharges
		08	Recording and Reporting
		09	Observation
		10	Vital Signs
		11	Physical Examination
		12	Hygiene
		13	Comfort Measures
		14	Feeding
		15	Breathing
		16	Elimination
		17	Diagnostic and Medical Measures
		18	Wound Care
		19	Bandages and Dressings
		20	Heat and Cold Applications
		21	First Aid
		22	The Dying and Dead
		23	Medications
		99	Combination of Above
05	The Practical Nurse	01	Definition
		02	The Student Nurse
		03	Problem Solving Techniques
		04	History
		05	Nursing Education
		06	The Health Team
		07	Patterns of Nursing
		08	The Hospital
		09	Interpersonal Relationships
		10	Spiritual and Cultural Considerations
		11	Ethics
		12	The Law
		13	Organizations
		14	Job Opportunities

BLOCK AND UNIT BREAKDOWN

Practical Nursing

Code	Block	Code	Unit
	The Practical Nurse (continued)	15	Continuing Education
		99	Combination of Above
06	Human Behavior	01	Rationale
		02	Terminology
		03	The Human Being
		04	Influences
		05	Personality
		06	Learning
		07	Emotions and Behavior
		08	Adjustment Patterns
		09	Behavioral Problems
		10	Illness
		99	Combination of Above
07	Growth and Development	01	Rationale
		02	Terminology
		03	Nature
		04	Familial Influences
		05	Child Rearing
		06	Prenatal Period
		07	Neo-Natal (0-4 wks)
		08	Infant (4 wks - 1 yr)
		09	Toddler (1 yr - 3 yrs)
		10	Pre-schooler (3 yrs - 6 yrs)
		11	School Age (6 yrs - 10 yrs)
		12	Pre-puberty (10 yrs - 12 yrs)
		13	Adolescence (12 yrs - 18 yrs)
		14	Young Adulthood
		15	Middle Age
		16	The Aged
		17	Deterrants to Normal Growth and Development
		99	Combination of Above
08	Pharmacology	01	Drug Standards and Legislation
		02	Sources
		03	Various Forms
		04	Effects
		05	Abbreviations
		06	Arithmetic
		07	Weights and Measures
		08	Fractional Dosages
		09	Solutions
		10	Syringes

BLOCK AND UNIT BREAKDOWN

Practical Nursing

Code	Block	Code	Unit
	Pharmacology (continued)	11	Rules in Handling Medicines
		12	Classification
		13	Combination of Above
09	Care of Adults	01	Basic Concepts
		02	Nursing Care Plan
		03	Allergies
		04	Surgery
		05	Cancer
		06	Prolonged Illness
		07	The Geriatric
		08	Rehabilitation
		09	Respiratory Disorders
		10	Disorders of the Blood
		11	Cardio-vascular Disorders
		12	Gastro-intestinal Disorders
		13	Urinary Disorders
		14	Disorders of the Reproductive System
		15	Endocrine Disorders
		16	Neurological Disorders
		17	Musculo-skeletal Disorders
		18	Eye and Ear Disorders
		19	Disorders of the Skin
		20	Mental Illness
		21	Emergency and Disaster
		99	Combination of Above
10	Diet Therapy	01	Hospital Diets
		02	Modification of Diets
		03	Weight Control
		04	High Caloric
		05	Diabetic
		06	Protein Controlled
		07	Gastro-intestinal Disorders
		08	Cardio-vascular Disorders
		09	Renal Disorders
		10	Allergies
		11	Metabolic Disorders
		12	Pregnancy
		13	Lactation
		14	Newborn and Infants
		15	Children and Adolescents
		16	Adults
		99	Combination of Above

BLOCK AND UNIT BREAKDOWN

Practical Nursing

Code	Block	Code	Unit
11	Drug Therapy	01	Legal Responsibilities
		02	Limitations
		03	Anesthetics
		04	Anti-neoplastics
		05	Anti-infectives
		06	Skin Disorders
		07	Blood Disorders
		08	Cardio-vascular Disorders
		09	Respiratory Disorders
		10	Gastro-intestinal Disorders
		11	Genito-Urinary Disorders
		12	Endocrine Disorders
		13	Neurological Disorders
		14	Musculo-skeletal Disorders
		15	Eye Disorders
		16	Ear Disorders
		99	Combination of Above
12	Maternity	01	Prenatal Development
		02	Preparation
		03	Problems of Pregnancy
		04	Labor
		05	Delivery
		06	Post-partum
		07	Newborn
		08	Health Regulations
		09	Family Planning
		99	Combination of Above
13	Pediatrics	01	Child Welfare
		02	Child Care
		03	Healthy Child
		04	Ill Child
		05	Hospitalization
		06	Disorders of Infant
		07	Disorders of Toddler
		08	Disorders of Preschooler
		09	Disorders of School Ager
		10	Disorders of Adolescent
		11	Special Needs and Abnormalities
		99	Combination of Above

APPENDIX D

COMPUTER CARD FORMAT

FOR ESCOE SURVEY QUESTIONNAIRE

COMPUTER CARD FORMAT

FOR ESCOE SURVEY QUESTIONNAIRE

Card Number	Card Column	Question Number	Variable Name	Data Specification
1	1	1	STATE	State in which employed: 1 = New York 2 = Massachusetts
1	2	2	YOURLEA	Type of LEA: 1 = Secondary 2 = Post Secondary 3 = Both 4 = Other
1	3	3	SERVES	Type of community served: 1 = One city or town 2 = More than one 3 = Other
1	4	4	CURRICUL	Type of curricula: 1 = Primarily occupational 2 = Diverse 3 = Other
1	5	5	STUENROL	Enrollment in vocational programs: 1 = 500 or less 2 = 500 to 1000 3 = Over 1000
		6		Staff position of respondent:
1	6		POSITIOH	Highest Rank
1	7		POSITIOS	Second Rank 1 = Administrator 2 = Coordinator 3 = Department head 4 = Counselor 5 = Teacher 6 = Other
1	8		POSITIOQ	Quantity ranked: 1 = One 2 = Two 3 = Three 4 = Four 5 = Five 6 = Six

Note: The question numbers in the Computer Card Format above refer to the survey questions in Appendix B.

Card Number	Card Column	Question Number	Variable Name	Data Specification
1	9-10	7	EXPERTIS	Subject expertise of respondents: 1 = Accounting 2 = Automotive 3 = Drafting 4 = Business Education 5 = Machine Shop Math 6 = Photography 7 = Banking 8 = Electricity 9 = Metal Fabrication 10 = Foreign Language 11 = Electronics 12 = Community Planning 13 = Practical Nursing 14 = Child Psychology Nursing 15 = Machine Shop 16 = Cabinet Making 17 = Mechanical Technology 18 = Health Technology 19 = Carpentry 20 = Distribution and Marketing 21 = Data Processing
1	11			Blank
1	12	8	PUBLAW	Federal money allocated by states: 1 = In ESCOE LEA(s) 2 = In non-ESCOE LEA(s) 3 = Both of above 4 = None of above
1	13	9	LEAS	ESCOE should have included: 1 = Fewer LEAs 2 = More LEAs 3 = Other
1	14	10	MEMOSENT	ESCOE memos were sent: 1 = Too often 2 = Too seldom 3 = Just right
1	15	11	MEMOINFO	ESCOE memos were informative: 1 = Not at all 2 = Partly 3 = Completely

Card Number	Card Column	Question Number	Variable Name	Data Specification
1	16	12	MUSECOMP	Most useful ESCOE component: 1 = Training 2 = Developing objectives 3 = Developing tests
1	17	13	LUSECOMP	Least useful ESCOE component: 1 = Training 2 = Developing objectives 3 = Developing tests
		14		Who benefits most from using objectives in LEAs:
1	18		BEUSEBOH	Highest Rank
1	19		BEUSEBOL	Lowest Rank
1	20		BEUSEBOS	Second Rank 1 = Teachers 2 = Administrators 3 = Students 4 = Coordinators 5 = Department heads
1	21		BEUSEBOQ	Quantity Ranked 1 = One 2 = Two 3 = Three 4 = Four 5 = Five
1	22	15	BOIMPEFF	Objectives would improve instructional effectiveness: 1 = Strongly agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree
1	23	16	BOTALENT	Writing objectives requires special talent: 1 = No 2 = Yes 3 = Don't Know
		17		Respondent participation in ESCOE:
1	24		WROTE	Wrote objectives
1	25		SYNTHESI	Synthesized objectives
1	26		BLOCUNIT	Generated Blocks and Units 1 = Yes 2 = No

Card Number	Card Column	Question Number	Variable Name	Data Specification
1	27	17	QUANTITY	Quantity checked 1 = One 2 = Two 3 = Three 4 = None
		18		Who should write behavioral objectives:
1	28		WHOWRITH	Highest Rank
1	29		WHOWRITL	Lowest Rank 1 = Department heads 2 = Paid teachers 3 = Each teacher
		19		Who should write/select objectives for LEAs:
1	30		WRITSELH	Highest Rank
1	31		WRITSELS	Second Rank 1 = Students 2 = Teachers 3 = Specialists 4 = State Board 5 = Local administrators 6 = Other
1	32		WRITSELQ	Quantity Ranked 1 = One 2 = Two 3 = Three 4 = Four 5 = Five 6 = Six
		20		Who should select objectives for individual student programs:
1	33		WHOSELEH	Highest Rank
1	34		WHOSELEL	Lowest Rank 1 = Students 2 = Teachers 3 = Specialists 4 = State Board 5 = Local Administrators
		21		Who should finance objectives development in LEAs:
1	35		FINANCEH	Highest Rank
1	36		FINANCEL	Lowest Rank 1 = Federal 2 = Local 3 = State

Card Number	Card Column	Question Number	Variable Name	Data Specification
1	37	22	BOSAVAIL	Objectives should be available: 1 = Only within the LEA 2 = From a central source 3 = Other
1	38	23	CENTBANK	Would a central objectives bank be useful: 1 = Don't know 2 = No, 3 = Yes
1	39	24	FINABANK	Who should finance objectives banks: 1 = State 2 = LEAs, 3 = Both
		25		ESCOE-type objectives to evaluate:
1	40		ADMINOBJ	Administrative objectives
1	41		EXCURACT	Extra-curricular activities
1	42		PARNTINV	Parental involvement
1	43		INDBUSIN	Industry and business input
1	44		ONLYOCCU	Only occupational programs
1	45		ENTRCURR	Entire curriculum 1 = Agree 2 = Disagree
1	46-48			Blank
1	49	26	TESTFROM	Test items came from: 1 = Raw objectives 2 = Synthesized objectives 3 = Both, 4 = Other
1	50	27	MARKED	On test items, students are marked: 1 = Pass-fail 2 = Letter grades 3 = Number grades 4 = Combination of above 5 = Other
1	51	28	MEASURES	Test items measure: 1 = Process 2 = Product, 3 = Both
1	52	29	PERFTEST	Performance tests should measure: 1 = Process 2 = Product, 3 = Both

Card Number	Card Column	Question Number	Variable Name	Data Specification
1	53	30	INSTRUCT	Instructed to measure: 1 = Process 2 = Product 3 = Both
1	54	31	SEARCH	Search for existing tests: 1 = Yes 2 = No
1	55	32	FINDTEST	Tests found: 1 = One only 2 = None 3 = Several 4 = Other
1	56	33	IFFOUND	Were they useful: 1 = Very much 2 = A little 3 = Not at all
1	57	34	TESTMEAS	Performance tests should measure: 1 = Degree of performance 2 = Successful performance only
		35		Type of tests preferred:
1	58		TYPTESTH	Highest Rank
1	59		TYPTESTL	Lowest Rank
1	60		TYPTESTS	Second Rank 1 = Standardized 2 = Tests tailor-made 3 = Teacher-made 4 = Other
1	61		TYPTESTQ	Quantity Ranked 1 = One 2 = Two 3 = Three 4 = Four
1	62	36	OBJBASED	Objective-based tests for accountability: 1 = Yes 2 = No 3 = Don't know
		37		Feedback useful to LEAs:
1	63		FDBTESTH	Highest Rank
1	64		FDBTESTL	Lowest Rank

Card Number	Card Column	Question Number	Variable Name	Data Specification
1	65	37	FDBTESTS	Second Rank 1 = Comparing students (LEAs) 2 = Comparing students (teachers) 3 = Compare states 4 = Individual performance
1	66		FDBTESTQ	Quantity Ranked 1 = One 2 = Two 3 = Three 4 = Four
1	67	38	INVOLVED	State involvement in test development: 1 = Very important 2 = Important 3 = Not important
1	68	39	TEACHTES	Teachers involvement in test development: 1 = Very important 2 = Important 3 = Not important
		40		Who should administer performance tests:
1	69		WHOADTEH	Highest Rank
1	70		WHOADTEL	Lowest Rank
1	71		WHOADTES	Second Rank 1 = State 2 = ESCOE - Neutral 3 = LEA 4 = No testing 5 = Other
1	72		WHOADTEQ	Quantity Ranked 1 = One 2 = Two 3 = Three 4 = Four 5 = Five
1,2,3	73		GROUP	Respondent-group identification: 1 = LEA facilitator 2 = ESCOE staff member 3 = LEA administrator 4 = RCU director 5 = Test consultant

Card Number	Card Column	Question Number	Variable Name	Data Specification
1,2,3	74-75			Respondent identification number: 1 = Respondent number one 2 = Respondent number two and so forth through Respondent number 71.
1,2,3	76-79			Name of investigator: RIOS
1,2,3	80			Computer card number: 1 = Card one 2 = Card two 3 = Card three
		41		Test results should be reported:
2	1		TEREFBWY	Weekly
2	2		TEREFBMY	Monthly
2	3		TEREFBQY	Quarterly
2	4		TEREFBMS	Mid-semester
2	5		TEREFBES	End of semester
2	6		TEREFBEY	End of year
2	7		TEREFBEP	End of program 1 = Agree 2 = Disagree
2	8		TEREFBQC	Quantity checked 1 = One 2 = Two 3 = Three 4 = Four 5 = Five 6 = Six 7 = Seven
		42		Other kinds of evaluation:
2	9		OTHKDEVH	Highest Rank
2	10		OTHKDEVL	Lowest Rank
2	11		OTHKDEVS	Second Rank 1 = Evaluation of teaching methods 2 = Cost effectiveness 3 = Alternative learning activities 4 = Success of students after high school
2	12		OTHKDEVQ	Quantity Ranked 1 = One 2 = Two 3 = Three 4 = Four

Card Number	Card Column	Question Number	Variable Name	Data Specification
2	13	43	STWIDEEV	Need for a statewide evaluation: 1 = Don't know 2 = Yes 3 = No
		44		Who would benefit the most:
2	14		BENEFMOH	Highest Rank
2	15		BENEFMOL	Lowest Rank
2	16		BENEFMOS	Second Rank
				1 = Teachers 2 = Students 3 = State departments of education 4 = Local school systems 5 = Federal government 6 = Business and industry 7 = No one 8 = Other
2	17		BENEFMOQ	Quantity Ranked 1 = One 2 = Two 3 = Three 4 = Four 5 = Five 6 = Six 7 = Seven 8 = Eight
2	18	45	TRAINSPE	Need to train evaluation specialists: 1 = Yes 2 = No 3 = Don't know
2	19	46	DESIGNEV	If No, who should design evaluation techniques: 1 = Non-occupational specialists in education 2 = Non-educational experts in business/industry 3 = Other
2	20	47	CERTEXAM	Need for a state certification exam: 1 = Strongly agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly disagree

Card Number	Card Column	Question Number	Variable Name	Data Specification
2	21	48	EXINSTAT	In-state exchange of teaching methods: 1 = Strongly agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly disagree
2	22	49	EXACSTAT	Across-state exchange of teaching methods: 1 = Strongly agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly disagree
		50		Methods to increase student achievement:
2	23		ALTRMTDH	Highest Rank
2	24		ALTRMTDL	Lowest Rank
2	25		ALTRMTDS	Second Rank 1 = Open campus 2 = Statewide standards 3 = Self-paced learning 4 = Modular curriculum 5 = Non-graded curriculum 6 = Monitoring progress 7 = Programmed materials 8 = Other
2	26		ALTRMTDQ	Quantity Ranked 1 = One 2 = Two 3 = Three 4 = Four 5 = Five 6 = Six 7 = Seven 8 = Eight
2	27	51	ORIENTED	ESCOE was primarily: 1 = Student oriented 2 = Teacher oriented 3 = Administrator oriented 4 = State department oriented
2	28-33			Blank

Card Number	Card Column	Question Number	Variable Name	Data Specification
2	34	52	ACHGOALS	Goals achieved in training and objectives development: 1 = Strongly agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly disagree
2	35	53	AWAREPRO	Kept aware of ESCOE progress: 1 = Not at all 2 = Partly 3 = Completely
2	36	54	LEAPROBS	Percentage of programs for which teachers wrote objectives: 1 = 0% 2 = 25% 3 = 50% 4 = 75% 5 = 100%
2	37	55	BLUNDEV	ESCOE blocks and units for LEA programs: 1 = None 2 = Partly 3 = Mostly 4 = All
2	38	56	SATISFAC	Satisfaction with blocks and units: 1 = Completely 2 = Almost totally 3 = With minor reservations 4 = Seriously dissatisfied 5 = Completely dissatisfied
2	39	57	DOMAINS	Classification by domains is essential: 1 = Strongly agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly disagree
2	40	58	RELSUBJ	Is related subjects classification useful: 1 = Yes 2 = No 3 = Don't know

Card Number	Card Column	Question Number	Variable Name	Data Specification
		59		To whom most useful:
2	41		TOWHOMH	Highest Rank
2	42		TOWHOMS	Second Rank 1 = Students 2 = Coordinators 3 = Administration 4 = Department heads 5 = Teachers 6 = Others
2	43		TOWHOMQ	Quantity Ranked 1 = One 2 = Two 3 = Three 4 = Four 5 = Five 6 = Six
2	44	60	AFFECTIV	Too little attention on affective domain: 1 = Strongly agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly disagree
		61		Not written because:
2	45		NOTWRITH	Highest Rank
2	46		NOTWRITS	Second Rank 1 = Lack of pay 2 = Lack of time 3 = Lack of administration support 4 = Lack of faculty cooperation 5 = Other
2	47		NOTWRITQ	Quantity Ranked 1 = One 2 = Two 3 = Three 4 = Four 5 = Five
		62		Released time provided for:
2	48		RELFACIL	Facilitators
2	49		RELTEACH	Teachers 1 - Yes 2 = No

Card Number	Card Column	Question Number	Variable Name	Data Specification
		63		Kind of released time:
2	50		KINDTCHH	Highest Rank, teachers
2	51		KINDTCHS	Second Rank, teachers
2	53		KINDFACH	Highest Rank, facilitators
2	54		KINDFACS	Second Rank, facilitators 1 = Students sent home 2 = Substitute teacher 3 = Teach one less class 4 = No extra duties 5 = Other
2	52		KINDTCHQ	Quantity Ranked
2	55		KINDFACQ	Quantity Ranked 1 = One 2 = Two 3 = Three 4 = Four 5 = Five
2	56	64	TEACHVOL	Teachers volunteered to write: 1 = Yes 2 = No 3 = Don't know 4 = Yes and No
2	57	65	FACILVOL	Facilitators volunteered to write: 1 = Yes 2 = No
		66		Reasons for participating:
2	58		REASONH	Highest Rank
2	59		REASONS	Second Rank 1 = Dissatisfaction with present teaching methods 2 = Dissatisfaction with student progress 3 = Dissatisfaction with levels of student interest 4 = To learn about objectives 5 = Knowledge about performance measures 6 = Gain in-school credit 7 = Acquire professional status 8 = Other
2	60		REASONQ	Quantity Ranked 1 = One

Card Number	Card Column	Question Number	Variable Name	Data Specification
		66		2 = Two 3 = Three 4 = Four 5 = Five 6 = Six 7 = Seven 8 = Eight
		67		Facilitators received professional:
2	61		CREDIT	Credit
2	62		MONEY	Money
2	63		OTHERBEN	Other benefits 1 = Yes 2 = No
2	64		QUANCHEK	Quantity Checked 1 = One 2 = Two 3 = Three
2	65	68	COMPLTBO	LEA could have developed more meaningful objectives: 1 = Yes 2 = Maybe 3 = No
2	66	69	VISITSAT	ESCOE visits satisfactory to needs: 1 = Not at all 2 = Not quite 3 = Reasonably well 4 = Very well 5 = Completely 6 = No visits were made
		70		Purpose of ESCOE visits:
2	67		PURVISIH	Highest Rank
2	68		PURVISIS	Second Rank 1 = Teacher orientation-training 2 = Administrator orientation 3 = Edit and code objectives 4 = Deliver materials 5 = No visits
2	69		PURVISIQ	Quantity Ranked 1 = One 2 = Two 3 = Three 4 = Four 5 = Five

Card Number	Card Column	Question Number	Variable Name	Data Specification
2	70	71	REGVISIT	Regular visits were needed: 1 = Yes 2 = No
2	71	72	FACONFER	More facilitators' conferences needed: 1 = Yes 2 = No 3 = No opinion
		73		Most useful training component:
2	72		TRAINCOH	Highest Rank
3	1		TRAINCOS	Second Rank 1 = Workshops 2 = Visuals 3 = Small groups 4 = Informal raps 5 = Guests 6 = Discussions 7 = Other
3	2		TRAINCOQ	Quantity Ranked 1 = One 2 = Two 3 = Three 4 = Four 5 = Five 6 = Six 7 = Seven
		74		Most useful ESCOE publications:
3	3		PUBLICAH	Highest Rank
3	4		PUBLICAS	Second Rank 1 = Technical Report #1 2 = Objectives Training Package 3 = SYNOB Manual 4 = Other 5 = None
3	5		PUBLICAQ	Quantity Ranked 1 = One 2 = Two 3 = Three 4 = Four
		75		How easily understood:
3	6		RAWOBPRT	Raw objective printout
3	7		RAWOBMAT	Raw objective matrices
3	8		BLBKDWN	Block and unit breakdowns
3	9		SYNOBMAT	Synthesized objective matrices

Card Number	Card Column	Question Number	Variable Name	Data Specification
3	10	75	SYNOBPRT	Synthesized objective printouts 1 = Very easily 2 = Fairly easily 3 = With difficulty
3	11		MOSTUSE	Which were most useful 1 = Rawob printout 2 = Rawob matrices 3 = Block and unit breakdowns 4 = Synob matrices 5 = Synob printouts
		76		Expansion to more states means:
3	12		EXPANDH	Highest Rank
3	13		EXPANDS	Second Rank 1 = Share costs 2 = Confusion 3 = Broader base 4 = More standardization 5 = Other
3	14		EXPANDQ	Quantity Ranked 1 = One 2 = Two 3 = Three 4 = Four 5 = Five
3	15	77	REQUEST	Requested objectives from other LEAs: 1 = Yes 2 = No
3	16	78	PROMPTLY	Were they promptly received: 1 = Yes 2 = No
		79		LEAs used ESCOE objectives:
3	17		USEBOPTH	Highest Rank
3	18		USEBOPTS	Second Rank 1 = Comparison 2 = Ideas for writing objectives 3 = Build broad-base curriculum 4 = Verify receipt and inclusion by ESCOE 5 = Other
3	19		USEBOPTQ	Quantity Ranked 1 = One 2 = Two

Card Number	Card Column	Question Number	Variable Name	Data Specification
		79		3 = Three 4 = Four 5 = Five
3	20	80	SYMODVAL	SYNOB model is valid: 1 = Yes 2 = With alterations 3 = Don't know 4 = Not unless refined 5 = No