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Increasing the Effectiveness of Education Management. A Research Proposal.

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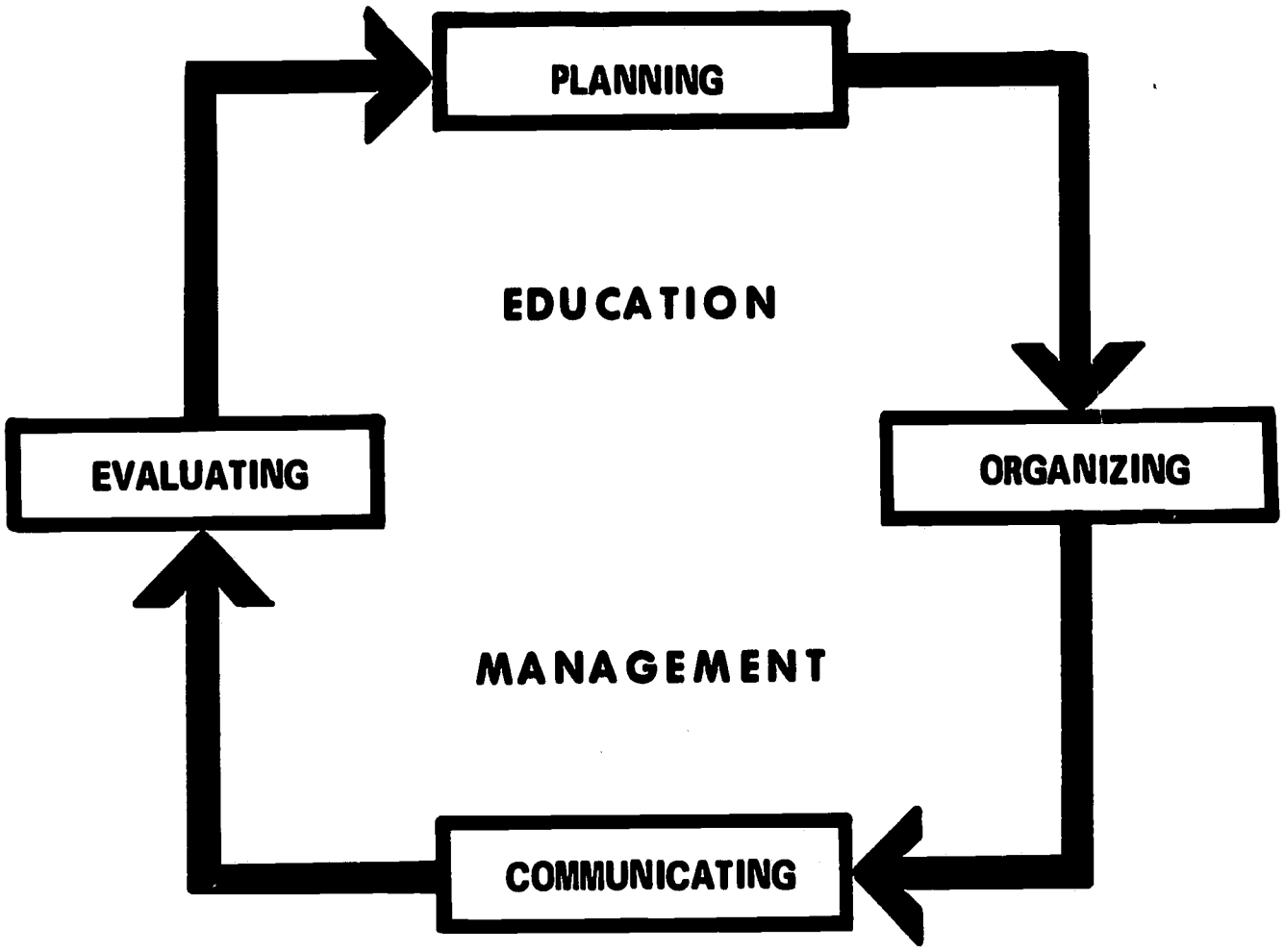
A 3-year research program is proposed to develop improved methods for increasing the effectiveness of education management, including those functions of the board of education and the superintendent that deal with planning, organizing, communicating, and evaluating. The proposal lists 30 major problems confronting school boards and superintendents and outlines a series of eight projects: (1) surveying the public's educational preferences, (2) describing the educational program, (3) personnel negotiations, (4) evaluating teacher performance, (5) evaluating performance of administrative personnel, (6) stating and measuring the accomplishment of instructional objectives, (7) followup evaluation of graduates, and (8) administration. (JK)



INCREASING THE EFFECTIVENESS OF EDUCATION MANAGEMENT

A RESEARCH PROPOSAL

CONTENTS

INCREASING THE EFFECTIVENESS OF EDUCATION MANAGEMENT

FOREWORD

April 20, 1968

FOREWORD

Historically, the education model for the public school system has been rather simple. The main ingredient of this model was the teacher standing in front of a roomful of students. All of the pupils were sitting abreast of each other in rows of wooden seats bolted to the floor. Being responsible for practically all aspects of the education program, the teacher made many of the decisions concerning what should be taught and most of the decisions concerning how it should be taught and when it should be taught. Tests were administered periodically by the teacher to determine which students should be advanced to the next rung on the educational ladder and which ones should be retained in the same grade for another year. The teacher was commander-in-chief, captain, and sergeant-at-arms -- all in one.

Today we are witnessing the emergence of a new model of education in the public school system. This model has many new ingredients: Federally supported educational programs, educational parks, joint vocational districts, and team teaching, to name only a few. We also are seeing the rapid development of a new educational technology, including programmed instruction, language laboratories, simulation gaming, computer-aided instruction, contingency management, and educational television. And the model contains some new and difficult problems -- such as personnel negotiations and civil rights. Indeed, this is a new model of public school education.

What is needed to cope with the demands of this new model of education? As never before, there is a need for systematic planning, organizing, communicating, and evaluating. In short, there is a great need to apply the concepts and methods of modern management to the public school system. To meet this need, the board of education and the superintendent need to have at their disposal improved methods for the effective and efficient management of the complex system for which they are responsible.

The improved methods that are needed are not readily available to local school districts. In fact, they do not exist in any useable form. Such methods must be developed through systematic research.

This proposal is addressed to the subject of education management – and specifically to the subject of developing improved methods for increasing the effectiveness of education management.

The proposed research program would be conducted by the School Management Institute, the Ohio School Boards Association, and the Columbus Laboratories of Battelle Memorial Institute.* SMI would conduct training seminars for the sponsoring school districts. OSBA would administer and coordinate the program, and perform research in the area of personnel negotiations. Battelle would conduct research in the following problem areas: Communicating with the Public, Staff Evaluation and Improvement, Program Evaluation and Improvement, and Administration.

The research outlined in the following pages would require 36 months and an expenditure of at least $390,000 on the part of the cooperating school boards. Those school districts that become members of the program would each invest from $500 to $5,000 per year for each of the 3 years, on a sliding scale depending on each school's enrollment.

*Battelle would serve as a subcontractor to the School Management Institute.

INTRODUCTION

The Columbus Laboratories of Battelle Memorial Institute recently completed a survey of the major education management problems found in the school districts of Ohio. Preliminary information for this survey was obtained from:

(1) Reviews of relevant reports and documents

(2) Interviews with school board members and superintendents from various districts in the State

(3) Interviews with the Executive Secretary of the Ohio School Boards Association, who indicated the frequency of various types of inquiries submitted to OSBA by board members.

This initial step in the survey uncovered the 30 problem areas listed in Table 1, which were conveniently grouped into six categories: (A) Public Relations, (B) Management of Physical Property, (C) Personnel, (D) Educational Program, (E) Management of Finances, and (F) Miscellaneous.

The Trustees of the Ohio School Boards Association were then asked to rank the identified problems in order of importance to their own school districts. Results of this rank-ordering are presented in Table 2. It is seen here that "Describing the program to the public" is ranked as the most important problem, and "Investing funds for maximum return" is ranked as the least important. This analysis revealed that there was considerable variation in perceived importance of some of the problem areas (e.g., "Planning and construction of new buildings"), whereas there was considerable agreement with respect to other problem areas (e.g., "Evaluating the total educational program").

It appears that the results of this analysis are a realistic representation of the most important problems confronting school board members and school superintendents in the State of Ohio. Solutions to these problems could lead to a considerable increase in the effectiveness of education management throughout the State of Ohio.

TABLE 1. MAJOR PROBLEMS CONFRONTING SCHOOL BOARDS AND SUPERINTENDENTS

A. PUBLIC RELATIONS
1. Determining the public's preferences about what the goals and objectives of the educational system should be
2. Describing the education program to the public
3. Dealing with minority groups on special problems

B. MANAGEMENT OF PHYSICAL PROPERTY
1. Planning for spatial and organizational design of school system
2. Planning for acquisition of land for new facilities
3. Planning for construction of new buildings and facilities and remodeling of existing ones
4. Planning for maintenance of buildings, playgrounds, equipment, and other facilities
5. Determining policy for the transportation of students
6. Setting policy for use of buildings after school hours

C. PERSONNEL
1. Recruiting staff
2. Establishing policy, procedures, and standards for staff selection and retention
3. Setting salary policy for salary schedules of professional and non-professional personnel
4. Negotiating with teachers
5. Evaluating performance of professional staff
6. Setting requirements and procedures for in-service training of professional staff

D. EDUCATIONAL PROGRAM
1. Specifying instructional objectives in measurable terms
2. Evaluating total educational program
3. Evaluating specific innovations in educational programs
4. Establishing policy for curriculum review and revision

E. MANAGEMENT OF FINANCES
1. Formulating strategy for bond issues and tax levies
2. Obtaining state and Federal financial support
3. Investing funds for maximum return
4. Establishing policy for purchasing school supplies

F. MISCELLANEOUS
1. Setting policy for student health services
2. Setting policy for counselling and guidance
3. Setting policy for special classes
4. Setting policy for lunch program
5. Setting policy for adult education
6. Setting policy for student conduct
7. Training school board members

TABLE 2. RANK-ORDER OF MAJOR PROBLEMS

Rank		Problem
1	–	Describing the education program to the public
2	–	Evaluating total educational program
3	–	Negotiating with teachers
4	–	Setting salary policy and salary schedules
5	–	Determining public's educational preferences
6	–	Evaluating performance of professional staff
7	–	Formulating strategy for bond issues and tax levies
8	–	Evaluating specific educational innovations
9	–	Setting requirements and procedures for in-service training
10	–	Establishing policy for curriculum review and revision
11	–	Specifying instructional objectives in measurable terms
12	–	Training school board members
13	–	Obtaining state and Federal financial support
14	–	Establishing policy and procedures for staff selection
15	–	Planning and construction of new buildings
16	–	Setting policy for counselling and guidance
17	–	Planning for maintenance of buildings and facilities
18	–	Establishing policy for purchasing supplies
19	–	Determining policy for transportation of students
20	–	Recruiting staff
21	–	Setting policy for use of buildings after school hours
22	–	Setting policy for student conduct
23	–	Planning for spatial and organizational design of school system
24	–	Setting policy for adult education
25	–	Planning for acquisition of land for new facilities
26	–	Setting policy for special classes
27	–	Setting policy for lunch program
28	–	Dealing with minority groups on special problems
29	–	Setting policy for student health services
30	–	Investing funds for maximum return

OBJECTIVE AND SCOPE

The general objective of the proposed research program is to develop improved methods for increasing the effectiveness of education management in the public school system. Education management includes those functions of the Board of Education and the superintendent that deal with planning, organizing, communicating, and evaluating.

The proposed program would deal with these five problem areas: (I) Communicating with the public, (II) Personnel negotiation, (III) Staff evaluation and improvement, (IV) Program evaluation and improvement, and (V) Administration.

The end product of the research program would be a set of practical methods to be used by the sponsoring school districts to help them achieve greater success in accomplishing their objectives. The entire research effort would be directed toward the development of methods that would be applicable to the problems that are common to all sponsoring districts.

DISCUSSION

Before describing the specific studies to be undertaken, we will discuss the general research strategy to be used, the problems to be investigated, and the expected benefits to be derived from the proposed research program.

The General Research Strategy

The overall strategy for the research program is a problem-solving approach. This consists of four major steps.

Step A. Identification of Major Problems Confronting School Boards and Superintendents.

(1) Visits to school systems

(2) Specification of major problems

(3) Determination of relative importance of problems

Step B. Translation of Problems into Research Projects.

(1) Selection of problems amenable to research

(2) Specification of priorities for attacking problems

(3) Development of research designs for selected problems

Step C. Application of Appropriate Concepts and Methods to Solution of the Problems.

(1) Carrying out systematic research*

(2) Analysis and interpretation of results

Step D. Translation of Research Results into Practical Methods for Sponsoring School Districts.

(1) Development of practical methods

(2) Conduct of instructional seminars with representatives of sponsoring school districts

(3) Preparation of written reports and procedural guides.

*This involves carrying out original research as well as capitalizing on the results of past research.

Steps A and B in this general strategy have been completed in the study supported by Battelle. We now have a foundation on which to carry out Steps C and D.

Problems to be Investigated

The selection of problem areas to be investigated was based upon two criteria:

(1) The order of importance of problems as indicated by: superintendents, the Trustees of OSBA, and other school board members

(2) The extent to which the problem area appears to be amenable to systematic research.

On the basis of these two criteria, we selected the following problem areas:

(I) Communicating With the Public

(A) Surveying the public's educational preferences

(B) Describing the education program to the public

(II) Personnel Negotiation

(A) Collecting salary data as back-up information for negotiations

(B) Formulating negotiation procedures

(III) Staff Evaluation and Improvement

(A) Evaluating performance of teachers

(B) Evaluating performance of administrative personnel

(IV) Program Evaluation and Improvement

(A) Stating and measuring the accomplishment of instructional objectives

(B) Follow-up evaluation of graduates

(V) Administration

(A) Evaluation and implementation of recommendations in the Little Hoover Commission report.

Expected Benefits

The proposed research program is expected to produce these end products:

(1) A general method for systematically surveying the public's attitudes concerning goals and objectives of education

(2) Guidelines and procedures for describing the educational program to the public, for the purpose of obtaining community acceptance and support of the program

(3) Guidelines for setting salary policy and schedules

(4) Guidelines and procedures for personnel negotiations

(5) A method for evaluating the performance of teachers

(6) A method for evaluating the performance of administrative personnel

(7) Guidelines and procedures for specifying instructional objectives

(8) Methods and procedures for evaluating specific educational innovations

(9) Methods and procedures for evaluating an overall educational program

(10) Cost-benefit data on alternative administrative policies.

The proposed program also would provide these additional benefits:

- Representatives of the sponsoring school districts would be given instruction in the use of the methods developed.

- A useful body of information would be collected as an integral part of the total research program. This information would contain such items as currently successful educational innovations, salary figures, salary schedules, items presently being negotiated, etc., all of which would be available to the sponsoring districts.

In essence, the major idea underlying the proposed research program is that each sponsoring school district would derive the benefits accruing from a large-scale research program by paying for only a small percentage of the total program. A large return could be realized from a small investment.

* * *

The projects to be included in the research program are described on the following pages.

PROJECT A

SURVEYING THE PUBLIC'S EDUCATIONAL PREFERENCES

"When communities actually did reflect communal or common interests, schools could function as community service centers and their success could be relatively easily assessed in terms of the climate of community opinion. *While schools are still expected to serve the public interest, it is no longer clear precisely what the public interest is.* The proposition that the school is a 'reflection of society' and must meet the 'needs' of the community is undebatable, but the statement is merely elliptical when neither society nor community are cohesive units. *The question is, what part of society is it to reflect, and whose needs are served?* Like the 'good life', the 'public welfare' is an undebatable goal but a very debatable issue" (emphasis added) (p170-171).

Ronald G. Corwin*

The Problem

Corwin's statement suggests that in present-day communities there is generally insufficient "communal or common interest" to serve as a clear indicator of the "public interest". His statement further implies that our local public schools are therefore reflecting a part of society and serving someone's needs *even though* few of us have even asked: Whose needs and what parts of society are being served by our local school systems—as they function today? More important, however, is the question: Whose needs and what parts of society will be served by our local school systems tomorrow . . . and the day after?

Because of the unique and significant role of local school boards in guiding and otherwise managing the educational process in American public schools, it behooves us to consider how communication from the public to the school board might be nurtured so as to provide local school officials with the best possible information about the educational preferences of local citizens. Toward this end, a general methodology would be developed which could be used by individual school boards for surveying the educational preferences of their local citizens.

One basic premise of the research program is that such a survey methodology would be of great value to local school board members in their efforts to guide public education in the directions desired by their local communities. A second premise is that the implementation of the resulting methodology would provide local school board members with the basis for

*Corwin, Ronald G., "The School In Its Power Environment", in Society and Education: A Book of Readings, by Havighurst, R. J., Neugarten, B. L., and Falk, J. M. (eds.), Allyn and Bacon, Inc., 1967, 165-179.

making sound management decisions *even when* no singular mandate is manifest among members of the local community. A final premise is that implementation of the resulting methodology by local school districts would lead to improved communication patterns between local schools and the communities in which they reside. In this latter vein, Carter has observed:

> "Education is too important an undertaking for the public to neglect it completely. Some messages do get through, but, in general, schoolmen are not devoting enough time, thought, and energy to the communications problem. What is needed is not just more informational programs, unidirectional and blind. Specific targets must be established on the basis of factual data; two-way communication must be fostered" (p. 164).*

Project Objectives

The project objective would be to develop a general method for surveying the educational preferences of local citizens in individual school districts throughout the State of Ohio. The two specific sub-objectives would be:

(1) To provide local school boards with detailed procedures for obtaining data of significance to the education management process

(2) To represent the public's educational goals and objectives in a fair and impartial way by means of an explicit sampling plan and an objective survey and analysis procedure.

Method of Attack

The method of attack would consist of the following chronological steps: (1) setting study boundaries, (2) generating educational preference statements, (3) constructing a preliminary educational-preference inventory, (4) specifying a sampling plan and data-analysis procedure, (5) pretesting the preference inventory, and (6) documenting project procedures and results.

(1) Setting Study Boundaries

Interviews would be conducted with participating school board members and superintendents to define study variables and to discuss study constraints. To illustrate: How should "the public" be defined for purposes of developing a sampling plan** (e.g., registered voters,

*Carter, Richard F., "Voters and Their Schools" in Society and Education: A Book of Readings, by Havighurst, R. J., Neugarten, B. L., and Falk, J. M. (eds.), Allyn and Bacon, Inc., 1967, 160-165.

**In a study for the U. S. Office of Education, The Institute for Communication Research, Stanford University, used "registered voters" as the sampling frame.

parents of school-age children,. random sample of households, etc.)? Which content areas should be included and which excluded in defining "the preference domain" for educational goals and objectives? What local personnel would be available to conduct interviews and assist the project staff? What socioeconomic, demographic, ecological, and personal characteristics of "the public" should be used to form homogeneous subgroups for *purposes* of sampling respondents and conducting data analyses?

(2) Generating Educational Preference Statements

Conducting interviews with members of the public for purposes of generating descriptions of educational goals and objectives would not require a formal sampling plan during this step. One approach to generating statements would be to give respondents certain types of content items (e.g., "My children's school should . . . ", "When a boy finishes high school he should be able to . . ." and other value-oriented statements) and then ask them to complete the sentences in as many different ways as possible. The use of questionnaires in conjunction with the personal interviews also would be considered for this step, and written materials that might contain appropriate statements would be reviewed at this time.

(3) Constructing a Preliminary Educational-Preference Inventory

Statements collected during the previous step would be reviewed, edited, and assembled for purposes of scaling (i.e., assigning numbers to the statements). During this step, several scaling methods would be reviewed and the most appropriate method(s) would be utilized.

After the statements are scaled, a preliminary educational-preference inventory would be constructed. This inventory would be pretested subsequently in Step (5).

(4) Specifying a Sampling Plan and Data-Analysis Procedures

Based on Step (1) and the experimental design required by the selected scaling method, a sampling plan and a data analysis procedure would be developed. All preparations needed to implement the sampling plan, including the design of response formats to be consistent with the planned analyses, would be completed during this step. Also, final decisions would be made at this time regarding the number and selection of school districts to participate in pretesting the educational-preference inventory.

(5) Pretesting the Preference Inventory

At the outset of this step, the preliminary educational-preference inventory would be administered to a representative sample of local citizens in each of the selected school districts. Any difficulties encountered by the interviewers and the respondents would be noted and

remedied to the extent possible. Also, data would be collected to provide evidence on the reliability and consistency of respondents' educational preferences. Next, the results of the pretest would be analyzed statistically, using Battelle's computer capabilities. Finally, any necessary modifications would be made in the proposed preference inventory—based on the pretest evaluation results.

(6) Documenting Project Procedures and Results

The final step would involve describing and documenting the project procedures used and the steps followed in surveying the public so that local school districts could subsequently conduct their own surveys.

Expected Results

Because the primary objective is to develop a general methodology for surveying the public's educational goals and objectives, certain results would be expected to accrue naturally during the development process. In contrast, other anticipated results would require special efforts after the proposed educational-preference inventory has been developed, pretested, and revised. Expected project results are therefore listed below under one of two classifications: those which may be termed "natural end products" and those referred to as "additional end products".

Natural End Products

(1) An educational preference inventory—complete with instructions for respondents

(2) Documentation of the basic survey steps followed in developing and pretesting the educational preference survey, including:

- sampling procedures for use in selecting respondents—complete with instructions for prospective users
- suggested data-analysis procedures for use in analyzing survey results
- sample results based on analysis of the data from the preference-inventory pretest

(3) Information concerning the reliability and consistency with which people make educational-preference judgments of the type appearing in the preference inventory.

Additional End Products

(1) Guidelines for translating the public's educational preferences (values) into statements of educational objectives would be formulated and included in the final report

(2) Detailed procedures to permit a local school district to implement the necessary steps in surveying the educational preferences of its local citizens.

PROJECT B

DESCRIBING THE EDUCATIONAL PROGRAM

The Problem

A school system may have an outstanding educational program, but the community-at-large may be completely unaware of it. Also, a school system may develop an excellent plan for future programs but be forced to abandon these plans because the community fails to provide the required financial support. Although the present and planned programs are pointed directly toward the educational preferences of the community members, the members may believe the contrary because they lack the facts.

One means for resolving these problems is a well-planned and executed program for describing the educational program to the community. Such a program can be developed only after the facts concerning community awareness and educational preferences are known. (The proposed study for determining community educational preferences is designed to obtain the needed facts.) These facts are then used in the formulation of the program for describing the educational program to the community for the purpose of obtaining community acceptance and support of the program.

A school-community relations program involves public relations of the highest order. Not all public relations methods are suitable for such a program, however. This means that the appropriate methods must be used effectively to gain public acceptance and financial support. Public acceptance of what is important and desirable in an educational program is essential if the school system is to obtain the backing of the community.

Objective

The objective of the proposed study is to develop guidelines and procedures for describing a school system's educational program to the citizens in that district.

Method of Attack

This study would be conducted in cooperation with a public relations firm that has experience in the school-community relations field. The research would consist of four steps as follows:

(1) Conduct of a survey of methods that have been used by school systems to describe their educational programs to the public

(2) An in-depth analysis of the methods that appear to have been most effective

(3) Further evaluation of the methods, by means of a field study

(4) Development of detailed guidelines and procedures for implementing the most effective methods.

The first step would involve the design and conduct of a survey to determine what methods have been used to describe educational programs. The survey coverage would include universities and colleges as well as public school systems. The coverage would be nationwide in scope, but would include only those universities, colleges, and school systems that are known to have good school-community relations programs. It is anticipated that the survey design would include both mail-questionnaires and selected interviews (in cases of particularly good programs). The survey would be designed to obtain details of program implementation and particular community situations.

An in-depth analysis of the methods that appear to have been most effective and the community situations in which they were effective would be carried out in the second step. This would involve a study of the detailed steps in implementing these programs and correlating the steps with factors of community situations. We would determine what specific action was taken in light of particular circumstances in the community.

The third step would involve selecting particular methods that could be evaluated by a field study within the time limits of this project. The selected methods would be broken down into detailed implementation steps. School systems within the sponsoring group would then be selected for field study of the selected methods. The specific school systems selected would be those manifesting community situations that would best test one or more particular methods. (The community situation data would be obtained by means of the procedures developed in the study of community educational preferences.) The field studies would then be conducted and the methods would be evaluated for effectiveness. The implementation steps would be modified on the basis of the field-study results.

The final step would consist of developing detailed guidelines and procedures for the sponsoring school systems to implement their own school-community relations programs.

Expected Results

This study would provide the information needed to develop procedures for describing to the public the educational program of a school system. This information would be translated into detailed implementation steps that could be executed by the sponsoring school systems within their communities.

PROJECT C

PERSONNEL NEGOTIATIONS

Introduction

The growing militancy of employees in public schools warrants careful attention on the part of the school officials and boards of education to ascertain causes of employee unrest. Means must be taken to provide the best possible learning environment for the students in the schools. A condition of upheaval and unrest is not conducive to desirable learning conditions for the students. Personnel policies which lay a foundation for a sound, fair, and equitable set of personnel procedures are essential.

The problem of personnel negotiations has been of great importance in school districts throughout the State during recent months. Some teachers have been on strike, and others have threatened to strike. School officials and board members are now raising some fundamental questions about personnel negotiation, such as: "Who should do the negotiating?" "What should be the role of the superintendent and the board of education in negotiations?" "What is negotiable?" Answers are now being sought to these and related questions. It is apparent that systematic research is needed to provide the answers.

Objective

This project has a twofold objective:

(1) To collect and organize back-up information and data for personnel negotiations

(2) To formulate procedures for personnel negotiations.

The scope of this project would cover both professional and nonprofessional personnel.

Collection of Back-Up Information

Part I of the project would be concerned with the collection and organization of information and data that would serve as back-up material for negotiations with school district employees.

We would plan to collect salary data for the following classes of personnel:

- Teachers (both regular and substitute)
- School administrators
- Non-professional personnel in the schools (clerical and custodial)
- State employees
- Industrial employees.

The data would be compiled at both a State level and a district level by type of school district along the lines reported annually by the Ohio Education Association. The salary data compiled would be of two forms: (1) scheduled salaries as presently reported by OEA, and (2) actual salaries as a function of years of experience. The former type of data permits a comparison among districts of salary schedules. The latter type of data permits a comparison among districts of the distribution of actual salaries. This type of analysis is not presently used to any great extent in the area of school personnel salaries. It is proposed because it would provide useful information for negotiation.

The information concerning actual personnel salaries would be obtained from a representative sample of school districts throughout the state. We would develop a survey design that would include procedures for selecting the sample of school districts. Also, standard forms for reporting the salaries and salary-related data would be developed. To the extent possible, procedures for obtaining fringe benefit data would be devised.

All of the relevant data collected in this part of the study would be organized so that it is useful to school officials and board members.

Formulation of Negotiation Procedures

Part II of this project would deal with procedures for negotiating with professional and non-professional employees. The emphasis would be on process. A primary objective would be to develop the basic *document* or *instrument* which should form the basis for future negotiations with school employees.

A first step in the study would be to investigate items that have been presented for negotiation by both the employees and the boards of education in various school districts – both in the State and outside the State. These items would then be grouped into meaningful categories, such as: (1) salaries, (2) fringe benefits, (3) hours of work, (4) professional development, etc.

The next step in the study would be to identify procedures that have been effective in personnel negotiations. This information would be obtained from two sources: (1) school districts in and outside the State, and (2) professional negotiators.

Procedures that appear to be useful in personnel negotiations for school districts would then be organized in a systematic manner. Each procedure would be addressed to a specific item that has been presented for negotiation in the past and to specific situations.

The final step in this part of the project would be to develop a procedural guide for use in negotiation with school personnel. This guide would include: State laws relevant to negotiation, strategies and tactics of negotiation, methods for handling grievances, methods of communication, agreements and contracts, and the back-up data on salaries and benefits developed in Part I of this project.

Expected Results

Completion of this phase would produce two major end products:

(1) A systematic compilation of salary data to serve as back-up material for personnel negotiations*

(2) A procedural guide for use in personnel negotiations.

*It also should be pointed out that the methodology for collecting and organizing salary data could be used by OSBA subsequent to completion of the proposed research program for maintaining salary data on a continuing basis.

21

PROJECT D

EVALUATING TEACHER PERFORMANCE

Introduction

Many school systems today have a program for teacher evaluation or appraisal. The evaluation is usually conducted by the school principal, or in some cases, a supervisor other than the principal, and the evaluation, in most instances, is based upon classroom observation of the teachers. Evaluation forms such as checklists or rating scales are widely used to record judgments about the quality of teacher performance. Many systems also ask the teachers to evaluate their own performance on the same or a similar form. Following such an evaluation, it is a common practice for the principal and teacher to have an evaluation conference using the completed forms as a discussion base. This description of the process is, of course, an oversimplification, but, nevertheless, contains the essential characteristics.

The major objective of such an evaluation procedure is to detect deficiencies in teacher performance. Actions are then taken to correct these deficiencies, thereby improving teacher performance. In turn, it is assumed that student performance will be improved. The logic underlying the procedure is valid. Why, then, do the results of teacher performance evaluations so often fall far short of expectations?

Discussion of the Problem

To state simply that teacher evaluation has failed in a given instance because of poor implementation does not provide insight into the means for resolving the problem. Many principals, supervisors, and teachers have spent considerable time and effort in diligently following evaluation procedures, completing forms, and participating in evaluation conferences, and have completed the exercise with a lingering doubt as to the results. The procedures, forms, and conference structure may well have been comprehensive and detailed, yet the information obtained does not diagnose the teachers' deficiencies, nor does it provide clues for correcting these deficiencies.

Those in education who have considered the problem, even in a cursory manner, are aware of and can identify its root. It is the problem of defining and describing *desired* teacher performance in terms of observable classroom behavior. Further, those who have considered the problem in a little more depth recognize that teacher performance can be judged desirable or undesirable only in terms of its relation to student performance. That is, teacher performance that facilitates or enhances student performance is desirable and that which inhibits or reduces student performance is undesirable.

Thus, there are two aspects to the problem:

(1) Defining and describing desired teacher performance in terms of observable classroom behavior

(2) Determining desirable teacher performance as a function of its relation to student performance.

The first aspect of the problem has been studied and partially resolved. A good example of this work is described in the booklet by Redfern*. Here it is emphasized that performance rather than personality or character traits should be evaluated. Further, the concept of performance "targets" stresses what the teacher does to improve his or her performance.

Study of the second aspect of the problem, determining desirable teacher performance as it relates to student performance, began only recently. No definitive results have been achieved as yet. Current developments in educational technology, such as prescriptive education and self-instructional methods, indicate the direction and areas in which definitive results should be achieved.

Objective of the Proposed Research

The objective of this project is threefold:

(1) To determine from selected functional areas, e.g., classroom instruction, the teacher performance that facilitates or enhances student performance

(2) To define and describe this teacher performance in terms of the observable classroom behaviors of teachers

(3) To develop detailed procedures for evaluating the classroom behaviors defined and described in (2).

Method of Attack

The proposed research would consist of the following six general steps:

(1) In cooperation with sponsor representatives, specify the selected functional areas of teacher performance to be studied.

*Redfern, G. B., How to Appraise Teaching Performance, School Management Institute, Inc., Columbus, Ohio, (1963), pp. 17, 19-22.

(2) Determine through classroom observation the teacher performance that facilitates or enhances student performance (conducted in conjunction with student performance research).

(3) Develop definitions and descriptions of the teacher behaviors identified in step (2).

(4) Devise preliminary procedures for observing these teacher behaviors and evaluation instruments for recording their occurrence.

(5) Test the procedures and evaluation instruments in classroom settings. Revise as necessary.

(6) Develop detailed instructions for the classroom observational procedures and the administration of the evaluation instruments.

The first step would require the project staff and the sponsor representatives, working cooperatively, to define the functional areas of teacher responsibility. Several examples of functional areas are: classroom instruction, guidance and counseling of students, and curriculum planning and development. After a list of agreed upon functional areas had been drafted, the areas judged to have the greatest effect upon student performance would be selected for study. The selected areas would then be elaborated in greater detail.

A field study of selected schools would be required in the second step. This step would be carried out in conjunction with the research on student performance and would involve the determination through classroom observation of the teacher performance that facilitates student performance. Procedures for observing and recording teacher behavior and for analyzing the products of teachers' work would be devised for obtaining the required information.

An analysis of the field-study information would be carried out in step three. The analysis would consist of identifying specific teacher behaviors that relate to improved student performance. These behaviors would then be defined and described as precisely as possible.

In step four, the definitions and descriptions of teacher behaviors would be used to devise procedures for observing these behaviors and evaluation instruments for recording their occurrence. The procedures would consist of detailed instructions that specify what an evaluator is to do while observing a teacher perform in the classroom. The instruments would specify what teacher behaviors to observe and how to record the occurrence of these behaviors.

The observational procedures and evaluation instruments would be tested in step five. A number of evaluators would make evaluations in a group of selected schools. Two or more evaluators would evaluate the same teacher at the same time as well as at different times. The evaluations would then be checked for agreement among evaluators and agreement for the

same evaluator making evaluations at different times. Comments of evaluators would be obtained regarding problems encountered in following instructions or in completing the evaluation instruments. The procedures and instruments would be revised as necessary based upon the test results achieved.

In the final step, detailed instructions for executing the classroom observational procedures and administering the evaluation instrument by the participating school districts would be developed.

Expected Results

The instructions would provide step-by-step directions for conducting evaluations of teacher performance as well as guidelines for interpreting the evaluation results. With these materials, a school system should need no assistance in conducting evaluations of teacher performance.

PROJECT E

EVALUATING THE PERFORMANCE OF ADMINISTRATIVE PERSONNEL

Introduction

One of the important tools in an administrative development program is the performance-evaluation procedure. Performance evaluation provides the information required to make decisions concerning the promotion, transfer, and training of administrative personnel. It also indicates how effectively an administrator is functioning in his job and whether or not he should continue in that job. And, of course, it provides the information required for contract renewal.

Performance evaluation of administrative personnel in school systems is not an established practice as it is in business and industry. This stems from the fact that, historically, school systems had smaller and less-complex organizational structures. In such circumstances, the top administrator knew his subordinates intimately and did not need a formal procedure for evaluating their performance. The accelerated growth of most school systems within the past three decades, however, has produced organizations of greater size and complexity, and formal procedures for evaluating administrators have become a necessity. This need is being recognized by a growing number of school systems, and many have adopted administrative-personnel evaluation procedures.

The Problem

Within an administrative development program, evaluation is a two-way operation: It not only enables the top administrator to get a better understanding of how effectively an administrative subordinate is performing but it also facilitates the subordinate's work by providing him with information concerning his supervisor's expectations, the important responsibilities of his job, and the alternatives open to him in performing his job. Thus, both participants in the evaluation procedure gain a clearer understanding of the work to be performed.

The key to an objective performance-evaluation procedure is the specification of job responsibilities. If a list of well-defined job responsibilities that is acceptable to both the top administrator and his subordinate can be developed, then both are aware of the basis for evaluation. The subordinate, understanding these, is aware of what is expected of him. The supervisor, in turn, can point his evaluation toward performance in relation to the established job responsibilities. In this way, the evaluation can be both fair and objective. Moreover, the evaluation then serves as a base for the subsequent development of the administrative subordinate. The supervisor and subordinate can agree upon the job responsibilities for which improved performance is required, and a plan for improvement can be formulated.

The job responsibilities used to evaluate performance must be defined so that there is no ambiguity in interpretation. Otherwise, a reliable evaluation cannot be conducted, because the supervisor and subordinate may infer different meanings from the definitions. A means of resolving this problem is to define job responsibilities in terms of achievement goals. The evaluation question then becomes, "Did the administrator achieve the established goals?" These goals need not be quantitative, and, in fact, most goals probably cannot be quantitatively defined. In most cases, however, qualitatively defined goals can be assessed almost as well as quantitatively defined goals.

The specification of job responsibilities in terms of achievement goals provides the objective data needed for accurately evaluating administrative performance. This approach reduces the subjectivity in an evaluation procedure, thereby increasing the precision and accuracy of the results obtained. A supervisor and subordinate can then reach greater agreement upon the outcome of an evaluation and the decisions resulting from the evaluation.

Objective

The objective of the proposed study is:(1) to develop procedures for evaluating the performance of assistant superintendents, principals, vice-principals, and supervisors in terms of achievement goals, and (2) to formulate these procedures in terms of detailed instructions for implementation by the sponsoring school systems.

Method of Attack

The proposed study would require extensive field work in selected schools and school systems of the sponsoring school systems. The study would be conducted in five phases:

Phase 1. Analysis of the job responsibilities of administrative personnel in selected schools and school systems.

Phase 2. Specification of job responsibilities in terms of achievement goals (done in cooperation with participating school administrators).

Phase 3. Development of procedures and evaluation instruments for conducting performance evaluations.

Phase 4. Conduct of a pilot study in selected schools and school systems and revision of procedures and evaluation instruments as needed.

Phase 5. Development of detailed instructions for implementing administrative performance evaluation procedures in the sponsoring school systems (done in cooperation with participating school administrators).

Phase 1 of the proposed study would involve analysis of the job responsibilities of assistant superintendents, principals, vice-principals, and supervisors in selected schools and school systems. The schools and school systems would be selected in such a manner that they would be representative of the spectrum of sponsoring school systems. The job responsibilities would be analyzed by means of interviews with administrative personnel and their supervisors. Based upon the analysis, a comprehensive list of job responsibilities would be generated.

In Phase 2, the list of job responsibilities would be reviewed by participating school administrators to determine whether it is comprehensive in coverage and sufficiently detailed. The project staff, working in cooperation with the administrators, would develop specifications in terms of achievement goals for each of the job responsibilities listed. These would, again, be reviewed by the administrators for adequacy, and revised as required. Further, the relative importance of each of the achievement goals would be determined by means of the administrators' judgments. The specifications would then be grouped into functional areas such as general operations, educational leadership, professional development, job perspective, and public relations.

The specifications of achievement goals would be used to devise procedures and evaluation instruments in Phase 3. The procedures would consist of directions for conducting performance evaluations of administrative personnel. These would include the detailed steps in preparing for, conducting, and analyzing the results of evaluation. Evaluation instruments would be constructed for each of the administrative jobs to be evaluated. It is anticipated that the instruments would be in a format that would permit adaptation to particular job circumstances, i.e., optional goal achievements that could be evaluated or not depending upon the job responsibilities.

Phase 4 would consist of a pilot study in which the evaluation procedures and instruments would be tried out in selected sponsoring school systems. Administrators would be asked to evaluate the performance of their administrative subordinates. The design of the pilot study would permit a test of the reliability and accuracy of the results obtained. This would be done by having two or more administrators evaluate the same subordinate. Also, the subordinate would be evaluated at different times by the same administrator. Further, the evaluations obtained would be compared with other criteria, such as promotion rate and educational accomplishments, to test the accuracy of the evaluations. The procedures and instruments would be modified, if necessary, based upon the pilot study results.

Phase 5 would involve the development of detailed directions for the sponsoring schools systems to implement an administrative-personnel performance-evaluation program. Instruction manuals and evaluation forms would be included.

Expected Results

The primary output of the proposed study would be an administrative-personnel performance-evaluation procedure developed in sufficient detail to permit its implementation by the sponsoring school systems with no external assistance. The procedure developed should readily fit into existing administrative development programs, or, in systems that do not have a development program, the procedure could serve as a base for building such a program.

29

PROJECT F

STATING AND MEASURING THE ACCOMPLISHMENT OF INSTRUCTIONAL OBJECTIVES

The Problem

The importance of and need for evaluating educational programs is self-evident. Huge sums of money are being spent on programs and innovations, and more will be spent in the future. What return is being obtained on this investment? How well are schools teaching the various skill and subject matter areas? How effective are the "innovations"? Are instructional goals and objectives being achieved? If not, *where* are we falling down on the job, and where should improvements and changes be made in the educational program?

Questions such as the above remain largely unanswered. One principal reason for this is that local school systems have not stated their objectives in measurable terms. Broad educational goals such as "to develop and understanding of the nature of the scientific method", or "to develop habits of writing and speaking correctly and effectively", or to "gain an appreciation of the heritage of music and art of Western civilization" must (and can) be given more precise definition. Such broad goals do provide some general direction to the design and conduct of the educational program. Stated in this form, however, these objectives are open to many different interpretations, which leads to endless and pointless arguments concerning their measurement. These broad goals must be translated into specific, observable desired student outcomes and behaviors, at a course by course, subject by subject, and grade by grade level. Currently, this translation of broad goals into specific objectives is not being accomplished. Until such translation is more effectively made, valid measures of program effectiveness cannot be developed, nor can useful direction be given to design of the learning environment.

A second major reason for school systems not having adequate information on program evaluation is that measuring devices have not been systematically and comprehensively matched to the objectives they intend to measure. For example, the same devices (e.g., the same standardized achievement tests in a statewide testing program) are often used to assess student accomplishment in all schools, even though it is known and accepted that the objectives vary widely from one school to another. This procedure may be valid for assessing the "common goals" (e.g., the "basic" skills), although even here the validity of such a procedure remains unknown until schools decide what these common goals are. Further, for any given school, instructional objectives vary from one student or group of students to another, yet a common set of measuring devices is often applied to all students. For example, vocational education students might be given the same standardized tests as college preparatory students, even though it is obvious that the educational objectives for these two groups differ widely.

In short, until local school systems: (1) specify in more precise terms what their instructional objectives are and then (2) systematically and comprehensively match assessment procedures with these objectives, they will not be able to validly gage the effectiveness of the educational program or of specific innovations that are introduced. They will neither know where changes should be made in the system nor have the information and guidelines required to point the direction for system improvement.

Objective and Scope

The objective of the proposed research is to develop a guide for stating and measuring accomplishment of instructional objectives. The guide would contain methods, procedures, and guidelines for: (1) translating broad educational goals into specific instructional objectives, (2) selecting and/or developing devices and instruments for measuring accomplishment of objectives, (3) administering the measuring devices, (4) analyzing the results, and (5) translating the results into a form useful for educational managers.

The guide would be generally applicable to any local school system, regardless of the objectives of the particular system. It also would be applicable for evaluating any individual student or subgroup of students in any grade level. It would be in a form that could be used by the personnel in a given school system, with a minimum of outside assistance. It could be used for evaluating the total educational program, selected aspects of the program, or specific innovations made in the program.

The guide would be diagnostic in nature and describe methods that would show specifically *where* improvement and changes are (or are not) needed in the educational program. Application of the guide would yield a "performance report" in a form useful for board members and school administrators, showing how well instructional objectives are being attained—classroom by classroom, course by course, subject by subject, grade by grade, and school by school. This information would give managers the information required to decide where efforts need to be expended for program improvement.

Method of Attack

The three general steps required to achieve the above objectives are briefly outlined below. A great deal of knowledge and technology already exist for effective program evaluation. The major tasks to be accomplished are to adapt and improve upon this technology, to place it in a form that is applicable to the school setting and personnel in the school, and to train and involve school personnel in its use.

Step 1. Develop a Preliminary Guide

The major purpose of Step 1 would be to review and adapt existing methods, procedures, and techniques to program evaluation. Existing guidelines for translating broad educational goals into specific behavioral objectives would be reviewed. Types of measuring scales and techniques appropriate for assessing various types of instructional objectives would be examined, including standardized tests, rating scales, checklists, interview methods, and performance tests. Lists of available measuring devices in these areas would be compiled. Accepted methods, rules, and procedures for test administration would be reviewed. Statistical methods and techniques of data analysis and interpretation, including computer utilization, would be reviewed and adapted to the school setting. Finally, guidelines for translating test data into a "performance report" useful for educational managers would be formulated.

In this step, the work of behavioral scientists, measurement psychologists, and educators would be examined.

The final output of this first step would be the preliminary version of a guide for school program evaluation.

Step 2. Train School Personnel in Use of Guide

During this step, selected school personnel of the sponsoring school systems would be trained in the use of the guide. Workshops would be developed and conducted. Also, self-instructional materials and literature covering use of various aspects of the guide would be made available.

Step 3. Conduct a Field Evaluation of the Guide

The third and final step would be an empirical tryout of the guide in selected schools. The guide would be used in evaluating selected aspects of the educational programs, completing all phases of the evaluation process. School personnel previously trained in the use of the guide [Step (2) above] would conduct the evaluation, under the close supervision and direction of Battelle personnel. Specific instructional objectives would be set, measures and instruments would be selected or developed, measurements would be obtained and analyzed, and a "performance report" for school administrators and board members would be prepared. Possible deficiencies in the guide would be noted, and modifications made accordingly.

Output

The final output of the project would be an empirically tested guide for evaluating educational programs and innovations. Application of the guide would tell educational managers how well their program is operating, and where improvements are needed.

PROJECT G

FOLLOW-UP EVALUATION OF GRADUATES

The Problem

There is an important need for school systems to conduct systematic and periodic follow-up of their graduates. Even if an educational system achieves its instructional objectives, this is no guarantee that students are prepared to function and adjust effectively in the world they enter. This is because the instructional objectives themselves might be mismatched to real-world conditions and requirements. The test of how well a system prepares its students to function in society is to actually observe their performance in the real world. How well do students perform in college, and where are their weaknesses? How well do students perform on a postgraduation job, and where are their performance deficiencies? What types of posteducational and job categories do students enter upon graduation? Answers to questions such as these are obviously important, and provide necessary information for program evaluation, planning, and improvement.

To conduct useful follow-up studies, several questions need to be answered. What postgraduate activities should be assessed? What measures and measuring devices should be used, and how can they be interpreted? What measures and procedures should be used to diagnose deficiencies in the educational system, in order to effect system improvement? These questions require better answers than are currently available. The research proposed here is directed toward filling this gap.

Objective and Scope

The objective of the proposed research is to develop measures and instruments for conducting student follow-up studies, along with procedures for the application of these instruments and interpretation of the data collected. The emphasis would be on developing instruments that are diagnostic in nature—instruments that would not only show overall success and failure of students in postgraduate activities but also indicate where improvements should be made in the educational program.

The instruments and procedures would be packaged into a Follow-Up Evaluation Guide. The Guide would be in a form that could be effectively used by local school personnel, with a minimum of external aid. Application of the Guide would yield information useful to school managers in program evaluation, planning, and improvement.

Method of Attack

The steps required to achieve the above objective are outlined below.

Step 1. Specify Types of Postgraduate Activity to be Included

The first step would be to specify the types of postgraduate activity to be included in the study. At least two areas would be included: (1) follow-up of students entering an advanced educational institution upon graduation (including 4 year and junior colleges, as well as technical institutes), and (2) follow-up of students entering a job upon graduation. Other areas also would be considered for inclusion in the study. For example, the possible usefulness of "social indicators" such as crime rate of former students, divorce rate, rate of voting in local and national elections, and extent to which graduates continue their education by reading and participating in other education and training activities would be considered.

Step 2. Develop Experimental Measures, Instruments, and Procedures

The objective of the second step would be to develop experimental measures and instruments, designs and procedures for use in a follow-up survey, and procedures for data analysis and interpretation.

In the area of advanced education, examination would be made of classical measures such as: (a) grades and other performance indicators while in these institutions, (b) institutional drop-out and graduation rates, and (c) percentage of college-bound students accepted into the college of their choice. Measures of the general "quality" of the educational institutions attended also would be developed. Further, methods and instruments would be developed for assessing the opinion of graduates with respect to how well they felt prepared for their role in an advanced educational institution, and in what areas they lacked preparation.

In the vocational area, rating scales and survey forms would be developed for use by present employers and immediate supervisors, to assess the success of these people on the job and their areas of strengths and weaknesses. Also, instruments would be developed for assessing the former students' opinions concerning how well they were prepared for their jobs, and which former school learning experiences were most valuable and which were least valuable. Other measures such as pay, promotions, turnover rate of former students, etc., would be considered. Finally, an important measure to be considered would be initial placement into a satisfactory job.

After the experimental instruments and measures are developed, sampling procedures and designs for use in a follow-up survey would be developed. Also, procedures and statistical

methods for analyzing and interpreting the results would be developed. An important consideration here would be the development of procedures for translating survey results into a form useful for board members and school administrators.

The output of this step would be experimental instruments, methods, and procedures for conducting follow-up studies.

Step 3. Conduct a Field Test of the Measures, Instruments, and Procedures

The last step would be to conduct follow-up studies for selected schools and graduating classes, using the previously developed methods and instruments. Survey results would be analyzed and interpreted, with emphasis on drawing useful conclusions about where the educational system might bring about improvements. Based on this tryout, various instruments, measures, sampling, design, and data analysis and interpretation procedures would be developed into final form.

Expected Results

These elements would then be packaged into a follow-up evaluation guide, for use by school personnel at a local level.

PROJECT H

ADMINISTRATION

Introduction

School administration has long been recognized as an area in which many problems and inefficiencies exist. Governor James A. Rhodes, being aware of this problem, reconvened the Council for Reorganization of Ohio State Government in February, 1967, to conduct a study of the noninstructional functions of elementary and secondary education. The study excluded curriculum and teaching methods and concentrated on business practices. The objectives of the study were:

- To evaluate the control of operational and administrative costs
- To identify areas of possible improvement and suggest better methods to obtain more value for tax dollars
- To recommend long-range guides for future administrative procedures.

From this study, a report was published entitled *Public School Survey and Recommendations* (November, 1967), which provided 260 recommendations for improving the effectiveness of noninstructional functions of Ohio's educational system. The primary emphasis of the recommendations is to provide more value for money spent on noninstructional functions.

The Little Hoover Commission report appears to have great potential value for the school districts in Ohio. A considerable amount of work is needed, however, to develop the recommendations into useful guidelines and procedures for given districts.

Objective and Scope

The objectives of this project would be to evaluate the recommendations included in the Little Hoover Commission report and specify the implementation process for those recommendations offering the greatest promise for increased effectiveness and efficiency.

The administrative areas of responsibilities that would be examined are:

(1) Accounting
(2) Attendance services
(3) Buildings (construction, maintenance, operation, and utilization)

(4) Data processing
(5) Federal aid
(6) Funds and fund raising
(7) Health services
(8) Insurance
(9) Lunch room programs
(10) Pupil transportation
(11) Pupil driver-education policies
(12) Purchasing policies
(13) Reorganization, consolidation, and annexation
(14) Staff travel-expense policies
(15) Systems and procedures
(16) Warehousing

Other administrative areas or responsibilities that might arise as a result of the above investigations also would be examined.

General Approach

Each of the 260 recommendations given in the *Public School Survey and Recommendations* would be analyzed in accordance with the following considerations:

(1) The impact of the recommendation on the autonomy of the school district

(2) The interaction of the recommendation with other changes recommended

(3) The realizable cost savings of the recommendations

(4) The results of a cost-benefit analysis of the recommendation

(5) The process of implementing the recommendation.

The five considerations and the reasons for their inclusion in the evaluation process are described in detail below.

Autonomy Implications

The implementation of some of the recommendations may result in the reduction of certain benefits involving rights or authority. These values would be referred to as those of autonomy. Many of these values are associated with a school board's feeling of independence and the freedom to allocate its resources as it sees fit. This same involvement is felt by the teachers, the administrative staff, and the community. Each recommended change must be examined in terms of the potential benefits and losses with respect to the autonomy of local school districts.

Interactions With Other Recommendations

The operating scope of each recommendation must be examined for possible interaction with other recommendations. It is possible that the implementation of one recommendation may reduce the effectiveness of another. For this reason, the joint effect of recommendations must be evaluated.

Cost Savings

The realizable cost savings for each recommendation or group of recommendations must be established. The most valuable recommendations are those that result in the elimination or reduction of cash outlays without affecting the effectiveness of the related function. Many recommendations, of course, do not result directly in a measurable cost savings. An example would be "establish goals and measure performance". The worth of this recommendation cannot even be estimated in terms of dollars.

Cost-Benefit Analysis

Each recommendation that appears to be desirable would then be subjected to a cost-benefit analysis. A cost-benefit analysis is a means by which the recommendations are quantitatively compared and their values established. The "cost" refers to the cost of implementing the recommendation, such as design engineering or equipment purchase, while the "benefit" refers to the benefits accruing from the implementation of the recommendation. Both costs and benefits are reduced to measurable terms. If benefits outweigh costs, a savings will result and the recommendation is considered to be desirable.

Selected, individual school districts would be used for the purpose of carrying out the cost-benefit analysis.

Implementation Process

After being subjected to the first four steps in the evaluation process, many of the recommendations would be eliminated from consideration; however, certain ones would still appear to be desirable at this point. Each of these changes would then be studied to determine the exact method for implementing it.

Method of Attack

It is proposed that the research be conducted in three phases. The phases and expected results of each phase are described below.

Phase 1. Phase 1 would consist of an evaluation of each of the 260 recommendations given in the *Public School Survey and Recommendations* report with respect to the first three considerations mentioned, i.e., autonomy implications, interactions with other recommendations, and cost savings.

The results of this phase would be a list of recommendations that appear to be desirable for incorporation into operation of a school district and that shows the estimated realizable cost savings for school districts of various sizes. These results would provide each school district with a listing of changes where definite improvement might be achieved.

Phase 2. Phase 2 would consist of the application of a cost-benefit analysis to those recommendations emerging from the Phase I analysis of the study.

The results of this phase would provide the cost of implementing each of the recommendations along with the resulting measurable benefits to be derived. Non-quantifiable benefits also would be stated. The primary result of this phase would indicate net savings to be provided by each recommendation for school districts of various sizes. While Phase 1 would provide a gross estimated cost savings, Phase 2 would provide a highly refined, net estimated cost savings along with an estimate of benefits.

Phase 3. Phase 3 would consist of a study to determine the method or process by which each of the recommendations emerging from Phase 2 could be applied to the operations of school districts of various sizes.

The implementation would be described in handbook form, and in sufficient detail so that each school district or region could decide if the recommended change should be instituted. This phase would include any required changes in law as well as the needs for engineering steps, operational changes, and information flow. With the results of Phase 3, school districts would be in a position to select recommendations for implementation on the basis of their net estimated savings and the implementation process.

Expected Results

The results of this study would permit school districts to identify those administrative areas of responsibilities in which improvement is feasible for *their* districts. It also would permit these districts to predict and evaluate the impact of certain recommended changes with regard to cost savings and intangible factors. In addition, it would allow school districts to implement recommended changes with a minimum of effort on their part.

In essence, this study would provide school districts with a guide for making better decisions regarding the improvement of specific facets of school administration. The implementation of the appropriate recommendations would help school districts operate more effectively and economically in carrying out their administrative functions.

PROGRAM ADMINISTRATION

PROGRAM MANAGEMENT

The proposed program would be conducted by the School Management Institute, the Columbus Laboratories of Battelle Memorial Institute, and the Ohio School Boards Association. The School Management Institute would conduct training seminars for the sponsoring school districts. OSBA would administer and coordinate the program, and perform research in the area of personnel negotiation. Battelle would conduct research in the four remaining problem areas.

The planned organization of the research team is shown in Figure 1. Co-Directors for the program would be Dr. Lewis E. Harris, Executive Secretary of the Ohio School Boards Association, and Dr. William D. Hitt, Chief of Battelle's Behavioral Sciences Division. The Trustees of OSBA would serve as the Advisory Council for the program. Mr. Harold Armstrong, Vice President of School Management Institute, would be responsible for planning and conducting seminars for the sponsoring school districts. Outside educational consultants would be called upon as needed.

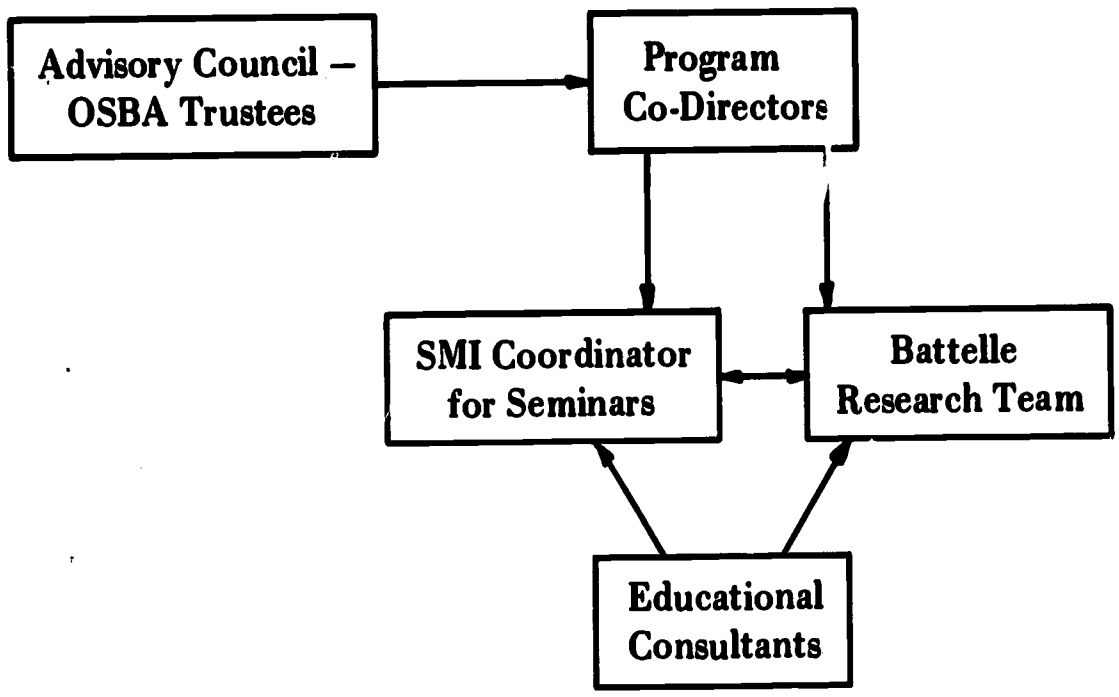


FIGURE 1. ORGANIZATION OF RESEARCH TEAM

The planned principal investigators for the five problem areas would be:

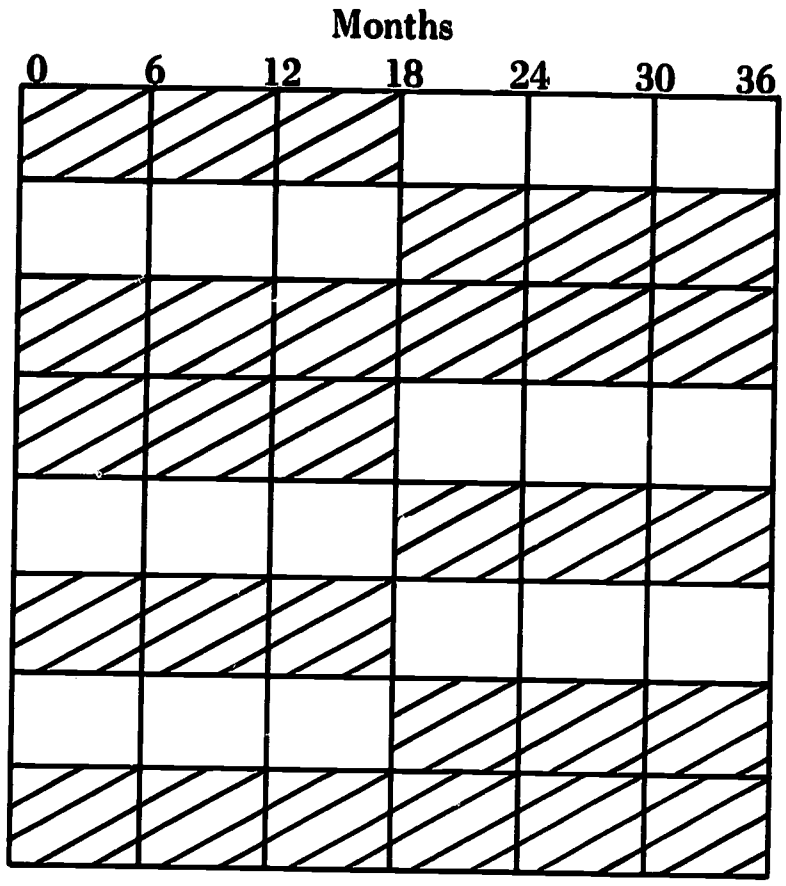
I.	Communicating with the Public	– Kenneth F. Connell
II.	Personnel Negotiations	– Lewis E. Harris
III.	Staff Evaluation and Improvement	– John R. Stock
IV.	Program Evaluation and Improvement	– Horace W. Ray
V.	Administration	– Benjamin B. Gordon

TIME SCHEDULE

A period of 3 years is proposed for carrying out the research program. Preliminary results would be made available to the sponsoring districts, however, after the first 4 months of work. Substantial results would be made available during the second year of the program.

It would be desirable to begin the program on July 1, 1968; it would then be completed by June 30, 1971.

The planned time schedule for carrying out the eight projects is as follows:



A. Surveying Educational Preferences

B. Describing the Educational Program

C. Personnel Negotiations

D. Evaluating Teacher Performance

E. Evaluating Performance of Administrators

F. Stating and Measuring Objectives

G. Follow-Up Evaluation of Graduates

H. Administration

REPORTS AND COMMUNICATION

- A written report describing the status of the research program and the results to date would be prepared and submitted to the sponsoring districts every 4 months.

- Three seminars would be conducted during each year of the program at Battelle-Columbus for representatives of the sponsoring districts. These seminars would give the participants an opportunity to interact with the research team, to discuss various aspects of the program in detail, and to assess what parts of the program might be useful to their districts at any given point in time.

- Answers would be provided to a reasonable number of specific queries from the sponsoring districts throughout the duration of the research program. Such questions might deal with any aspect of the five projects or the body of information being collected and organized as part of the program.

OTHER SPONSOR BENEFITS

- All instruments developed in the course of the research program (such as a rating scale for evaluating administrative personnel) would be the exclusive property of the group of school districts sponsoring the research.

- The seminars conducted at Battelle-Columbus for the purpose of presenting the research results and providing instruction in the methods developed would be open only to representatives of the sponsoring school districts.

- The research reports would be available only to the sponsoring districts.

FINANCING OF THE PROGRAM

The *desired* rate of effort for the proposed 3-year program, which would involve completing all projects in all problem areas, would require an annual support of $300,000, for a total cost of $900,000 for the 3 years. The *minimum* rate of effort—which would make it possible to complete at least one meaningful study in each of the five problem areas*—would require an annual investment of $130,000. Should the amount of annual support be somewhere between $130,000 and $300,000, a corresponding number of projects would be undertaken. Should the amount of annual support be greater than $300,000, the additional funds would be used to assist the sponsoring school districts in implementing the results of the research projects. These decisions would be made in collaboration with the Trustees of the Ohio School Boards Association.

The prorating of costs for the sponsoring school districts would be based upon pupil enrollment.** Annual billing would be made according to the schedule shown in Table 3. As an example: a school district with an enrollment of 2500 students would be billed $2000 each year for 3 years, for a total of $6000.

The project would be initiated as soon as enough school boards have returned executed agreements to provide the minimum support of $130,000 per year.

TABLE 3. SCHEDULE OF PAYMENTS

Pupil Enrollment**	Annual Billing
Less than 500	$ 500
500 - 999	1,000
1,000 - 1,999	1,500
2,000 - 2,999	2,000
3,000 - 3,999	2,500
4,000 - 4,999	3,000
5,000 - 9,999	3,500
10,000 - 19,999	4,000
20,000 - 49,999	4,500
50,000 and above	5,000

*This would include:

- Project A – Surveying Educational Preferences
- Project C (second phase) – Formulation of Negotiation Procedures
- Project D – Evaluating Teacher Performance
- Project F – Stating and Measuring Instructional Objectives
- Project H (first phase) – General evaluation of Little Hoover Commission recommendations.

**As reported in "Financial Report and Public Debt Statement, Ohio School Districts, 1966", prepared by Roger Cloud, Auditor of State. For those districts not reporting an enrollment in this publication, data will be taken from "School District Revenues, Enrollments, and Tax Duplicate Valuations for Calendar Year 1966", prepared by Roger Cloud, Auditor of State, for submission to the 107th Ohio General Assembly.

STAFF AND FACILITIES

GENERAL CAPABILITIES

The general capabilities of Battelle-Columbus, the Ohio School Boards Association, and the School Management Institute are presented below.

Battelle-Columbus

The Columbus Laboratories of Battelle Memorial Institute comprise the original research center of an international organization devoted to science and research. As an independent, endowed, not-for-profit research institute, Battelle conducts research which encompasses virtually all facets of science and its application. It also pursues programs in fundamental research and education.

Battelle-Columbus, through its contract research, serves the research needs of industry, government, and society. Its studies range from subjects on the frontiers of science, to the development of materials for defense which may have industrial application in future decades, to the immediate research problems of a school system. In its laboratories, it seeks new opportunities for economic expansion; develops new or improved processes, materials, machines, and products; points the way toward better use of natural resources; and helps to solve people-oriented problems such as those affecting national health and security. Techno-economic and socioeconomic studies are extensively undertaken.

Its research today—often multidisciplinary in approach—delves into the life sciences, ocean engineering, education, transportation, water quality and management, information storage and retrieval, application of systems concepts, miniaturization, component reliability, astronautics, and energy conversion and power generation—to name just a few fields.

The research projects and programs are supported by industrial firms both small and large; by municipal, regional, state, and Federal Government agencies; and by private, industrial, and public groups. Included among sponsors of research are firms and governmental agencies throughout the free world.

Research studies undertaken at Battelle-Columbus on behalf of such organizations on a contract basis represent an expenditure over the past 35 years of nearly $400 million. Current volume approaches $50 million annually, and the staff numbers over 3,000.

In addition to the Columbus Laboratories, Battelle Memorial Institute has major research centers in Frankfurt, Germany; Geneva, Switzerland; and Richland, Washington. A seminar and fundamental research center is maintained in Seattle, Washington, adjacent to the University of Washington campus. Offices are located in Washington, D.C., Los Angeles, Portland (Ore.), Seattle, Cleveland, London, Paris, Madrid, Rio de Janeiro, and Lima.

The Institute, of which Battelle-Columbus is a part, was founded by Gordon Battelle as a memorial to the Battelle family. Its members were among the first settlers of Ohio and were prominent in the development of the state's iron and steel industry. Since the Institute first opened its doors in 1929 it has been guided by the fundamental concept that the welfare of modern man can—and should—be improved by science and technology.

The Ohio School Boards Association

The OSBA is the banding together of school boards in this State for the purpose of improving their performance and, as a result, improving the system of public education.

Viewed in terms of organization and statistics, the OSBA is a voluntary membership organization, incorporated as a nonprofit body under Ohio laws. In 1967, 666 school boards were members. They paid membership dues based on their ability to pay (tax valuation) and number of purpils enrolled in the district. Members elect the officers of the association and meet once a year in an annual business meeting.

The OSBA was formed in 1956. Prior to that, several areas of the State had formed regional associations of school boards The regional basis is still reflected in the state structure. There are five regional groups, each with its own regional secretary and elected officers. The regional associations conduct programs for the boards in their area in full cooperation and coordination with the state association.

A school boards association enables the school boards in this State to work together in meeting their common goals. These goals could be listed as improving performance, raising the standards of education in the state, and communicating to the public the necessity for a quality system of school in every area.

The OSBA program, then, provides a full complement of inservice programs as well as the machinery for transmitting school boards' concerns to legislators, the State Board of Education and other agencies, and to the public.

A year-round program of OSBA inservice training for every member of the school management team guarantees participating districts that their people will be up-to-date on the latest developments in public education—whether in administration, fiscal management, or policymaking.

Included in the OSBA program are:

Boardmanship Clinics
Regional Meetings
Clerk-Treasurers Workshop
Special Meetings

Annual Negotiations Conference
Annual Joint Conference
Publications
  The Ohio School Boards Journal
  Basic Boardmanship
  Selecting the School Administrator
  Guidelines for Personnel Negotiations
  Four Steps to New Schools
  A Manual for Clerk-Treasurers
  OSBA Legislative Report

School Management Institute

School Management Institute is a nonprofit corporation that provides advanced training for school administrators. SMI is a jointly held corporation of the OSBA and the Ohio Association of School Administrators.

The SMI program of inservice seminars, held in Columbus and other cities, draws participants from across the nation. The main intent of all its programs and activities is to put at the disposal of the practicing school administrator and related personnel the best knowledge, techniques, and skills that can be gleaned from education, business, and industrial management.

SMI has conducted conferences on such topics as:

- Personnel Negotiations
- Appraisal of Managerial Performance
- Improving Teaching Performance Through Appraisal
- Board Procedures
- School Public Relations
- Planning Tomorrow's Schools

RELEVANT EXPERIENCE

Battelle-Columbus has had broad experience in the field of education and training management. This work has been sponsored by the U. S. Office of Education, the U. S. Bureau of Prisons, industrial organizations, local schools, trade unions, and others. Examples of projects that illustrate the breadth of this experience are summarized below.

An Evaluation of a Public School System

Hancock County School System, West Virginia

The general objective of this research program is to evaluate the present school system in Hancock County, West Virginia.

The specific objectives of this research program are:

(1) To describe the present school system in detail

(2) To specify characteristics of a desired school system

(3) To identify discrepancies between the actual system and the desired

(4) To formulate practical recommendations for moving from the present situation toward the desired.

The end product of this study will be a comprehensive written report that will serve as a planning guide for the School Board. This planning guide will assist the Board in making decisions dealing with these three areas:

- The educational program (including content of instruction, method of instruction, and overall organization)
- Staff organization and utilization
- Facilities and special services.

The Development of an Official Plan for the Jefferson Technical Institute

Board of Trustees, Jefferson County Technical Institute

Jefferson County, Ohio, was designated by the Ohio Board of Regents as a technical institute district based upon the need for technical education demonstrated by previous Battelle work. To secure state funds for the construction of a technical institute, the Board of Trustees of the Jefferson County Technical Institute District submitted to the Ohio Board of Regents an official plan for the establishment and operation of the technical institute. Approval of the plan resulted in a charter being issued to the Jefferson County Technical Institute District by the Ohio Board of Regents.

The objective of this Battelle study was to develop the official plan for the technical institute. The plan covered these topics: objectives, demonstration of need, curriculum, predicted enrollment, transfer of credits, award of degrees and certificates, organization and personnel, lands and buildings, required tax levy, estimated operating expenditures, and fee schedule.

Evaluating the Efficiency and Effectiveness of Self-Instructional Methods for Selected Areas of Vocational Education

U. S. Office of Education

The overall objective of the study is to determine the efficiency and effectiveness of self-instructional methods for teaching selected primary vocational skills. The objective includes identifying and selecting primary vocational skills of central importance to vocational education within a number of vocational curricula; determining self-instructional teaching strategies for these primary skills; determining self-instructional methods for implementing the teaching strategies either by selecting existing methods or by generating novel methods, or by combining these two procedures; empirically formulating the self-instructional courses; evaluating the self-instructional courses; formulating automated-instructional courses for those skills that appear to be of primary importance to vocational education; and disseminating information and selected self-instructional materials.

The Evaluation of U. S. Air Force Instructional Programs Within Civilian Education

The Aerospace Education Foundation

The objectives of this study is to determine the feasibility of adapting Air Force instructional programs to civilian education systems.

Included in the study are instructional programs in these three areas: (1) medical service specialist, (2) aircraft mechanics, and (3) electronic principles. These programs will be tested in the Utah school system. The results of the evaluation will be examined in terms of relative benefits and relative costs associated with this type of transfer of instructional materials.

The Development of Practical Recommendations for Improving the Education and Training of Inmates in Federal Correctional Institutions

U. S. Bureau of Prisons

This project includes three major work phases:

(1) Analysis of the education and training program in two Federal correctional institutions

(2) Development of a model education and training system

(3) Formulation of recommendations for implementing the model system.

Consideration is being given to these factors: objectives of education and training, job-market information, motivation of inmates, classification and assignment, counseling and guidance, curriculum, instructional methods, organization and training of staff, evaluation, and job placement.

Basic Training of Peace Officers Within the State of Ohio

Ohio Peace Officer Training Council

Battelle-Columbus Laboratories is participating in a research program on basic training of peace officers within the State of Ohio. This study is being performed under a grant from the Office of Law Enforcement Assistance, U. S. Department of Justice, to the Ohio Peace Officer Training Council.

The overall objective of the study is to formulate a meaningful and practical plan of action for implementing improved basic training of peace officers within the State of Ohio.

To accomplish the overall objective four work phases will be carried out.

The purpose of Phase I is to examine in considerable detail the on-the-job performance requirements of newly appointed peace officers.

The purpose of Phase II is to analyze on-the-job performance requirements and translate them into a basic training curriculum that, when implemented, will provide valid and effective basic training for peace officers.

Phase III is designed to delineate tentative criteria for selecting instructors and to develop guidelines for the eventual establishment of more rigorous selection criteria.

The purpose of Phase IV is to bring together the work of the three previous phases into a plan of action for the basic training of peace officers within the State of Ohio. This phase will serve as the basis for future implementation of improved basic training. The plan will be a relatively detailed descriptive document that will give Ohio a leading valid and reliable peace officer training program.

Michigan Manpower Study

Michigan Employment Security Commission
(Michigan Department of Labor)
State Resource Planning Division of the Office of Economic
Expansion (Michigan Department of Commerce)
Division of Vocational Education
(Michigan Department of Education)

The Michigan Manpower Study represents an analysis of the characteristics of the labor force of Michigan as projected to 1980. The study was conducted by the Manpower and Regional Economics Division of Battelle Memorial Institute.

This study had three major objectives:

(1) To develop an improved methodology for analysis of projected characteristics of labor force (including educational attainment, industry of employment, and occupation of employment)

(2) To provide estimates of the characteristics of Michigan's labor force in 1970, 1975, and 1980

(3) To serve as manpower guidelines for educational planning in the state of Michigan.

The report on this study provided a detailed analysis of the factors affecting the future level of employment for each of 45 specific occupations for the entire state and for the Detroit Standard Metropolitan Statistical Area (Wayne, Oakland and Macomb Counties). As an important complement to the occupational analysis, detailed projections of employment in 32 industry classifications were furnished. All of the projections were developed through careful analysis of the supply of labor with respect to such characteristics as educational attainment and labor-force participation.

Identification of Training Needs

National Cash Register Co.

A systems study of NCR's service training program was conducted for the purpose of identifying deficiencies in the program. The study was conducted in three phases: (1) a comprehensive analysis of the entire training program, (2) isolation of the deficiencies of the program, and (3) development of recommendations for the correction of these deficiencies.

The analysis of the entire training program was conducted to determine the overall scope of the program, which included consideration of hiring procedures, apprentice training, service-school selection, service-school training, and upgrading. Using the information obtained

in the analysis of the program, the deficiencies of the program were identified. The final phase of the study was devoted to the development of recommendations for correcting the deficiencies of the program.

The types of recommendations that were formulated are as follows:

(1) The development of a capability in programmed instruction

(2) The development of a selection program for apprentices

(3) The construction of more appropriate forms for evaluating student performance

(4) The implementation of an EDP system for processing service-school records.

An Evaluation of the Apprenticeship Training Program

A major trade union

The general objective of this project is to evaluate an apprenticeship training program. Specific objectives are:

(1) To specify criteria for evaluating the apprentice program

(2) To evaluate the present apprentice program

(3) To formulate practical recommendations for improving the present program.

Included in the study are these three functions: (1) selection of apprentices for training, (2) training of apprentices (both on-the-job and related), and (3) evaluation and upgrading of apprentices.

This project will have two major end products:

- A comprehensive written report describing the entire study
- A one-day conference with officials and training personnel to discuss the project.

The Use of Programmed Instruction in Christian Education

National Councils of the Episcopal Church and the
Presbyterian Church (jointly)

The objectives of this research program were: (1) to evaluate the use of programmed instruction in Christian education, and (2) to train a group of church representatives so that they could develop programmed-instruction materials.

An experimental linear program was developed for one part of Suzanne de Dietrich's book, *The Witnessing Community*. The purpose of this 434-frame program was to evaluate the effectiveness of using the program as compared with reading the book, and the effectiveness of using the program plus group discussions as compared with reading the book plus group discussions.

An evaluation experiment involving about 100 people from local Episcopal and Presbyterian congregations was conducted. This experiment generated criterion-test-score data, time data, and opinion-questionnaire data. Analyses of these data indicated the following: (1) programmed instruction in all cases resulted in significantly higher criterion-test scores, (2) programmed instruction took longer to complete than studying the book, and (3) opinions generally were either strongly favorable toward programmed instruction or else strongly critical of programmed instruction. Few opinions were neutral.

In addition to thc evaluation experiment, seven Presbyterian and six Episcopalian representatives were trained in the techniques of programmed instruction. This training consisted of an initial workshop followed by individualized instruction over a period of about 9 months. Many of these representatives completed programs which were the basis for further field testing within each church.

PERSONNEL

Many of the research divisions in Battelle's Columbus Laboratories would furnish specialists for the research team formed to undertake this investigation. Although the Behavioral Sciences Division would supply most of the necessary people, others would be drawn from the Systems Analysis, Manpower Economics, Computation Research, and Construction Economics Divisions.

Biographical sketches for those staff members expected to play a major role in the proposed program are presented below. Also included are the biographical sketches for Dr. Lewis E. Harris (OSBA) and Mr. Harold Armstrong (SMI).

Key Project Personnel

Program Co-Director — Lewis E. Harris

Executive Director, Ohio School Boards Association
Ed.D. (1952), New York University

Lewis E. Harris, who would be a co-director of the program, has served as executive director of the Ohio School Boards Association (OSBA) since its formation in 1955. Under his leadership, the Association has grown steadily in membership and program. It now represents some 84 percent of all Ohio schools, carries on a year-round information and training program for school officers and conducts one of the most comprehensive conferences in the nation.

Concurrent with his duties as director of the OSBA, Dr. Harris also serves as president of School Management Institute, Inc. (SMI) a rapidly growing nonprofit corporation that provides advanced training for school administrators. SMI is a jointly held corporation of the OSBA and the Ohio Association of School Administrators.

A nationally recognized authority on school administration, Dr. Harris was chosen in 1960 to direct the Joint Project on Procedures in Self-Evaluation, sponsored by the National School Boards Association and the American Association of School Administrators, under a grant from the Fund for the Advancement of Education (Ford Foundation). In this assignment, Dr. Harris visited outstanding school systems all over the United States. A series of 13 booklets which described 28 outstanding systems was published under the title *Quest for Quality*. A final booklet in the series, *Keys for Quality,* was written by Harris and is an analysis of evaluation techniques.

Dr. Harris came to Ohio as an associate director of the School-Community Development Study, a research project aimed at improving the preparation program for school administrators, financed by the Kellogg Foundation. As part of his work with the Kellogg study, he participated in many community studies and worked with boards of education and administrators on schoolwide curriculum analysis. During the time he was associated with the Kellogg Foundation, Dr. Harris was also teaching at The Ohio State University.

In addition to serving as co-director of the program, Dr. Harris would be Principal Investigator in the area of personnel negotiations.

William D. Hitt — Program Co-Director

Chief, Behavioral Sciences Division
B.S. (1951), University of Kentucky
M.S., psychology (1954), The Ohio State University
Ph.D., psychology (1956), The Ohio State University

As noted previously, Dr. Hitt would serve with Dr. Harris as co-director of the program. Dr. Hitt has broad interests in the application of behavioral science to problems of education and training. Since coming to Battelle in 1957, he has worked in these areas: development of a reading machine for the blind, training of business leaders in an antipoverty program, development of a master plan for educational research, development of courses in research management, analysis of a public school system, development of requirements for a model school, the study of creativity, the analysis of education and training in correctional institutions, the training of faculty nurses in research methodology, and determination of needs for a technical institute.

Dr. Hitt is especially interested in the area of education management, including planning, organizing, and evaluating educational systems. A major interest is in the application of the methods and concepts of systems analysis to these problems. He also is interested in the promotion of an interdisciplinary approach to education management, seeking the cooperation of psychologists, educators, economists, systems analysts, and computer scientists in attacking a given problem.

Dr. Hitt is the author of approximately 20 technical papers and special reports in the area of general psychology. He is a member of the American Psychological Association and Sigma Xi.

Kenneth F. Connell — Principal Investigator Area I

Research Psychologist, Behavioral Sciences Division
B.A. (1963), Princeton University
M.A. social psychology (1966), Miami University
Graduate School, social-industrial psychology and statistics, The Ohio State University

Since coming to Battelle in 1966, Mr. Connell has developed training techniques and procedures for use with an American Sioux Indian tribe. Mr. Connell has also been involved in the evaluation of these training procedures in terms of their usefulness and adaptability to the needs of the Indian plant and construction crews who are assembling and erecting homes for needy reservation families.

Mr. Connell has participated in survey design and analysis activities for Battelle and non-Battelle sponsored projects, including: (1) the design of a nutrition study questionnaire, (2) the design and analysis of a questionnaire to determine the degree of satisfaction of Battelle personnel with Battelle Report Services, and (3) the design of a pilot questionnaire survey to identify the transportation needs of innercity Columbus families. In a recent Battelle analysis of urban transportation problems, Mr. Connell also participated in the identification of psychological research issues and the formulation of a research program for achieving the "Design of Urban Transportation for the User". He is presently working on a project dealing with the training of apprentices.

In the proposed project, Mr. Connell would be in charge of investigations on "Communicating with the Public".

Principal Investigator John R. Stock

Area III

Associate Chief, Behavioral Sciences Division
B.A., psychology (1953), Duquesne University
M.A., industrial psychology (1956), The Ohio State University

Mr. Stock's field of specialization is management systems. Since joining Battelle in 1960, Mr. Stock has engaged in a variety of research projects. He conducted a study for the validation of a psychological test battery to select research scientists. Also in the area of personnel selection, he assisted in the revision and validation of tests for selecting mechanical and electronic business machine servicemen. His recent activities in the area of psychological measurement have been concerned with attitude measurement and the design of questionnaires and surveys. He has supervised the work of an interview team and has devised procedures for the statistical analysis of interview and survey results.

In the area of training, Mr. Stock has been involved with the preparation of training materials covering merchandise arithmetic and sales and stock planning for retail executive trainees. He has developed several courses of programmed instruction including one on the programming of computers for the automatic checkout of electronic equipment. He assisted in the development of a methodology for identifying and defining vocational skills. He is presently engaged in a project involving the analysis and evaluation of an apprentice training program.

Mr. Stock's responsibility in this project would be to supervise the study of staff evaluation and improvement.

Horace W. Ray

Principal Investigator Area IV

Associate Fellow, Behavioral Sciences Division
B.S., psychology (1954), Pennsylvania State University
M.A., psychology (1959), The Ohio State University
Ph.D., psychology (1963), The Ohio State University

Problem Area IV, Program Evaluation and Improvement, would be under the direction of Dr. Horace W. Ray. Dr. Ray's major interests are in the areas of education and training, statistical methods, and psychological measurement and evaluation techniques. Since joining Battelle in 1957, he has had a wide variety of research experience, including analysis of personnel selection and training needs, application of systems analysis and behavioral-science methodologies to the management of education and training systems, assessment of research and development needs in education and training, and research in decision making.

Dr. Ray's previous experience includes 1 year's teaching/research experience as an Assistant Professor at the University of Tennessee. During this time, he taught courses in statistics, psychological – and behavioral – measurement techniques, and in industrial and applied psychology. Research activity during this period included development and evaluation of examination procedures for graduate students and of entrance requirements for graduate students.

Dr. Ray is presently engaged in the analysis and evaluation of a public school system. This study encompasses curriculum, staff, facilities, and special services.

Dr. Ray was the recipient of a special award from the American Institutes of Research in 1964 for his Ph.D. dissertation on human decision making. He is a member of the American Psychological Association and of SigmaXi.

Benjamin B. Gordon

Principal Investigator Area V

Chief, Systems Analysis Division
B.E.E. (1952), The Ohio State University

Since joining the Battelle staff in 1951, Mr. Gordon has engaged in a large number of research programs concerned with systems analysis. He has participated in the development of automatic checkout techniques, the evaluation of advanced control techniques, the analysis of antenna systems, and the computer implementation of logical design. His recent research has dealt with the solution of integer-linear-programming problems, safety analysis of public-transportation systems, simulation of railroad freight systems, renewal theory, analysis of computer applications in the trucking industry, military family-housing requirements, and urban transportation systems.

As head of Battelle's Analog Simulation Laboratory from 1956 through 1960, Mr. Gordon was engaged in analog-computer simulations of aircraft dynamics, servomechanism

designs, heat-transfer systems, radar and electronic-countermeasures systems, suspension systems, and nuclear-reactor control systems. He has performed real-time simulation with actual hardware included as part of the simulated systems.

Mr. Gordon would lead studies related to the application of systems analysis to administrative problems in the proposed program.

School Management Institute

Harold B. Armstrong

Executive Vice President, School Management Institute
B.S., education (1947), The Ohio State University
M.S., education (1952), The Ohio State University

Mr. Armstrong has 20 years of experience in the field of education. He has been an elementary principal, a director of curriculum, a college instructor, and an assistant superintendent.

In his present position as Executive Vice President of School Management Institute, he spends considerable time organizing seminars for school administrators. He also serves as a consultant on a variety of educational projects.

Mr. Armstrong is a member of the following professional associations: American Association of School Administrators, Ohio Association of School Administrators, Association for Supervision and Curriculum Development, National School Public Relations Association, and the National Association of Secondary School Principals.

The experience which Mr. Armstrong has had makes it logical that he conduct seminars as a part of the new program.

Supporting Staff

John L. Coffey

Associate Chief, Behavioral Sciences Division
B.S., psychology (1958), The Ohio State University
M.A., psychology (1960), The Ohio State University

Mr. Coffey's primary interests and responsibilities are in the area of instructional-system research. He has conducted research on the development and evaluation of instructional systems designed for teaching visually handicapped persons to use an aural reading device. Also in the area of blindness, Mr. Coffey has implemented and evaluated programmed-instruction materials with blind children.

The development, implementation, and evaluation of self-instructional methods and systems in a variety of other contexts also has been one of Mr. Coffey's major interests. This has been accomplished in the areas of retail sales, catalog operations, merchandise distribution, religious education, meat merchandising, grocery stocking, and vocational education. He also has been involved in the formulation of an overall plan for a technical institute, as well as the design of a state-wide instructional system for police officers.

Ronald J. Cress

Senior Psychologist, Behavioral Sciences Division
B.S., education (1960), Ball State University
M.A., psychology (1962), University of Denver

Mr. Cress's major interests are in experimental and learning psychology, with specific interests in the application of operant techniques to the teaching of overt and covert human behaviors. He is presently working toward a Ph.D. degree in experimental psychology at The Ohio State University.

Since coming to Battelle in 1963, he has conducted research on the application of programmed instruction to a variety of subjects. This work has included such subjects as visualization, retail sales, mechanical and electronic repair, and selected areas of high school vocational education. He also has conducted research on developing guidelines for the formulation of a natural-science museum and a model school. He presently is conducting research on the transfer of educational technology from the U. S. Air Force to the public school system.

Joseph W. Duncan

Chief, Manpower and Regional Economics Division
B.S.M.E. (1958), Case Institute of Technology
M.B.A. (1960), Harvard's Graduate School of Business Administration
Special Program (1960-61), London School of Economics and Political Science
Doctoral Program (1961-Present), The Ohio State University

The Manpower and Regional Economics Division, which Mr. Duncan leads, is concerned with studies of manpower trends and related educational requirements, regional economic-growth patterns and their influence upon human and natural resource development and utilization, and analysis of socioeconomic problems associated with urban development.

During the past 5 years, Mr. Duncan's research has been directed to projection of occupational requirements in the next 10-15 years, with particular emphasis on the national economy and including labor-force projections in several regional studies. He recently

completed a major study of the relationships between the structure of the labor force and the resulting demands upon education in the state of Michigan for the Michigan Employment Security Commission, Michigan Department of Public Instruction, and the Michigan Office of Economic Expansion. Mr. Duncan is chairman of Battelle's Urban Studies Task Force which is concerned with a multidisciplinary approach to solving problems related to the urban environment.

John R. Hagely

- Research Architect, Construction Economics Group
  B.S., architecture (1953), The Ohio State University
  M.S., architecture (1961), The University of Illinois

Since Mr. Hagely has been with Battelle, he has been involved with a number of projects concerning low-cost housing, urban renewal, and new materials and techniques for the construction industry.

In past projects he has been responsible for developing statistical information on a nationwide project to determine the trends in building materials in nonresidential construction. In the same project he directed the build-up of a construction information center related to the collection, analysis, and dissemination of information covering design, construction, maintenance, and performance of architectural environments. More recently, he has conducted a study to identify the impact of technological change in the construction industry of the United States between 1965 and 1975.

Robert W. House

Associate Manager, Systems Research, Systems and Electronics Department
B.S. (high honor), mathematics (1949), Ohio University
M.S., mathematics (1952), Ohio University
Ph.D., electrical engineering (1959), Pennsylvania State University
Program for Management Development (1966), Harvard Business School

Since joining the Battelle staff in 1959, Dr. House has been engaged in many research programs. He also has taught courses in logical design of digital systems and linear programming to members of the Battelle staff. He is an adjunct professor of mathematics at The Ohio State University.

Dennis N. McFadden

Research Psychologist, Behavioral Sciences Division
B.S., psychology and mathematics (1960), The Ohio State University
M.A., psychology (1966), The Ohio State University

Mr. McFadden's special interests include experimental design, statistics, test construction and measurement. He is currently involved in a study concerning the evaluation of apprenticeship training in the building trades industry.

Prior to joining Battelle, Mr. McFadden was a fellow at the Educational Testing Services, Princeton, New Jersey, where he conducted research in the areas of test theory.

Diane M. Metcalfe

Research Psychologist, Behavioral Sciences Division
B.A., psychology (1960), The Ohio State University

Mrs. Metcalfe's field of specialization is statistics. She is currently working toward a master's degree in psychological statistics at The Ohio State University.

Mrs. Metcalfe is currently conducting statistical analyses of a variety of projects including the evaluation of a prison's training program and of an apprenticeship-training program. She is participating in the design and analysis of several surveys including a survey of compensation paid to scientists and engineers engaged in research and development and a survey of the transportation needs of innercity residents. For a community attitude study, she is developing methods of applying multidimensional scaling analysis to the measurement of people's attitudes toward their community.

Robert N. Pesut

Research Statistician, Systems Analysis Division
B.S. (cum laude), mathematics (1960), Youngstown University
M.S., applied statistics (1962), Purdue University

Since joining the staff in 1962, Mr. Pesut has been engaged in a wide variety of projects requiring the application of statistical techniques. These projects have included the application of vector stochastic difference equations to the problem of developing failure-prediction techniques for use in automatic checkout equipment, computer simulation of railroad operations to study the activities of a diesel service area, and the application of regression techniques to assist the Navy in the distribution of maintenance resources for their real-property inventory.

Mr. Pesut has directed a project to develop an economic evaluation model to determine whether it would be more economical to retain an existing building in the naval inventory by means of modernization or to replace it with a new building. He also assists other staff members with statistical problems arising in their work.

Gerald L. Robinson

Senior Research Scientist, Systems Analysis Division
B.S., electrical engineering (1950), Massachusetts Institute of Technology
M.S., industrial engineering (1957), New York University

Mr. Robinson's fields of interest include operations research, management science, systems analysis, and industrial engineering.

Since joining Battelle in 1965, Mr. Robinson has participated in research programs involving the development of an economic model for facility replacement-modernization decisions under uncertainty, the investigation of the applicability of inventory-control theory and electronic data processing to inventory management in the United States shoe-manufacturing industry, and long-range planning of aircraft-maintenance resource requirements.