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ABSTRACT

This report describes a study to collect, analyze, interpret, and report appropriate information that could be used to guide the implementation of an automated management information system (MIS) for vocational education in Vermont. The first section lists twenty-five specific recommendations for action to follow-up the completion of this study. The next five sections present an introduction, statement of the problem, goals and objectives, methodology (which included interviews and consultations, design of three MISs, and orientation workshop), and review of the literature. In the final and largest section three alternative MISs are discussed: manual-based MIS, mechanized MIS, and combination manual/mechanized MIS. Topics covered include alternate organizational elements, analysis of current MIS resources, assuring data quality, and labor supply/demand data. Detailed strategies are then outlined for development of manual-based and computer-based MISs. For each alternative this information is presented: overview of system (advantages and disadvantages), discussion of its components, budget justification, estimated budget, personnel requirements, and flow diagram. Appendixes, amounting to approximately one-third of the report, include Data Collection Needs Based on Vocational Education Data System and Data Collection Based on Vermont's Current Data Elements. (YLB)

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REPORT OF A STUDY TO DETERMINE THE FEASIBILITY OF ESTABLISHING A MANAGEMENT INFORMATION SYSTEM FOR VOCATIONAL EDUCATION IN THE STATE OF VERMONT

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February 28, 1979

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THE NATIONAL CENTER MISSION STATEMENT

The National Center for Research in Vocational Education's mission is to increase the ability of diverse agencies, institutions, and organizations to solve educational problems relating to individual career planning, preparation, and progression. The National Center fulfills its mission by:

* Generating knowledge through research
* Developing educational programs and products
* Evaluating individual program needs and outcomes
* Installing educational programs and products
* Operating information systems and services
* Conducting leadership development and training programs

Final Report
of a Study Conducted for the
Vermont State Department of Education

The material in this publication was prepared pursuant to a contract with the Vermont State Department of Education. The basic intent of the document is for planning purposes; therefore, points of view or opinions expressed do not necessarily represent official position or policy of the Vermont State Department of Education.

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ABSTRACT

The major purpose of this study has been to determine the feasibility for establishing a management information system (MIS) for vocational education in the State of Vermont. The type of data which needs to be included in such a MIS has been determined at the federal, state and local educational agency levels. Several alternative systems for the collection, processing, and utilization of management data/information have been proposed as outcomes of the study.

Specific recommendations for the implementation of a management information system in Vermont are included in this final report. Limited assistance will be provided to the vocational-technical division management staff in the selection of an appropriate management information system. Basic training opportunities will be provided for staff members of the state department of education as preparation for assuming their roles in a management information system.

It is hoped that the ultimate outcome resulting from this study will be the establishment of an efficient and effective management information system for vocational education in the State of Vermont. Such a system will be used for purposes of planning, evaluation, reporting, monitoring, public information and decision making.

PREFACE

The Vocational-Technical Division of the Vermont State Department of Education felt a need to improve and increase the amount of program data and information available for planning, evaluation, reporting and decision-making which was available to the state staff. They requested the National Center for Research in Vocational Education at the Ohio State University to recommend alternative strategies to meet these needs. This report is an outcome of that study. The materials contained in this document will be used by state-level decision-makers to make plans leading to the establishment of a state management information system.

Many individuals assisted the project staff in the development of this report. Notable among these are Arthur W. Ericson, State Director of Vocational-Technical Education for Vermont, and Barbara M. Gutheil, Director of the Vermont State Research Coordinating Unit. Other members of the state Vocational-Technical Division staff who made significant contributions are: Thomas W. Watts, Elizabeth P. Carr, Briggs P. Dunn, Richard F. Sargent, Richard E. Higgins, Walter L. Wimmer, Marie-Ann O'Connor, Loreen O'Connor.

Many leaders from the educational and governmental segments of the state contributed significant time and advice. Among the major contributors were:

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Special recognition is due Mr. Joseph P. Kisko, Industrial Arts Consultant, and Dr. Marc Hull, Assistant Director, Special Education and Pupil Personnel Services Division of the State Department of Education who provided useful information.

The research team is grateful for the help of the above named individuals and for that provided by the local school superintendents, directors of area vocational centers, and vocational education teachers who shared their suggestions for improving the data collection and utilization processes.

Under the present dedicated and capable leadership team, the Vermont State Department of Education will certainly succeed in making substantial progress toward providing every citizen with a relevant and rewarding educational experience. It is the sincere wish of The National Center's management and staff that this initial

effort toward the development of a management information system for vocational education will foster a lasting and mutually beneficial relationship between our Center and the Vermont State Department of Education.

RECOMMENDATIONS

The following are very specific recommendations for action to follow-up the completion of this feasibility study. They are based strictly on an admittedly limited understanding of unique Vermont conditions. In the judgement of the project director and other National Center staff members, however, they are activities that should be considered for implementation as soon as possible.

Recommendation 1. A commitment should be made to implement a computer-based management information system as soon as possible. Such a system will decrease the amount of staff time needed for maintenance and use and will provide a potential for data analysis and retrieval.

Recommendation 2. The MIS must be designed to convert data to information that can be used by personnel at all levels, places, and times throughout the decision-making process.

Recommendation 3. The State Department of Education should develop an administrative policy statement and set of regulations to govern the collection, processing, and utilization of data and information by members of the State Department of Education.

Recommendation 4. Plans should be developed for the orientation of state and local vocational education staff to the workings of a computer-based MIS and the potential for using such a system. These plans could include a series of well-designed and well-executed short workshops (not over two days in length) conducted during the early spring of 1979. The first of such meetings may center on state-level personnel and involve educators as well as selected non-educators who should be included in MIS development activities. The final report of this project could serve as a basis for the workshop. The major outcome of this first series of meetings should be a better understanding of how a MIS is designed, how it functions, and how the output can be used to facilitate management decision-making.

The second group of meetings in this series could be designed for local educators who work with vocational education programs. The meetings could be conducted at three or four locations throughout the state in an effort to keep the number of

participants at a workable level. Many of the same features covered in the state personnel session can be covered. The collection and reporting of data must be emphasized, in addition to the use of feedback from the system.

Recommendation 5. The MIS must be designed as a "disaggregated data bank," which will allow managers to retrieve data in the form they want without having to specify all their information needs in advance.

Recommendation 6. The State Department of Education should purchase the data storage/retrieval/reporting program known as "Data Analyzer" produced by Program Products Incorporated. This is a very efficient elementary system that should well serve the purposes of vocational education, until the staff becomes more sophisticated in the area of data analysis and use. The cost of the total implemented system is estimated at about $20,000. Several programs in the department could share the cost of this initial installation. The

Division of Vocational-Technical Education could spend up to $10,000 for the program and justify the cost on an amortized basis, leading to higher efficiency and effectiveness in the use of stored data.

Recommendation 7. The first activity in the development of an adequate MIS must be the development and application of a battery of instruments that allows the staff of the vocational-technical division to meet the reporting requirements of VEDS (vocational education data system). This activity must be begun in early 1979 and, when completed by the late summer of 1979, should serve as the nucleus of a state-wide MIS for vocational-technical education.

Recommendation 8. One of the greatest problem area of data collection will be the student follow-up/employer evaluation requirements under VEDS. The individual or group who is designated to design the MIS program should contact Dr. Robert Morgan, Director of VEDS in the U.S. Office of Education for recommended procedures for data collection and processing.

Recommendation 9. A contract should be arranged with a local individual or group to determine specific data elements that should be collected as input for the MIS.

Recommendation 10. A centralized system of data collection should be implemented in order to decrease the burden of data handling on LEA staff and to better control the quality of data that is put into the MIS. Such a centralized system should be a great incentive to encourage LEA's to cooperate in providing requested data. Such a centralized system should counteract the claim of LEA's relating to the excess costs of data collection.

Recommendation 11. Provisions must be made for differentiating between phases of the research program that address data that must be collected on an annual basis (such as those required for federal reporting purposes) and data which can be collected on a one-time basis (such as targeted studies).

Recommendation 12. A contract should be arranged with a local individual or group to design the required data collection forms needed to implement a computer-based MIS.

Recommendation 13. The basic format and content of the MIS must be kept as consistent as possible from year to year in order to allow for the comparison of predetermined program factors that can serve as criteria for evaluation purposes.

Recommendation 14. A data processing system based on the use of key punched data cards should be used. A key punch system/instead of an optical scanning process is recommended because:

-Facilities at the state central computer services lend themselves best to this type of processing.

-The relatively small number of forms to be processed can best be handled by this process.

-Past experience shows that results obtained from raw data forms will be more accurate with a key punching format.

Recommendation 15. All output from the computer-based MIS which is to be used for federal reporting purposes should be printed in tabular form directly by the computer. These forms may then be transmitted directly to

VEDS in the machine print-out form in order to reduce clerical time and error in transcribing and manual typing.

Recommendation 16. The State Department of Education should form a Data Needs Assessment Task Force, organized and directed by the Deputy State Commissioner of Education. The main function of this group would be to monitor and approve all requests for data that originate in the State Department of Education. Every precaution must be taken to minimize the number and volume of data requests made of LEA's.

Recommendation 17. As much use as possible should be made of the remote data terminal housed in the State Department of Education. This installation should prove useful for the recall of stored data/information.

Recommendation 18. Maximum use must be made of the computer-based MIS for purposes of returning as rapidly as possible processed data to all agencies/organizations who supply such data.

Recommendation 19. The Division of Vocational-Technical Education should establish a toll-free telephone line which LEA personnel may

use to request assistance and information regarding MIS operations and data requests. This "hot line" should be staffed by the MIS manager and clerical assistant.

Recommendation 20. Each individual subject matter consultant in the Vocational-Technical Division, in cooperation with LEA administrative staffs, should devise means for working with vocational teachers in the following areas:

- -Motivation to provide accurate and timely data
- -Interpretation of data collection forms
- -Using information feedback in a productive way.

Recommendation 21. When the program for the computer-based vocational MIS, is designed a serious effort must be made to interface with the SFEMS program (School Finance Equalization Management System). This combination of data bases will allow for the determination of cost effectiveness/ cost benefit for all funded vocational programs.

Recommendation 22. A critical factor in the operation of a computer-based MIS is the timeliness of data processing. Schedules for making raw data available for machine processing must take into account periods of peak load on the system. The heaviest work loads experienced by the state computer center usually fall during the last week of each month and the period from mid-June through mid-August.

Recommendation 23. Staff assigned to the computer-based system in the State Department of Education should be assigned for administrative purposes to the Office of Statistics and Information (A.J. McCann, Chief). All personnel are recommended for 0.5 FTE employment in the vocational education MIS, which means that the other 0.5 FTE assignment can be in another related area such as special education. The MIS manager should have a strong background in statistics and computer operation and the clerical assistant should be capable of accessing the computer system with both input and output.

Recommendation 24. The Vocational-Technical Division should use the field publications of various

other state agencies to disseminate information about activities and requests of the MIS (e.g., "VSBA Newsletter" of the Vermont School Boards Association to reach school superintendents and school board members or "The Vermont Labor Force" to reach employers).

Recommendation 25. Financial investments in the MIS development and operation should not be justified on the basis of cost reduction, which is often irrelevant with an MIS, but on an estimate of the systems ability to help managers and others make more profitable program decisions.

INTRODUCTION

Many aspects of our technological society continue to fluctuate and change. As Toffler remarkably portrays in Future Shock (1970), education has not been exluded from this process of change and modernization. We are living at a time when people are questioning the relevance and quality of vocational education as a means of preparing people for the world of work. At the same time, public schools, like other institutions competing for public funds, are increasingly being subjected to the taxpayer's demand for greater accountability.

An overwhelming volume of data continues to be gathered by all concerned, in the belief that adequate and appropriate information can be delivered and made accessible in a timely manner to administrators who formulate plans and make decisions. Directives can then be issued to appropriate staff charged with the responsibility of attaining set objectives.

Yet events/activities occur so rapidly that many administrators are unable to stay abreast of events/activities rapidly enough to fully grasp them.

The task of administrating vocational education at both state and local levels has become increasingly more complex and vital to the successful operation of vocational education programs. The development of appropriately designed management information systems has become essential to the administration of vocational programs. A management information system

(MIS) is defined for the purposes of this report to be the systematic collection and analysis of information to be used by all levels of administration to make planning, evaluation, and reporting decisions.

STATEMENT OF THE PROBLEM

Vocational education programs in the state of Vermont are rapidly expanding at all levels. The demand for new programs far exceeds the resources available. Decisions must be made regarding the best investment of scarce resources. Such determinations must be based on current and accurate information about conditions in the field.

The revised Federal Vocational Education Data System (VEDS) will request a more sophisticated type of program information than before. The Vocational Education Amendments of 1976 (PL 94-482) mandate that states maintain a refined system of planning and evaluation. Legislative efforts on behalf of vocational education must be supported by improved public information programs. Congressional delegations, state legislators and taxpayers need factual data in order to assess the accountability of vocational education. Governing bodies need information to guide the formulation of policies, standards and regulations. Advisory groups need such information as a basis for their recommendations.

The Vocational-Technical Division in the Vermont State Department of Education currently has in operation a number of the components needed to operate a management information system. These components vary in scope and complexity. All involve manual procedures for the collection and analysis of data. Because of limited state staff size, the processing of such data frequently requires long periods of time. Expanding programs and the burden of increased requests for data will

tax this manual system even more.

For these reasons, staff members in the Vocational-Technical Division are exploring the feasibility of establishing a management information system that would be responsive to all the needs of their operation as well as to those of the agencies and institutions the division serves.

GOAL AND OBJECTIVES

The primary goal of this study was to collect, analyze, interpret, and report appropriate information that could be used to guide the implementation of an automated management information system for vocational education in the state of Vermont. The underlying intent of this study was to adapt appropriate current resources rather than to develop a completely new system. In order to accomplish this goal, the following objectives were set forth:

1. Inventory and analyze information needs to meet federal and Vermont state requirements.
2. Determine information elements that are needed for reporting, planning, and evaluating activities at the secondary, post-secondary, and adult program levels.
3. Inventory state and local personnel, equipment, and financial resources available for implementing a management information system for Vermont.
4. Analyze the current State Department of Education system and the federal VEDS system to determine interface points and potential problems.
5. Analyze MIS systems in five states to determine elements or components that may be adapted for the Vermont system.
6. Design three alternative management information systems that are viable solutions to the specific Vermont state needs and prioritize the alternative systems.

7. Develop implementation schedules for each of the three alternatives, complete with personnel, equipment, and financial resource needs, along with appropriate personnel training needs.
8. Develop a final project report that describes:
   a. The problem and its context
   b. Specific information needs
   c. Existing personnel, equipment, and financial resources
   d. Three alternative systems

METHODOLOGY

Procedures followed in performing the scope of work covered by this project, comprise primarily those of descriptive research in the areas of needs analysis, context analysis and system design.

Development of Technical Plan

The project director and his staff carefully reviewed the provisions and requirements of the project proposed in addition to consulting with appropriate technical and design resource personnel. The technical plan included detail about the planning functions and an outline of the procedural activities to be followed in achieving the primary goal and related objectives.

Review of MIS Literature

An extensive computer-based search of existing literature data bases was conducted during the first phase of the study. Documents for review were obtained from Research in Education (RIE) and from the Educational Research Information Center (ERIC). The search was extended to include special publications from the holdings of the research library in The National Center for Research in Vocational Education located at The Ohio State University. This review yielded several MIS feasibility studies conducted during the last decade. A summary of selected studies can be found in the section labeled "Review of Literature".

Requests for MIS Materials and Follow-Up

Requests for MIS descriptions and materials were made to seventeen state divisions of vocational education. Each state was chosen because it had an exemplary MIS, had characteristics that are similar to Vermont's or had both an exemplary MIS and characteristics similar to those of Vermont. Twelve of the seventeen state divisions responded with information. Respondents' names, state, mailing addresses and telephone numbers are included in exhibit 3 of the Appendix.
Five of the responding states' management information systems were then selected by consultation with Vermont State Department of Education staff.

Interviews and Consultations

A number of interviews and consultations were conducted by the project director with five groups of organizational personnel: (1) state vocational education staff, (2) staff of local education agencies, (3) state education staff, (4) personnel from other state agencies and (5) staff from other state-level educational organizations. Exhibit 4 in the Appendix contains the names of persons interviewed during this part of the study.

State Vocational Education Staff. Personal interviews were conducted with staff members in the Vocational-Technical Division of the State Department of Education in an effort to identify their information needs. The information from these

sessions was compiled into a list of data requirements and used as an interview guide that was responded to by state staff at a regular staff meeting. These staff responses were preceeded by a one-hour explanation of what an MIS is and how it works by the project director.

A recommended list of data to be collected in order to meet the information needs of state vocational-technical staff in the area of planning, evaluation, and reporting can be located in Supplement I.

Staff of Local Educational Agencies. A number of staff persons from local educational agencies in Vermont were interviewed to determine their capabilities for providing the data state staff persons indicated they needed. Included in the groups surveyed were local superintendents, directors of area vocational centers, and teachers of vocational subjects. The interviews were largely informal and the state staff data need list was used to guide the LEA's input. A recommended list of data which can be obtained from LEA's is located in Supplement I.

State Non-Vocational State Department of Education Staff. Various persons outside the Vocational-Technical Division were consulted regarding the current and projected status of the following concerns: policies and regulations affecting the operation of an MIS, data gathering instrument design and clearance procedures, data gathering and processing procedures' and fiscal considerations.

Recommendations, which, were at least in part outcomes from these interviews are found throughout this report.

Personnel from Other State Agencies. A number of individuals from other non-educational state agencies were consulted about the role their organization could play in the establishment and operation of a vocational education MIS. Among these agencies were the Vermont Department of Employment Security, the Division of State Information Systems, and the State Planning Office.

Findings resulting from these contacts are included in this report.

Staff from Other State-Level Educational Organizations. The State Advisory Council for Vocational Education and the State School Boards Association were also consulted about the use they might make of information from a state vocational MIS and about any operational constraints that might exist.

Design of Manual MIS, Mechanized MIS, and combination Manual/Mechanized MIS.

All available information and findings were utilized in the development of three systems, a manual based MIS, a mechanized MIS, and a combination manual/mechanized MIS to facilitate the collection and processing of MIS data from local educational agencies in Vermont. Each system varies from the other in operational characteristics, cost of installation/operation and implementation/operation strategies and requirements.

A number of factors were considered in the design of all three systems. Some of the collection factors considered were that:

1. Data requested must be relevant and have an identified use.
2. Data must pass through a minimum number of hands on its way to the state agency.
3. Maximum use must be made of the most recent technological advances in instrument format, design, and handling.

Some of the processing factors considered were that:

1. Maximum use will be made of the most recent technological advances in electronic and manual data processing. Consideration will be given to fully utilizing all resources now available.
2. Consideration will be given to processing data in the shortest possible time.
3. The most effective and efficient storage of processed data will be considered in order to minimize retrieval time.
4. Methods for the rapid return of processed data to LEA's will be included.

Consultants who are knowledgeable about Vermont conditions reviewed the recommended systems and reacted to the appropriateness of techniques and practices recommended.

Orientation Workshop

A one day in-service workshop was organized and conducted for state staff members in vocational-technical education. The workshop had three major purposes:

1. To advise staff about selecting the most appropriate state management information system
2. To prepare state staff for their roles in implementing the MIS program.
3. To secure feedback from staff concerning the appropriateness of techniques and practices contained in the models developed

Appropriate workshop activities designed to familiarize staff with MIS programs were utilized in conducting the workshop sessions. These activities included the use of techniques that simulate the roles of various individuals in the collection, processing, and utilization of MIS data.

REVIEW OF LITERATURE

Introduction

In the last two decades public vocational institutions have generally grown in both size and complexity. Expanded programs, reporting requirements, and the fact that vocational administrators at all levels are now more than ever being accountable for all decisions have made the need for relevant information more imperative. Generally, many vocational institutions have not given particular attention to the planning of their management information system, especially, in regard to its intended function that of guiding in decision making. Starr and others (1977) reached this conclusion also in a national study of management information systems for education. Some of the major findings derived from this study (p.56) follow:

- No states, were found to have a totally comprehensive, and adequate MIS as defined by this study.
- Only five states were found to have management information systems that had a combination of very good data base, data processing, and report generating capabilities.
- Only six states had adequate or near adequate MIS data bases.
- Facilities data were found in the data bases of only fifteen states; program data were in the data bases of only seven states; (and) only four states reported having community data.
- Only nine states had adequate data processing systems and eight still depended on a manual system for managing their MIS data.

The purpose of this Review of Literature is to define a management information system, to identify its characteristics, and to review six selected projects concerned with the development of management information systems.

Management Information Defined

Management information systems are many things to many individuals and they vary accordingly. Kreibel, Van Horn, and Hermes (1971) defined a management information system as the:

> formal configuration of human and capital resources and programs in an organization that results in collecting, encoding, storing, processing, retrieving, communicating, decoding, and using data for management decision and control. (p. 16)

Enger (1969) defined a management information system as a system distinguished by its information elements structured into a data base serving the information requirements of policy and operating management. He further points out that management information systems: (1) shift toward the use of computer for management application, (2) attempt to provide data to both policy management and operational management, and (3) that the key to management information system design is the data base, composed of elements of information which represent transaction detail.

Kennevan (1970) defined a management information system as an organized method of providing past, present, and projected information relating to internal operations and external intelligence which supports the planning, control, and operational function of an organization by providing decision-makers with uniform information in the proper time-frame.

According to Dusseldorp (1969) a management information system is defined as "an organized method of providing management with information needed for decisions, when it is needed and in a form which aids understanding and stimulated action" (p.32).

As reviewed above, management information systems can be defined in several ways and developed for a variety of institutions. However, while definitions for a management information system vary, it is generally agreed that a management information system has three distinct but interrelated sub-systems (Starr, 1976). These sub-systems are:

1. An input sub-system which deals with the identification of management-useful data and procedures for their collection
2. A data management sub-system which deals with the encoding, organizing, and storing of source data
3. An output sub-system which decodes the stored data and reorganizes them in user-specified formats

In Lee's (1976) view the following five characteristics should be found in any good management information system today:

1. Uses a definition for each item of data that is uniform within the state and compatible with the definitions used in other states
2. Uses only primary source data
3. Uses automation
4. Uses standardized coding
5. Involves interlocking sub-systems

Lee further believes that there are two additional remarks that should be made about a system of this kind: 1) it must contain regular feedback and 2) have updating procedures.

Development of appropriately designed management information systems is critical in the administration of vocational education programs. According to Lee (1973) six major components are necessary in development of comprehensive state vocational management information systems. The components stressed are as follows: enrollment,

follow-up, finance, instructional personnel, instructional program, and facilities and equipment.

Yeager (1976) however believes that although information systems have profited from improvements in hardware components, the most critical factor in the development of information systems is not the hardware but the human factor. In Yeager's view, the three basic components to the successful design and implementation of the system are the following:

1. Top management support and involvement from the inception of the system
2. Communication and cooperation with the individuals who must ultimately make the system function
3. Meaningful and timely outputs

Stevenson and others (1978) agree with Yeager and go on to suggest that information systems cannot and should not attempt to replace the good judgment and instinctual reaction of an experienced and competent administrator. An information system in their view must also have the capacity to adapt to changing situations and have the capacity to learn from experience.

State of the Art: Review of Selected Studies

Six selected examples of recent attempts to develop management information systems are reviewed.

West Virginia Comprehensive Data System for Vocational Education. In a recent study (Burdette, 1976) attempts were made to design and further develop the fiscal and student follow-up components of the West Virginia Comprehensive Data System for Vocational Education. The information system development in this project

integrated information needs at local, state, and federal levels into a comprehensive system which would facilitate program management activities by all agencies concerned. In order to provide information about program effectiveness and program budgeting the study focused on two components, the financial accounting component and the student follow-up component.

The implementation of the financial component of the data system allows state and local level administrators to determine average operating costs of different curriculum offerings, establish trends in the costs of courses, and make selected types of comparisons. The follow-up component, on the other hand, can be used in updating the curriculum, determining program effectiveness, and conducting cost-benefit and related types of analyses. Despite the field testing, however, it was found that systems and procedures developed would need more investigation before they could be transported to other school systems or states.

South Dakota Follow-Through Management Information System. The Follow-Through Management Information System (Stover, 1976) was designed and implemented for program initiation, operation, and induction. It had the following purposes:

- To provide a statewide, uniform procedure for assessing the training given to vocational students in the labor force
- To collect feedback information to be used in making administrative decisions
- To implement a statewide placement system for postsecondary vocational-technical students

The system was designed to be initiated, directed, and conducted from the state level. The exit information in this type of system is gathered by local school personnel while the placement information is collected through a cooperative agreement between the SD Division of Vocational Education and SD Job Service. This system consists primarily of data collection forms and their administration, and a computer program to summarize the data for state and local use. A job development fact sheet and a set of procedures for administering a statewide placement effort are also part of this system. The materials and procedures developed in this project were successfully implemented and evaluated; however, additional refinement was recommended.

Management Information System for Vocational Education. The Management Information System for Vocational Education (MISVE) developed by The National Center for Research in Vocational Education is a system designed to allow the acquisition, processing, and retrieval of information in a manner optimally useful for planning, reporting, and accountability purposes (Starr and others, 1977b). It is specifically designed to deal with the needs of information system administrators who must periodically redefine information requirements, update existing data bases, access stored data in a form and at a time when they are needed, and who must have options open to them for acquiring and maintaining computer software on computer hardware that is available to them.

MISVE addresses itself directly to the national concern for better planning and accountability made possible with timely and targeted data-based information available to managers. MISVE

does so in several ways. First, the prototype MISVE data base is broad in scope and includes the most current information concerns of vocational educators. Second, MISVE is specifically designed for ease in making user-specified data base modifications to meet changing federal, state, and local information needs. Third, output from MISVE can take the form of either standard or ad hoc reports. Staff persons who are not computer programmers can sit at a terminal and interact with (query) the MISVE data base using an English-like syntax. Data in the data base can be retrieved in this way in many combinations and in a variety of formats. Planners can also query the data base by inserting arithmetical expressions into their query statements. This interactive capability has the potential for promoting improved utilization of information as managers at all levels are able to browse their MISVE data base(s) and retrieve information rapidly. Fourth, data input and data output are largely independent.

New Mexico's Vocational-Technical Information System. New Mexico's Vocational-Technical Information System (VTIS) provides clear and concise data showing the outcomes of vocational programs in the state (Labodda and Snyder, 1977). This system has been tailored to collect a data base (enrollments) and program outcomes (follow-up surveys) at two distinct levels of vocational programs, secondary and post-secondary.

Recognizing the need for improved long- and short-range planning and programs, the researchers included in VTIS methods for collecting, processing, and analyzing enrollments, completion,

and follow-up data. Currently the system is capable of providing various agencies and controlling bodies with accurate and essential information.

Wisconsin's Feasibility Study. Poehlmann (1978), in a recent study entitled Feasibility Study of Impact of The Proposed National Vocational Education Data Reporting and Accounting System (VEDS) Forms on Reporting Systems For Secondary Vocational Education in Wisconsin, interviewed in-depth seven local educational agencies about the proposed reporting system in order to assess the impact of the reporting forms on local educational districts in the state. It was found that both follow-up forms (a) program completers and (b) employer evaluation of competency precipitated the greatest reaction from all respondents across the various sizes of the school districts. Further, the requested follow-up from employers puts an extensive data burden on both the LEA and the state department because:

1. Gathering procedures need to be designed to collect data
2. Computer programs need to be established to aggregate basic information
3. Follow-up needs to be done on both completers and leavers, which means more local administrative directions as well as possible increase in data gathering/analysis personnel

It was further found that:

LEA's would shoulder most of the data costs. Estimated costs for Wisconsin's LEA's to implement VEDS system are

illustrated in Table I.

Adequate lead time at both the local and state level is needed to adjust procedures and to develop a capacity to decrease costs of data collection especially at the LEA level.

The employer Follow-up study form for Program Completers and Leavers was time consuming and potentially high cost. In addition, local individuals see this data collection as an added burden for the employer.

It was recommended that VEDS reconsider the form that involves extensive follow-up with employers of program completers/leavers. Another recommendation was that a survey instrument developed in other states that have a record of "good" follow-up procedures be adapted for periodic use in all states.

Texas Management Information System for Occupational Education. A study by Parr (1976) was designed to identify information needs of individuals who make management decisions about public vocational education programs in Texas and to develop ways to meet these needs through use of a management information system. Particular emphasis was given to the information needs of Texas Education Agency management in the course of long range planning, legislative proposals, accountability, and funding requirements. A series of twenty-nine interviews were conducted with people representing management and mid-management from the Department of Occupational Education and Technology and with the Commissioner and Deputy Commissioners of the Texas Education Agency. The structured interviews gathered information related to the following: (1) level of decision-making

TABLE I

Estimated Costs Per Local Education Agency Classification for Implementing VEDS Reporting System

Base year 1976-77, Funded Projects)

District Personnel and Estimated Time Allocation Per Item for Data Reporting in Vocational Education	District Type Based on Student Enrollment (Funded Projects, 1976-77)										
Student Enrollment:	Section I Below 1,499	Section II 1,500 - 4,999	Section III 5,000 - 8,499	Section IV 8,500 - 12,999	Section V 13,000 - 15,499	Section VI 15,500 - 18,999	Section VII 19,000 - 22,499	Section VIII 22,500 - 25,999	Section IX 26,000 - 29,499	Section X 29,500 - 32,999	Section XI Above 33,000	Average - All School Districts
District Administrator (1 day)	$ 67.00	$ 76.00	$ 90.00	$ 83.00	$ 90.00	N.A.	$ 96.00	N.A.	$ 120.00	N.A.	$ 177.00	$ 95.00
Business Officer (3 days)	205.00	279.00	335.00	375.00	376.00	N.A.	315.00	N.A.	464.00	N.A.	540.00	374.00
Administrative Staff, General (3 days)	154.00	188.00	220.00	217.00	232.00	N.A.	224.00	N.A.	255.00	N.A.	225.00	216.00
Line Administration, Principals and Assistant Principals (2 days)	139.00	122.00	137.00	138.00	142.00	N.A.	150.00	N.A.	152.00	N.A.	143.00	140.00
Local Vocational Education Coordinator (10 days, exclusive of follow-up and cooperative activities)	513.00	565.00	541.00	591.00	N.D. (2)	N.A.	N.D. (1)	N.A.	791.00	N.A.	N.D. (1)	575.00
Vocational Teacher (2 days, exclusive of coordinating activities if the teacher is so assigned)	169.00	163.00	173.00	190.00	177.00	N.A.	184.00	N.A.	214.00	N.A.	223.00	184.00
TOTAL AVERAGE PROFESSIONAL PERSONNEL EXPENDITURE	$1,318.00	$1,392.00	$1,496.00	$1,594.00	$1,019.00	N.A.	$ 969.00	N.A.	$1,996.00	N.A.	$1,787.00	$1,384.00
Clerical Support - Estimated Average Expenditure(14 days)	351.00	351.00	351.00	351.00	351.00	N.A.	351.00	N.A.	351.00	N.A.	351.00	351.00
TOTAL ESTIMATED PERSONNEL COST	$1,669.00	$1,743.00	$1,847.00	$1,945.00	$1,370.00	N.A.	$1,320.00	N.A.	$2,349.00	N.A.	$1,638.00	$1,735.00
Estimated Commodity Cost(Ratio base 1:4 of Personnel Cost)	417.00	434.00	462.00	486.00	343.00	N.A.	330.00	N.A.	587.00	N.A.	410.00	434.00
(PROJECTED) ESTIMATED TOTAL COST	$2,086.00	$2,177.00	$2,309.00	$2,431.00	$1,713.00 (2)	N.A.	$1,650.00 (2)	N.A.	$2,936.00	N.A.	$2,048.00	$2,169.00

(1) No data found

(2) Since LVEC salaries were not reported in these categories, the sectional costs are low. It should be noted that LVEC's are not "considered administrators" by many districts. The average cost figure for all school districts would be a more reliable estimate for districts in Section V and Section VII.

of each participant, (2) types of information needed, (3) issues of management decision-making and problems related to obtaining information, and (4) additional comments or suggestions pertaining to the development of a management information system. As a result of the interviews the following worthwhile information was identified: (1) a listing of problems affecting decision-making, (2) a tentative listing of specific data elements needed by various decision makers, and (3) several recommendations for the implementation of a management information system.

The data base management information system finally proposed for the Department of Occupational Education and Technology uses an inverted tree structure format. Such a structure permits a computer to search logically through the hierarchy of data elements with greater ease and speed than linear data bases.

Summary

The selected review of literature revealed that the development of a management information system must take into consideration a number of interrelated components and functions. Several states have already designed and developed vocational education management information systems.

Further, the use of management information systems is widespread and on the increase; however, as the review indicates, many users are not completely satisfied with their results this far.

Alternatives for Organizing the MIS

A number of alternative choices will be faced by state-level managers as they decide upon which type of management information system will best serve the needs of vocational education throughout the state of Vermont. This section will briefly discuss several of the organizational elements where more than one alternative structure exists.

Manual vs. Machine-Based MIS. Included in this chapter are sections that outline detailed strategies for the development of two alternative Management and Information Systems. One employs manual processes and procedures, the other is machine-based (computer-based). These two systems are organized around the following component activities:

1. Data Needs Assessment
2. Data Gathering Form Design/Redesign
3. Data Collection
4. Data Processing
5. Data Analysis
6. Information Interpretation
7. Information Packaging
8. Information Dissemination, Storage, and Recall

Actually, a third alternative exists for the organization of a MIS: the combination of some manually performed component activities with machine-based component activities. The two

alternative systems detailed here have been designed so that components in each system may be interchanged to facilitate the third alternative, combination of methods.

The following is a set of general criteria that may be helpful as a guide when selecting the basis for a state MIS.

1. Amount of data to be collected, processed, and stored. When considering the amount of data to be handled, it is necessary to estimate:
   A. The number of agencies supplying data.
   B. The number of forms used and the amount of information collected per average form. This determination also depends somewhat on how much data will be collected over and beyond the requirements of federal reporting.
2. The use to be made of collected and stored data. A manual-based MIS will probably suffice if the major use of data is for compliance through federal reporting. Therefore, a determination must be made about how much and how often data/information recall will be required and, further, how often such recall involves the comparison or other statistical manipulation of data. Obviously, a high level of recall and manipulation throughout the year would agree for the establishment of a machine-based system.

Centralized vs. Decentralized MIS. The decision regarding a centralized or decentralized MIS relates largely to where the

work of aggregating or tabulating individual subject data takes place. The following descriptions help to differentiate between the functions of the two structures:

1. Centralized MIS - Where individual student, teacher, or other completed subject-data gathering forms are sent to the state agency or its designee for verification, tabulation, and combining into an aggregate form. Raw data forms are stored by either the local or state agency for audit purposes.
2. Decentralized MIS - Where individual student, teacher, or other completed subject data-gathering forms are verified, tabulated, and combined into an aggregate form by the local agency. Each local agency then submits a single aggregated data form to the state agency for combining with reports from other agencies having vocational programs.

The relative advantages and disadvantages of each organizational system may be seen in Table 1.

Key Punched Data Cards vs. Optical Character Reader Punched Data Cards. Should the machine-based MIS option be selected, it will be necessary to determine, based on the total volume of work, whether it is more economical to use keypunching or optical scanning as a means for translating raw data into a machine-usable form. Under the machine-based system, the centralized organization option will probably be more efficient since most local agencies do not have access to machanized tabulation equipment, whereas the state has a relatively sophisticated system.

TABLE 1

Advantages and Disadvantages
of
The Centralized vs. Decentralized MIS

Function	Centralized		Decentralized	
	Pro	Con	Pro	Con
Verification of data on individual completed data forms for accuracy, appropriateness, and completeness	Allows for greater consistency and perhaps more accuracy when a single individual or group verifies for the entire state	Requires a greater commitment of dollars, personnel time, and effort on the part of the state agency	Allows the local agency to make necessary corrections onsite and allows the local agency to monitor deficiencies	Requires a greater commitment of dollars, personnel time, and effort on the part of the local agency
Tabulation of data from individual completed data forms to aggregate total forms for entire local agency	Allows state agency to verify totals by retabulating individual raw data forms	Requires a greater commitment of dollars, personnel time, and effort on the part of the state agency	Places total responsibility for accuracy in transcribing raw data on the local agency	Requires a greater commitment of dollars, personnel time, and effort on the part of the local agency

Analysis of Current MIS Resources

It appears that the current reporting procedures followed by Vermont Vocational-Technical Division are adequate for the limited use which is being made of the output. The following documents were reviewed to assess forms and information:

The Vermont Plan for Vocational Education, 1978-1982 (Including Amendments).

Vocational Education Programs in Vermont: Quality Assessment System (Handbook for Local Vocational Education Staff and Assessment Team members).

Management Review for Compliance (Vermont State Department of Education, Division of Vocational-Technical Education).

Annual Local Report of Program Activities in Vocational Education (State of Vermont).

Local Plan for Vocational-Technical Education - Regular Programs FU 1979 (State of Vermont).

A thorough review of these documents showed that the forms they contained were adequate for use in a manual-based MIS. However, revisions and additions in some areas are needed in order to comply with recent VEDS reporting requirements. Extensive revisions will be required if a computer-based MIS is selected.

The processes currently in use appear to lack the articulation across the various data activities that is necessary in a well-planned MIS. Organization around certain projected outcomes and schedules should produce the desired coordination.

It is recommended that, after the decision has been made to implement either a manual-based, computer-based, or a combination system, a Vermont-based individual or group be engaged to assist the state education department in the following areas related to establishing an MIS for vocational-technical education:

1. Conduct an in-depth assessment of the data and information needs at all levels of the program.
2. Develop a specific organizational plan for the MIS pattern that is chosen.
3. Adapt existing data-gathering forms and develop new forms where needed in order to gather the data needed to implement the MIS pattern that is chosen.

This recommendation suggests that an individual or group outside the state government be engaged to conduct the recommended developmental activities because available state staff members either do not have the required competencies or do have insufficient time to devote to these tasks.

Assuring the Quality of Data

A critical function to be performed as a part of the management information system will be that of quality control. The activities given here in some detail will be touched on in a brief manner under the appropriate alternative systems description.

The most difficult point for controlling the quality of data input is at the primary source of such data. In most instances this means students, teachers, and administrative or other support staff.

Several common steps must be followed to assure quality regardless of the type of MIS adopted:

1. All data-gathering forms and procedures should be field tested with a representative group of respondents. This should assure clarity of instructions and forms.
2. Adequate preparation must be given to all individuals who will administer the forms to those who will supply the data.
3. Each responding agency or institution should design a plan that includes procedures for accomplishing the following:
   A. Monitor the data collection process while in progress.
   B. Verify the accuracy and completeness of each individual data form. (This may be done by the state education agency if a centralized data collection organization is followed.)

Field Testing of Forms. Both Alternative Systems I and II recommend the use of an organization outside the state education agency for the design of data-gathering forms. It is recommended that one aspect of the contract developed for form design include the actual testing of such forms by administering them to a small representative sample of data suppliers under actual field conditions. Procedures for administering the forms, including instructions, should be the same as those planned for the actual administration of the forms.

Monitoring Collection and Verifying Data. The responding agency plans recommended above should include procedures for monitoring the data collection process and verifying the accuracy and completeness of each data form. Mass data will likely be collected from only two groups of individuals in each LEA. The largest group will naturally be vocational/pre-vocational students. The smaller group will be the teachers of vocational/pre-vocational subjects. The numbers of reporting subjects will vary according to the size and type of educational program in each building. The monitoring of data collection is likely to be much more burdensome and complex in the area vocational centers than in the comprehensive high schools.

The data collection monitoring process universally consists of assigning an appropriate staff member in each building or district to perform the following functions:

1. Secure the necessary forms from the State Education Agency at the proper times and in adequate amounts.
2. Distribute proper forms to individuals who are responsible for administering them.
3. Orient first-time data collectors to the process and procedures and answer questions from repeat data collectors.
4. Develop a master schedule of deadlines for completion and make all data collectors aware of the schedule.
5. Determine the collection schedule to be followed by each data collector and monitor as many collection

sessions as possible to assess the processes and procedures followed by the various data collectors. The individual doing the monitoring should be prepared to immediately correct deficiencies which may have an adverse affect on the quality of the data collected.

6. Collect all completed data forms and check to be sure that a form has been completed for each eligible subject.
7. Data verification functions will vary according to the following organizational differences:
   A. Decentralized MIS--Be responsible for verifying the accuracy and completeness of each individual form. The actual checking may be done by trained clerical personnel.
   B. Centralized MIS--Be responsible for randomly auditing forms for accuracy and completeness and for sending all completed forms to the State Education Agency for verification.
8. Be responsible for maintaining an archive of all processed data collection forms that are subject to audit by state or federal authorities when requested.

Three options exist for the verification of completed data forms under the centralized organization at the State Education Agency level.

1. Forms can be manually verified by a visual inspection made by clerical personnel.

2. Forms can be verified as a function of the key punch operation.
3. Forms can be verified as a part of the numeric or optical scanning process.

The selection of a verification method will depend largely on the data processing methods that are chosen and the design of the forms.

Labor Supply/Demand Data

The collection and dissemination of labor supply/demand data and information in Vermont is the basic responsibility of the State Occupational Information Coordinating Committee (SOICC). The type and scope of information that will be provided to vocational education by SOICC in Vermont is speculative at this time since the committee is still in the process of recruiting staff and developing a program. However, the Research and Statistics Section of the Vermont Department of Employment Security has provided the following general guidelines for the preparation of planning information to be used by vocational educators.

1. Information will be provided on those occupations for which vocational education training is recommended.
2. The planning information should be provided to the state and local vocational education authorities by the end of the second quarter of the fiscal year (March 31st).

3. The information transmitted should provide a narrative analysis and tabular data on target occupations. The report will identify labor shortages and surpluses, summarize employment and unemployment trends, provide a description of the industrial composition of the area by size of employment in major local industries, and provide occupational information on reasonable prospects for employment in the community and elsewhere. The information provided will be converted to USOE vocational education program codes and titles so as to facilitate their use in vocational planning.

4. The organization and content of the SOICC report will probably contain the following kinds of information:

   A. A narrative statement analyzing the occupational labor situation for the areas and state. This will include data on occupational demand and supply

   B. A narrative analysis of the data following factors that relate to the data used for indicating supply/demand

      a. An indication of the extent to which <u>low</u> wages <u>or poor working conditions</u> are causing shortages

      b. The extent to which vacancies in occupations listed are usually <u>filled internally by promotion</u> from within companies employing such workers and "ports of entry" occupations in which such workers are usually hired.

c. Whether there are significant seasonal variations in reported unfilled job openings

d. The extent to which local long-term outlook deviates from national outlook for specific occupations

C. Comments, findings, and interpretations of the following nature:

a. A discussion of those occupations for which there is a definite and apparent pattern of labor shortage or surplus including probable reasons for imbalances and means of averting them

b. Summarized and interpreted conclusions regarding occupations for which there appears to be a need for vocational education programs and in which there are reasonable prospects of employment.

c. Reliable estimates as to whether the supply of workers in the occupation may be increased by promotions or transfers from other occupations, immigration from other areas, or by persons being discharged from the military

d. The extend to which vocational education completers enter the occupations listed, particularly if the area is a major training center for the surrounding district and from which many graduates out-migrate to other areas for employment

Tables 2, 3 and 4 illustrate tabular formats which may be used to provide labor supply/demand data. Table 2 is a suggested format for providing labor demand data based upon the occupational projections developed under the Occupational Employment Statistics (OES) program. Table 3 is a suggested format to present labor demand data based on unfilled job openings data. Table 4 is a format for presenting labor supply information.

The output of the SOICC may also include:

1. Related Reports
   - A. Copy of latest available Labor Area Review
   - B. Copy of latest available API
2. Supplementary Statistical Data

   Any additional statistical material prepared to support the narrative analysis
3. Occupational Briefs

   A brief description of job content, performance requirements, career ladders, promotion opportunities, etc., for occupations included in the analysis
4. Additional Occupational and Area Information
   - A. Data on wage rates, fringe benefits, working conditions, and other data for occupations and areas covered
   - B. Supplementary tables on current employment by industry and/or occupations for individual counties or subsections of SMSAs

U.S. DEPARTMENT OF LABOR
Employment and Training Administration

EMPLOYMENT OPPORTUNITIES RELATED TO VOCATIONAL EDUCATION PROGRAMS
TABLE 2 LABOR DEMAND - GENERAL PROJECTIONS

Page ___ of ___

1. State	2. Date Report Prepared (Mo / Day / Yr)	3. Current Employment Data Refer to (Mo / Day / Yr)	4. Geographic Coverage of Report: ☐ a. Entire State ☐ b. Area	5. ... Area Only

6. Political Subdivision(s) Within Area (Use reverse side if additional space is necessary)

Dictionary of Occupational Titles		Vocational Education Instructional Program Code	Current Employment	Projected Requirements					
				2 Years Hence			5 Years Hence		
Code	Title (Abbreviate if necessary)			Net Expansion Needs	Replacement Needs	Total Needs	Net Expansion Needs	Replacement Needs	Total Needs
A	B	C	D	E	F	G	H	I	J

U.S. DEPARTMENT OF LABOR
Employment and Training Administration

EMPLOYMENT OPPORTUNITIES RELATED TO VOCATIONAL EDUCATION PROGRAMS
TABLE 3 LABOR DEMAND IN HARD-TO-FILL JOB OPENINGS

Page ___ of ___

1. State	2. Date Report Prepared	3. Unfilled Openings Data Refer to 12 Months Ending	4. Geographic Coverage (Check one)	5. Area Name if Area Only
	Mo / Day / Yr	Mo / Day / Yr	a. Entire State b. Area Only	

6. Political Subdivision(s) Within Area (use reverse side if additional space is necessary)

Dictionary of Occupational Titles		Vocational Education Instructional Program Code	Unfilled Openings 30 Days or More				National Growth to 1985
				Annual Average			
Code	Title (Abbreviate if Necessary)		Annual Range in Number	Number	Percent of Total	Number Range Anticipated in Next FY	a. Very rapid b. Rapid c. Moderate d. Slow e. None f. Decline
A	B	C	D	E	F	G	H

U.S. DEPARTMENT OF LABOR
Employment and Training
Administration

EMPLOYMENT OPPORTUNITIES RELATED TO VOCATIONAL EDUCATION PROGRAMS
TABLE 4 LABOR SUPPLY SUMMARY

1. State	2. Date Report Prepared	3. Currently Available Labor Supply Data	4. Geographic Coverage (Check one)	5. Area Name (if Area Only)
	Mo. / Day / Yr.	Refer to Mo. / Day / Yr.	☐ a. Entire State ☐ b. Area Only	

6. Political Subdivision(s) With Area *(Use reverse side if additional space is necessary)*

Dictionary of Occupational Titles		Vocational Education Instructional Program Code	Currently Available Labor Supply (ES Job Applicants)	Training Output			
				Vocational Education Training		Training by Other Sections	
Code	Title (Abbreviate if necessary)			2 Years Hence	5 Years Hence	2 Years Hence	5 Years Hence
A	B	C	D	E	F	G	H

Labor supply/demand information may be utilized for many purposes in the planning/evaluation and reporting functions. Most of these uses require a type of analysis that calls for the correlation with data from other files in the MIS. The following are several ideas for using such data:

1. Curriculum planning--Labor supply/demand data can be combined with student preference, aptitude/attitude/ability scores, course-leaver placement data, enrollment data, etc., to determine whether to add, drop, or maintain certain training courses.
2. Guidance and Counseling--Labor market states reports and job characteristics reports can be used by guidance counselors, teachers, parents, and others to guide the career training and retraining choices of youth and adults.
3. Allocation of funds--Labor supply/demand information can be used to guide the placement of vocational funds by geographic area as well as by occupational area, e.g., geographic areas of high unemployment may be targeted for an increase in training/retraining monies or job categories with an undersupply of workers may be favored by establishing more training programs.

Alternative System I: Manual-Based MIS

Overview

One of the factors which makes the consideration of a manual system feasible in Vermont's case is the comparatively small number of vocational programs. A manually operated MIS is one which relies strictly on human resources to perform all the necessary functions and activities necessary to the system. This kind of organization does not use electronic equipment as a part of the processing function.

A manual-based management information system has both advantages and disadvantages.

Advantages

1. A manual system would allow the state Division of Vocational-Technical Education to exercise strict control over the processing and manipulation of data. This internal control would permit more rapid data processing for federal reporting purposes.

Disadvantages

1. A manual system would call for a greater number of human transpositions of numeric data. This would increase the chance of data error due to human limitations.
2. A manual system would require the employment of temporary clerical personnel at peak work times. The location and training of such personnel could present a problem.

3. Strict limitations are placed on the flexibility and scope of data-use through recall since all retrieval and analysis of stored data is a hand process. Such activities require a lot of time and expertise and contain a high risk of human error.

The initial establishment of a state MIS program requires that a determination be made of what data to collect. Such information should be sought from the potential users of the system. This determination may be made using a number of data gathering sources, e.g., state Research Coordinating Unit, other appropriate state agencies, or by contract with a private or other public research organization.

It is generally best to use a structured data form which allows for write-in responses as needed. The structured data items may be copied from the lists found in Supplement I of the Final Report and augmented with required VEDS reporting items.

All reporting of data needs must be completed on standard manually tabulated data forms. The analysis and interpretation of the output from such tabulation will be by frequency count. The data needs assessment must be conducted on a periodic basic in order to up date input into the system in an organized fashion.

MIS Components. The following detailed strategies may be followed in planning a manual-based MIS. This alternative system is so designed that components may be interchanged with those of Alternative System II - Computer-Based MIS to provide a combination of manual and computer functions in the same system. Strategies are organized according to MIS functions.

Data Needs Assessment. This is a critical function of the system. The data put into the system must be assessed periodically using the following criteria:

1. Is the resulting information needed by staff for planning, evaluation, reporting, or other decision-making functions?
2. Is it feasible and realistic to request a local educational agency to supply the data requested?

Two phases exist in the area of data needs assessment: (1) an initial assessment must be made to determine what data should be included in the design of the initial system, and (2) a periodic assessment, probably on an annual basis, must be made to determine the need to revise, drop, or add data requested by the system.

These functions can best be performed by a Data Needs Assessment Task Force which should be organized and headed by the Deputy State Commissioner of Education. It is suggested that consideration be given to including membership from the following groups: (1) the data collection and research components of the state education agency, (2) the vocational-technical education component of the state education agency, (3) local educational agencies with vocational-technical programs, and (4) the State Advisory Council for Vocational Education. Other groups should be considered for membership as appropriate. The task force personnel may be augmented with others for short periods when considering special data requirements.

It would be desirable to have the Data Needs Assessment Task Force organized and functioning prior to the establishment of the MIS. This group could direct the determination of initial data to be collected as input for the system. The following steps are recommended to guide such determination:

1. Review the data needs section contained in Supplement I to this report. Use the data elements recommended for collection to form a basic list of MIS data elements.
2. Request the individual or group assigned to design the MIS to use this list as a basis for developing an instrument that can be administered to appropriate state and local decision-makers in order to determine what their data needs are.
3. Construct a preliminary list of data to consider for collection.
4. Submit this data list to the Data Needs Assessment Task Force for review and approval.

Once the task force has agreed that the data should be collected, steps may be taken to design collection instruments.

Data-Gathering Form Design/Redesign. It is recommended that the design of initial data-gathering forms may best be accomplished by contracting with an individual or agency outside the State Department of Education. This suggestion is made because departmental staff members have neither the time or expertise required to do an adequate job of design. The following steps must be followed in designing the forms:

1. Determine which functions of the Division of Vocational-Technical Education require data as a basis for execution (e.g., planning, evaluation, reporting, etc.)
2. Determine the deadlines for gathering data to facilitate each identified division function.
3. Organize the data to be collected by function level, deadline, and source.
4. Determine the best possible format for recording the data at the source. Take into consideration the capacity and abilities of individuals and groups responsible for generating data, as well as the ease of transferring the raw data from the collection form to the tabulation form.

Existing data gathering forms used by the Division of Vocational-Technical Education in its present manually operated data system should be reviewed in an attempt to design or modify them to meet MIS needs.

The MIS data-gathering forms will need to be redesigned each time the Data Needs Assessment Task Force modifies the type or amount of data collected.

Data Collection. Data Collection procedures will be essentially the same regardless of the MIS basis. Major differences in procedures will depend upon whether a centralized or decentralized organizational pattern is selected. Suggested activities for data collection will be grouped according to the structure selected:

1. Decentralized Sub-System

A. The local educational agency is responsible for collecting primary data from the most elemental units in the organization, e.g., students, teachers, etc. The instrument used for gathering this elemental data may be either standardized forms that are used by all similar agencies throughout the state or forms that are designed by each individual agency based on specifications set by the state- evel MIS. One advantage of the matter method is that it allows the LEA to collect with the same instrument data which might be helpful to them but that is not required by the state. The disadvantage of the system is that more in-service education is required for LEA personnel who will design the customized instruments.

B. All completed elemental data forms are collected in a central area of the LEA. The data contained on the forms is verified for completeness and accuracy. Verification is done manually by visual inspection of each form. This is a clerical function and can be performed by a trained non-professional.

C. Elemental data must be tabulated and placed on tabulation sheets. This aggregate data is then sent to the state MIS for combination with data from other institutions and agencies.

2. Centralized Sub-System

A. Just as with the decentralized system, a centralized system makes the LEA responsible for collecting primary data from the most elemental units in the organization, e.g., students, teachers, etc. The instruments used for gathering this elemental data must be standardized forms designed by the state educational agency and used by all similar agencies throughout the state. Standardization of data forms is necessary to facilitate the centralized tabulation of data by the state agency.

B. All completed elemental data forms are collected in a central area of the LEA for transmission to the state education agency.

C. Completed elemental data forms from all reporting institutions and agencies are verified at the state level for completeness and accuracy. Verification is done manually by visual inspection of each form. This is a clerical function and can be performed by a trained non-professional.

D. Elemental data from individual data forms are tabulated for each LEA reporting. This aggregate report by institution or agency is used to prepare totals for the state.

Data Processing. The processing of LEA-generated data is identical for both the centralized and decentralized sub-systems.

The data processing function is relatively simple in the manual system. It consists largely of transferring aggregate LEA data from the tabulation sheet to data forms that allow for the storage of vocational program data by individual LEA and aggregate state total. Since this is all done manually, the critical factor is not organizing to do the work. The critical factor is designing the manual storage forms and system s- that records lend themselves to manual searches for recalling data and manual data analysis processes.

Data Analysis. The analysis of processed data is considerably more cumbersome under the manual system than it would be on the computer-based system. All data recall must be done by a hand search. For this reason it is extremely important that a well-organized data recording and filing system be developed. There must be a great deal of stability in staffing the clerical functions of a manual system. These persons must be well-trained and provided with back-up assistance in case of prolonged absences.

Data analysis that involves the comparison of historical and current data or cross comparison of data files will require the use of a calculator and the technical assistance of someone with a statistical background. Simple computations such as totals, averages, and means are relatively easy to do. It must be understood that data recall and the more sophisticated analysis technique will require more time and a higher level of expertise when done with the manual system than would be in the case of using a computer-based system.

Information Interpretation. The process of information interpretation consists of taking the information resulting from the data analysis process and subjecting it to expert scrutiny. The result of such examination should be one of explaining the meaning of the displayed information in terms that can be used by decision-makers and others who need such information.

The interpretation of analyzed data can best be performed by professional staff of the state department of education and other appropriate experts. A preliminary step to organizing the information interpretation function of the MIS is that of deciding which program areas are to be grouped for interpretation and then identifying the specialists who will be responsible for interpretation. Information may be organized by program area (e.g., agriculture, trades and industries, etc.), by function)e.g., personnel development, budgeting, etc.), by a combination of areas and functions, or by any other grouping that facilitates the needs of the organization and other agencies and institutions being served.

Information Packaging. Generally, information about vocational programs is prepared for two types of functions: (1) public information/relations or (2) management decision-making. Each of these uses requires a different style of packaging. Under normal circumstances it is not desirable to simply photocopy the manually prepared sheets that are used for storing data under the manual based MIS. The two

types of functions for which information is packaged are treated separately in the explanation which follows:

1. Public Information/Relations

   A. This function is one of keeping the general public informed about the needs and achievements of vocational-technical education in Vermont. The information must be packaged in as simple and efficient a way as possible. Much use should be made of very elementary visual displays such as graphs and charts. Narrative descriptions should be kept to a minimum and aimed at a third grade reading level. Whenever possible, actual photographs should be used to illustrate needs or achievements shown by the information.

2. Management Decision-Making

   A. Contrary to popular belief, most decision-makers are not voracious readers, partly because they do not have time to do extensive reading but mostly because they are oriented toward oral communication and communicate best in this medium. Therefore, it is a waste of time and effort to provide these individuals with extensive sets of unsynthesized data and expect them to do their own analysis of the outcomes in light of the problems they are trying to solve.

Decision-making information that is provided to managers should be synthesized and packaged into a very palatable form. Extensive charts and tables of data must be summarized for quick understanding and the information must be displayed in such a way that it is easy to use.

A great deal of responsibility rests on the shoulders of the individuals who interpret and package information for dissemination. Top managers in the organization must feel comfortable with the fact that these individuals know vocational programs, are familiar with the problems faced, and can relate to the target audiences they are trying to reach.

Information Dissemination, Storage, and Recall. Dissemination of MIS output is a critical activity. Management information must get to where it will be used if it is to have maximum value. The dissemination phase has several dimensions:

1. Feedback to LEA's

   Raw data and processed information should be returned to the institutions and agencies that supply data for the MIS as rapidly as possible. The specifics of a dissemination system to meet this purpose will depend somewhat on whether a centralized or decentralized type of organization is adopted. Care must be taken to maintain confidentiality of data and information. At a minimum, schools should receive all information and data recorded about their own programs as well as summary data for the state as a whole. Consideration may also be given to the grouping of schools

by certain characteristics such as size, etc., for another type of analysis. Care should be exercised in sharing the data/information from individual schools with other schools. If this practice is deemed to be useful, clearance should first be received from the State Department of Education and the schools involved.

2. Key Decision-Makers.

Special treatment should be given to making certain that key dicision-makers, such as state and federal legislators, members of the state and local boards of education, and others, are well-informed about the accomplishments and problems associated with delivering vocational education to the public. The dissemination of information to these individuals should be personalized as much as possible. The use of personal letters of transmittal with packaged information or the publication of information in newsletters and publications of organizations and associations made up of key decision-makers should be helpful.

3. The General Public.

Public information can usually be disseminated best through mass media. The State Department of Education could package vocational information for distribution to all state newspapers and radio and television stations on a regular basis.

Storage of MIS data and information in a manual system must be organized and planned well.

ALTERNATIVE SYSTEM I:

MANUAL-BASED MIS

BUDGET JUSTIFICATION
COST ELEMENTS RELATED TO SYSTEM DEVELOPMENT

1. Data Needs Assessment cost estimate is based on work done under a contract with a Vermont-based indificual or organization.

2. Data-Gathering Forms Design cost estimate is based on work done under a contract with a Vermont-based individual or organization.

3. Data Collection

   A. Data Collection Orientation Workshop -- Two one-half day sessions designed to orient one representative from each agency and/or institution having vocational programs to the use of data gathering forms.

      Number attending - 70 individuals

      Lodging for one night

      Meals for two days

   This meeting should be conducted by State Department of Education personnel who are responsible for data collection.

   B. Collection of Data -

   Printing of necessary forms

   Secondary School Programs

      Number of LEA's 60

Number of impressions per LEA package	30
Number of secondary students	22,000
Number of impressions in secondary student package	2
Number of secondary teachers	900
Number of impressions in secondary teacher package	2
Total impressions needed	47,600

Adult School Programs (long and short term)

Number of LEA's	15
Number of impressions per LEA package	10
Number of Adult students	8,600
Number of impressions in adult student package	1
Number of adult teachers	400
Number of impressions in adult teacher package	1
Total impressions needed	9,150

Post-Secondary School Programs

Number of LEA's	4
Number of impressions per LEA package	20
Number of post-secondary students	300
Number of impressions in post-secondary student package	2
Number of post-secondary teachers	30
Number of impressions in post-secondary teacher package	2
Total impressions needed	740

Postage for mailing forms, etc.

C. Data Processing -- The cost of manually processing collected data will vary depending upon whether a centralized or decentralized organization is used.

Centralized System - All raw data forms processed by SEA.

A total of 36,940 individual forms to be hand-tabulated requiring approximately 1,847 hours of clerical time per year.

Decentralized System - All raw data forms tabulated by LEA and aggregate totals transmitted to SEA for processing.

A total of 2,480 individual LEA forms to be hand-tabulated requiring approximately 248 hours of clerical time per year.

Approximately 500 impressions of special forms for the tabulation of LEA data will be required each year.

D. Data Analysis

The cost of data analysis per year will depend upon the amount and frequency of analysis. An average should be:

- Special consultants to write data analysis programs -- 10 days:
- Clerical personnel to compute hand analysis of data -- approximately 800 hours.

E. Information Interpretation

This dimension should require no extra expense but will necessitate the assignment of a professional staff person to coordinate the activities of State Department of Education staff to interpret information coming out of the MIS.

F. Information Packaging

There currently is no one on the State Department of Education staff with the expertise required to advise

about the effective packaging of MIS output. It is therefore suggested that an outside consultant be retained for about 30 days of work. NOTE: This is for consultation only; the actual display and other necessary work related to packaging could be done by clerical personnel.

G. Information Dissemination, Storage, and Recall

Additional funds should be budgeted to cover dissemination activities (i.e., postage, radio and TV tapes, etc.)

Clerical activities related to the manual storage and recall of data may be performed by the clerk assigned to the manual processing and analysis of data.

ALTERNATIVE SYSTEM I:

MANUAL-BASED MIS

ESTIMATED BUDGET
(Annual Operations Basis)

1.	**Personnel**	
	a. MIS manager (50% of time)	9,000
	b. Clerical Assistant (100% of time)	8,500
2.	**Employee Benefits**	3,000
3.	**Travel**	
	a. MIS staff travel	600
4.	Special Studies (one time expense)*	
	a. Data needs assessment study	6,000
	b. Data Gathering Forms Design	12,000
5.	Workshop (Data Collection Orientation)	
	a. Lodging (70 participants for 1 night @ $22.00/night)	1,540
	b. Meals (70 participants for 2 days @ $12.00/day)	1,680
	c. Travel (70 participants for 1 trip @ $10.00/trip)	700
6.	**Consultant Services**	
	a. 40 consultant days @ $100/day	4,000
	b. Consultant travel 10 trips ! $50/trip	500
7.	**Printing**	
	a. Secondary School Forms - 47,600 impressions @ .05/impression	2,380
	b. Adult School Forms - 9,150 impressions @ .05/impression	458
	c. Post Secondary School Forms - 740 impressions @ .05/impression	37
	d. Special data tabulation forms - 500 impressions @ .05/impression	25
8.	**Dissemination**	
	Postage, radio-TV tapes, telephone	2,000
	Total Cost	52,420

*NOTE: Budget line 4. Special Studies is a one time expense of $18,000 which can be deducted from the total cost leaving an on going annual operating cost of $34,420.

ALTERNATIVE SYSTEM I:

MANUAL-BASED MIS

PERSONNEL REQUIREMENTS

1. Management and Technical Staff -- The minimum requirement for efficient and effective operation of the system will be at least one .50 FTE professional staff person. If the minimum staffing recommendation is followed, a sufficient amount of money should be budgeted to allow for the purchase of consulting assistance to supplement systems staff.
2. Clerical Assistance - Regardless of whether the centralized or decentralized organizational pattern is adopted, there will be a need for a full-time clerical assistant (1.0 FTE), to perform the following functions associated with the manual-based MIS:

    A. Manual processing of data

    B. Manual analysis of data

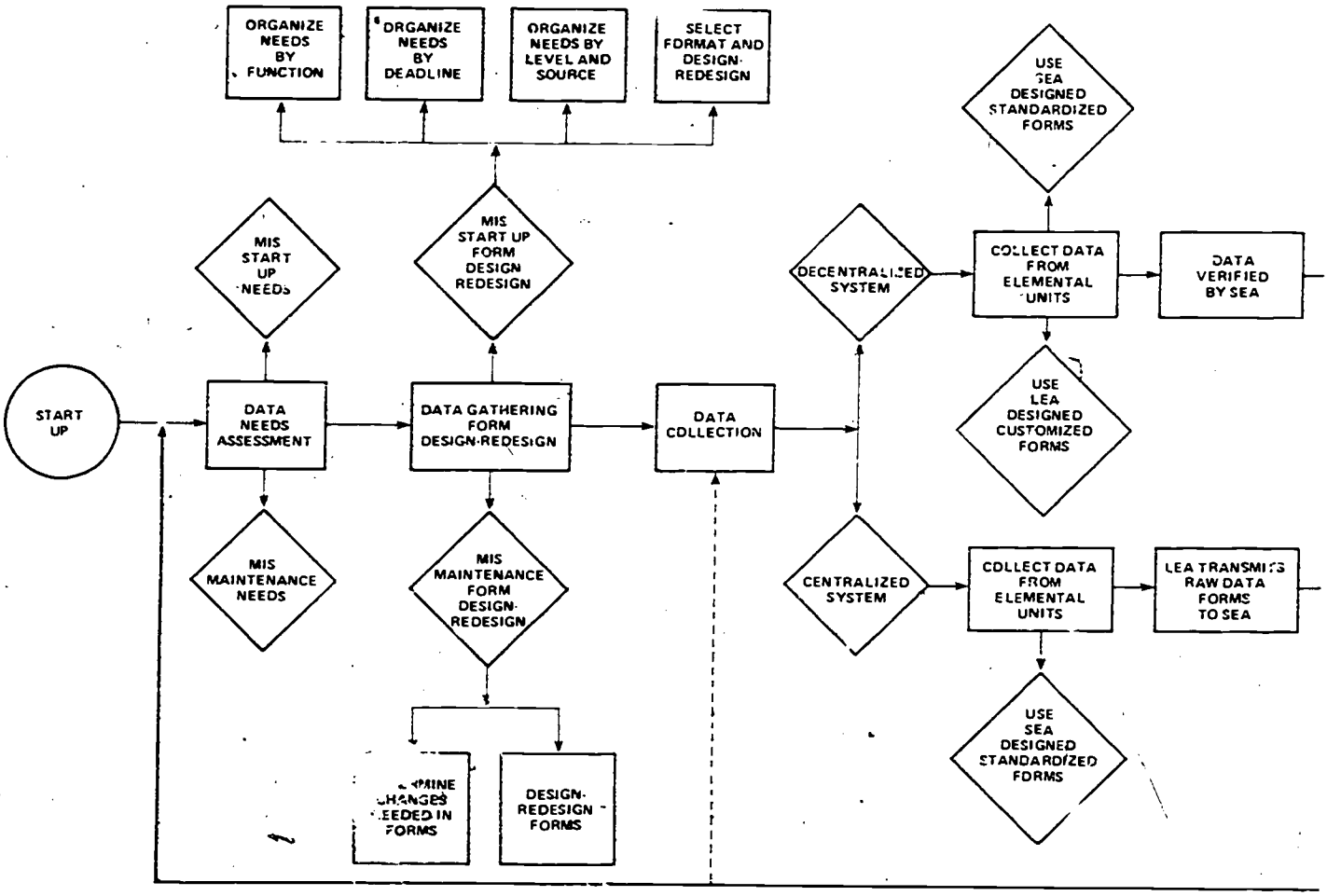
    C. Dissemination of information

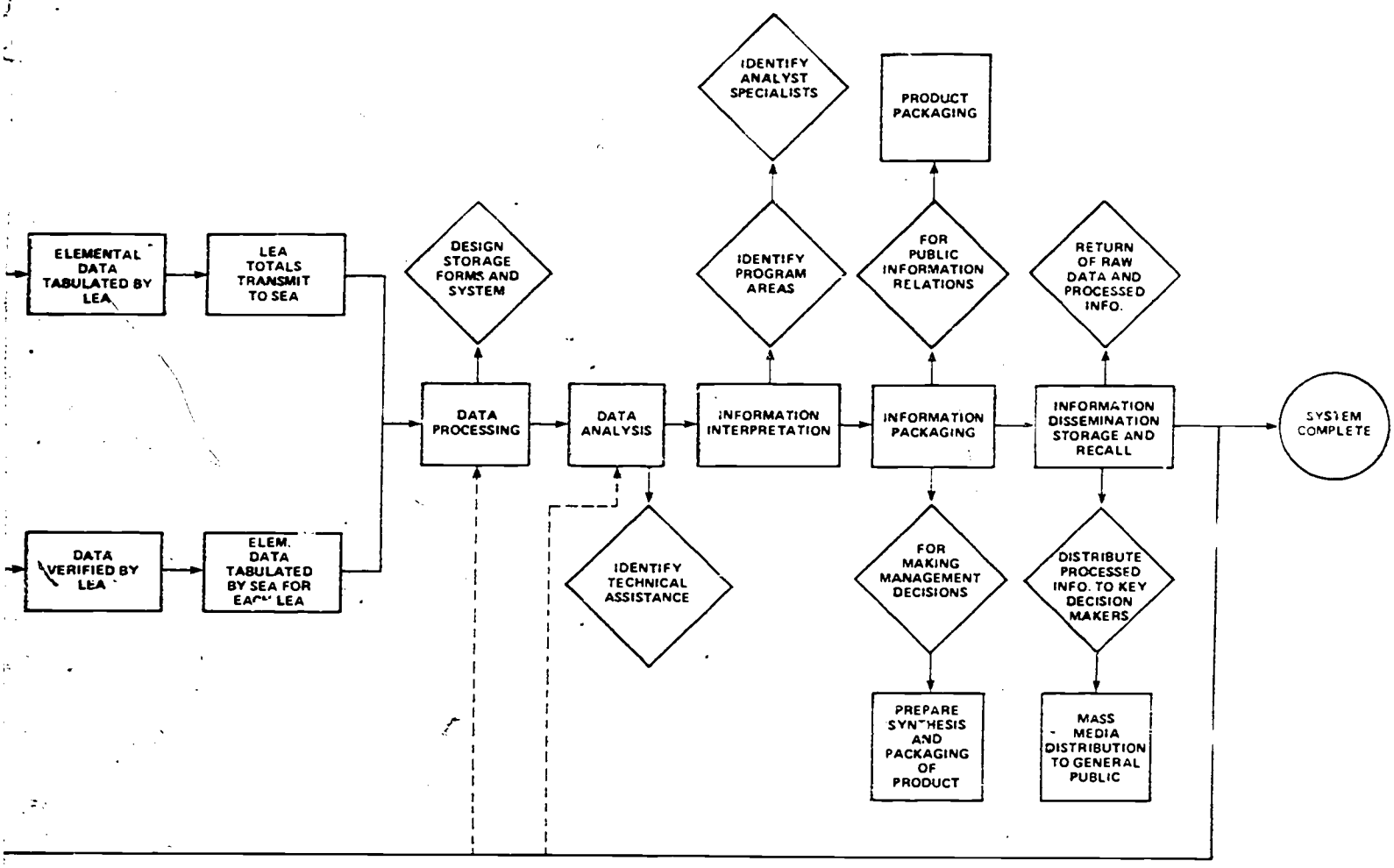
    D. Storage and Recall of data/information

Financial investments in the MIS development and operation should not be justified on the basis of cost reduction, which is often irrelevent with an MIS, but on an estimate of the system's ability to help managers and others make more profitable program decisions. This type of cost benefit is impossible to measure with any degree of accuracy until a MIS is in place and operating. Even then, the benefit derived

from use will be in direct proportion to the amount of use decision-makers are willing to make of system output. Frequently the amount of use is directly proportional to the degree of understanding such decision-makers have about how to use the output and their personal attitude about the usefulness of data/information generated by the MIS.

FLOW DIAGRAM
FOR A
MANUAL BASED MANAGEMENT INFORMATION SYSTEM




ELEMENTAL DATA TABULATED BY LEA
LEA TOTALS TRANSMIT TO SEA
DATA VERIFIED BY LEA
ELEM. DATA TABULATED BY SEA FOR EACH LEA
DESIGN STORAGE FORMS AND SYSTEM
DATA PROCESSING
DATA ANALYSIS
IDENTIFY TECHNICAL ASSISTANCE
IDENTIFY ANALYST SPECIALISTS
IDENTIFY PROGRAM AREAS
INFORMATION INTERPRETATION
PRODUCT PACKAGING
FOR PUBLIC INFORMATION RELATIONS
INFORMATION PACKAGING
FOR MAKING MANAGEMENT DECISIONS
PREPARE SYNTHESIS AND PACKAGING OF PRODUCT
RETURN OF RAW DATA AND PROCESSED INFO.
INFORMATION DISSEMINATION STORAGE AND RECALL
DISTRIBUTE PROCESSED INFO. TO KEY DECISION MAKERS
MASS MEDIA DISTRIBUTION TO GENERAL PUBLIC
SYSTEM COMPLETE

ALTERNATIVE SYSTEM II:

COMPUTER-BASED MIS

Overview

Several factors make the consideration of a computer-based management information system feasible for use by vocational education in Vermont. The installation of a fully automated system could facilitate the implementation of a centralized system by reducing the amount of clerical work required by a comparable manual system. Data recall and analysis would also be considerably more efficient in a computer-based system. The storage of data would require much less space in a machine-based system than the storage of comparable data in a manual system.

The computer operated MIS is one that relies strictly on electronic data processing equipment to perform all data processing and analysis functions necessary to the system.

A Computer-Based Management Information System has the following advantages and disadvantages:

Advantages

1. The computer based system virtually eliminates human errors connected with data transposition since only one such data transfer is needed, that being from the data-gathering form to a punch card via keypunch.
2. The computer can be programmed to generate necessary display tables, graphs, etc., for reports.

3. Retrieval of data and the analysis of data is more effective and efficient when it is done by the computer.

Disadvantages

1. The initial investment of dollars for establishing the computer-based MIS will undoubtedly be higher than for establishing a manual system.
2. The time required for the initial processing and machine entry of data may be comparably longer, depending on work load and staffing in the computer center at the time such service is required.

MIS Components

The following detailed strategies may be followed in planning a computer-based MIS. This alternative system is so designed that components may be interchanged with those of Alternative System I--Manual-Based Management Information System to provide a combination of manual and computer functions in the same system. Strategies are organized according to MIS functions.

Data Needs Assessment. The initial establishment of a state MIS program requires that a determination be made of what data to collect. Such information should be sought from the potential users of the system. This determination may be made using a number of data-gathering sources e.g., State Research Coordinating Unit, other appropriate state agencies or by contract with a private or public research organization.

It is generally best to use a structured data form which allows for open-ended write-in responses as needed. The structured data items may be copied from the list found in Supplement I to the Final Report and Augmented with required

VEDS reporting items.

All reporting of data needs can be completed on machine-scored or key-punched forms. This will allow for computer tabulation and analysis of data.

This data needs assessment must be conducted on a periodic basis after the initial survey in order to update input into the system in an organized fashion.

Data needs assessment is a critical function of the system. The data input into the system must be assessed periodically using the following criteria:

1. Is the resulting information needed by staff for planning, evaluation, reporting, or other decision-making functions?
2. Is it feasible and realistic to request a local educational agency to supply the data requested?

Two phases exist in the area of data needs assessment: (1) an initial assessment must be made to determine what data should be included in the design of the initial system, and (2) a periodic assessment, probably on an annual basis, must be made to determine the need to revise, drop, or add data requested by the system.

These functions can best be performed by a Data Needs Assessment Task Force which should be organized and headed by the Deputy State Commissioner of Education. It is suggested that consideration be given to including membership from the following groups: (1) the data collection and research components of the state education agency, (2) the vocational-technical education

component of the state education agency, (3) local educational agencies with vocational-technical programs, and (4) the State Advisory Council for Vocational Education. Other groups should be considered for membership as appropriate. The task force personnel may be augmented with others for short periods when considering special data requirements.

It would be desirable to have the Data Needs Assessment Task Force organized and functioning prior to the establishment of the MIS. This group could direct the determination of initial data to be collected as input for the system. The following steps are recommended to guide such determiniation:

1. Review data needs contained in Supplement I of the final report. Use the data elements recommended for collection to form a basic list of MIS data elements.
2. Request the individual or group assigned to design the MIS to use this list as a basis for developing an instrument that can be administered to appropriate state and local decision makers in order to determine what their data needs are.
3. Construct a preliminary list of data to consider for collection.
4. Submit this data list to the Data Needs Assessment Task Force for review and approval.

Once the task force has agreed that the data should be collected, steps may be taken to design collection instruments.

Data-Gathering Form Design/Redesign. It is recommended that the design of initial data-gathering forms may best be accom-

plished by contracting with an individual or agency outside the State Department of Education. This suggestion is made because departmental staff members have neither the time or expertise required to do an adequate job of design. The following steps must be followed in designing the forms:

1. Determine which functions of the Division of Vocational-Technical Education require data as a basis for execution (e.g., planning, evaluation, reporting, etc.)
2. Determine the deadlines for gathering data to facilitate each identified division function.
3. Organize the data to be collected by function, level, deadline, and source.
4. Determine the best possible format for recording the data at the source. Take into consideration the capacity and abilities of individuals and groups responsible for generating data, as well as the ease of transferring the raw data from the collection form to the tabulation form.

Existing data gathering forms used by the Division of Vocational-Technical Education in its present manually operated data system should be reviewed in an attempt to redesign or modify them to meet MIS needs.

The MIS data-gathering forms will need to be redesigned each time the Data Needs Assessment Task Force modifies the type or amount of data collected.

One of the most radical differences between the manual and computer-based MIS is in the area of data form format and organization. The structure required will largely depend on

the method selected for processing data. If an optical reading device is chosen, the forms must conform to specifications of the chosen system. For instance, if an optical reader is selected to prepare data for the computer, a commercially printed form must be used. On the other hand, if the keypunch is to be used, forms can be typewritten and mimeographed.

When designing forms for the computer-based system it is imperative that knowledgeable technicians from the State Information Systems Agency be involved.

Data Collection. Data Collection procedures will be essentially the same regardless of the MIS basis. Major differences in procedures will depend upon whether a centralized or decentralized organizational pattern is selected. Suggested activities for data collection will be grouped according to the structure selected:

1. Decentralized Sub-System

   A. The local educational agency is responsible for collecting primary data from the most elemental units in the organization, e.g., students, teachers, etc. The instruments used for gathering this elemental data may be either standardized forms that are used by all similar agencies throughout the state or forms that are designed by each individual agency based on specifications set by the state-level MIS. One advantage of the latter method is that it allows the LEA to collect with the same instrument data which

might be helpful to them but that is not required by the state. The disadvantage of the system is that more in-service education is required for LEA personnel who will design the customized instruments.

B. All completed elemental data forms are collected in a central area of the LEA. The data contained on the forms is verified for completeness and accuracy. Verification is done manually by visual inspection of each form. This is a clerical function and can be performed by a trained non-professional.

C. Elemental data must be tabulated and placed on tabulation sheets. This aggregate data is then sent to the state MIS for combination with data from other institutions and agencies. It is suggested that tabulation sheets be processed by keypunch since the number of tabulation sheets will be relatively low. If this option is selected, care must be taken to assure that the forms lend themselves to keypunching.

2. Centralized Sub-System

A. As with the decentralized system, a centralized system makes the LEA responsible for collecting primary data from the most elemental units in the organization, e.g., students, teachers, etc. The instruments used for gathering this elemental data

must be standardized forms distributed by the state educational agency and used by all similar agencies throughout the state. Standardization of data forms is necessary to facilitate the centralized tabulation of data by the state agency. The type of form used will depend upon whether preparation for machine processing will be by optical reader or keypunch.

B. All completed elemental data forms are collected in a central area of the LEA for transmission to the state education agency.

C. Completed elemental data forms from all reporting institutions and agencies are verified at the state level for completeness and accuracy. Under the computer-based system this verification can be done by machine. Either the keypunch or optical reader can be used. When using either machine, the tabulation of elemental data may be done simultaneously with this verification process. The raw data may be placed on either computer cards or tape for use in the data processing operation.

Data Processing. The processing of LEA-generated data is identical for both the centralized and decentralized sub-systems. The data processing function under a computerized system is much more efficient and effective than under a manual system. The process is much faster since the data turned in by LEA's is already in machine-useable form. After the computer program

has been selected and entered into the machine, it is a simple matter to feed the data into the system for processing. The processing and storage is almost instantaneous.

A critical decision at this point is the selection of a program to guide the computer during the processing and analysis of data. Several adequate programs are recommended for consideration; (1) Data Analyzer, (2) System 2000, (3) Statistical Package for the Social Sciences (SPSS). An orientation meeting has been held with representatives of the Vermont State Department of Education and the State Central Computer Services to familiarize them with the various programs. It is suggested that these individuals be consulted when deciding on a program or combination of programs for data processing, storage, and analysis.

Data Analysis. Data analysis is the process by which data is transformed into information that can be used as a basis for making decisions relating to functions such as planning, evaluation, and reporting. The analysis of processed and stored data is considerably more efficient under the computer-based system than it would be with the manual system.

Data analysis, which involves the comparison of historical and current data or cross comparison of data files, can be done simply by instructing the machine to perform the function. Assuming that an adequate statistical package has been selected, the only limiting factor to what can be accomplished is the creativity employed by the individuals who design the requests for data analysis.

Information Interpretation. The process of information interpretation consists of taking the information resulting from the data analysis process and subjecting it to expert scrutiny. The result of such examination should be one of explaining the meaning of the displayed information in terms that can be used by decision makers and others who need such information.

The interpretation of analyzed data can best be performed by professional staff of the state department of education or other appropriate experts. A preliminary step to organizing the information interpretation function of the MIS is that of deciding which program areas are to be grouped for interpretation and then identifying the specialists who will be responsible for interpretation. Information may be organized by program area (e.g., agriculture, trades and industries, etc.), by function (e.g., personnel development, budgeting, etc.), by a combination of areas and functions or by any other grouping that facilitates the needs of the organization and other agencies and institutions being served.

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to be useful, clearance should first be received from the State Department of Education and the schools involved.

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ALTERNATIVE SYSTEM II:

COMPUTER - BASED MIS

BUDGET JUSTIFICATION

COST ELEMENTS RELATED TO SYSTEM DEVELOPMENT

1. Data Needs Assessment cost estimate is based on work done under a contract with a Vermont-based individual or organization.

2. Data-Gathering Forms Design cost estimate is based on work done under a contract with a Vermont-based individual or organization. The appropriateness of forms should be checked by a representative from the agency, institution, or organization that will be providing the computer services for data processing, analysis, and storage.

3. Data Collection

   A. Data Collection Orientation Workshop - Two one-half day sessions designed to orient one representative from each agency and/or institution having vocational programs to the use of data gathering forms.

      Number attending - 70 individuals.

      Lodging for one night.

      Meals for two days.

   This meeting should be conducted by State Department of Education personnel who are responsible for data collection.

B. Collection of Data -

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Number of secondary teachers	900
Number of impressions in secondary teacher package	2
Total impressions needed	47,600

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Number of adult teachers	400
Number of impressions in adult teacher package	1
Total impressions needed	9,150

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Number of LEA's	4
Number of impressions per LEA package	20
Number of post-secondary students	300
Number of impressions in post-secondary student package	2
Number of post-secondary teachers	30
Number of impressions in post-secondary teacher package	2
Total impressions needed	740

Format and organization of the various data forms will depend upon whether the data collection subsystem is centralized or decentralized:

1. Centralized Sub-System: Data collection forms used at all levels must be designed for mechanized processing.
2. Decentralized Sub-System: Data collection forms used for collection of elemental data from the lowest level in a responding unit may be disigned for either machine or manual tabulation. The tabulation forms which are sent to the state and certain aggregate data must be designed for mechanized processing.

Include in the budget postage for mailing forms, etc.

C. Data Processing - The cost for machine processing collected data will vary depending upon whether a centralized or de-centralized organization is used. A further cost variable will depend on whether forms are processed by key punch or by optical reader. The following are cost estimates for the various types of processing equipment:

I. Key Punch Costs

Key punch	$7.14/hour
Verify	$7.14/hour

II. Optical Reader Costs

Optical Character Reader	$50.00/hour

1. Centralized sub-system - A total of 36,940 individual raw data forms processed by SEA.

I. Key Punch - 320 hours required
Verify - 200 hours required

II. Optical Character Reader - 75 hours required (estimated)

2. De-centralized sub-system - A total of 2,480 individual LEA aggregate data forms processed by SEA.

I. Key Punch - 121 hours required
Verify - 95 hours required

II. Optical Character Reader = hours required

D. Data Analysis - The cost of data analysis on an annual basis will depend upon the amount and frequency of analysis required. An average should be:

- Computer programmers to write machine data analysis programs @ $10.75/hour
- Computer CPU Cycle Time required for data analysis per year @ 10¢/second

E. Information Interpretation

This dimension should require no extra expense but will necessitate the assignment of a professional staff person to coordinate the activities of State Department of Education staff in interpreting information coming out of MIS.

Interpretation can be done directly from the computer printout sheets.

F. Information Packaging

There currently is no one on the State Department of Education staff with the expertise required to advise about

the effective packaging of MIS output. It is therefore suggested that an outside consultant be retained for about 30 days of work. NOTE: This is for consultation only; the actual display and other necessary work related to packaging could be done by clerical personnel.

Data charts and tables required for federal VEDS reporting purposes may be printed in a useable form directly by the computer.

B. Information Dissemination, Storage, and Recall

Data may be stored for ready use on the computer by either computer tape or the computer disk method.

The costs for storage are:

Tape storage = 50¢ each/month

Disk storage = $25.00/month

The cost and use of the computer for data recall purposes are included under the cost of data analysis.

ALTERNATIVE SYSTEM II:

COMPUTER-BASED MIS

ESTIMATED BUDGET
(Annual Operations Basis)

1.	Personnel	
	a. MIS Manager (50% of time)	9,000
	b. Clerical Assistant (50% of time)	4,250
2.	Employee Benefits	2,200
3.	Travel	
	a. MIS staff travel	600
4.	Special Studies (one time expense)*	
	a. Data needs assessment study	6,000
	b. Data gathering forms design	12,000
5.	Workshop (Data Collection Orientation)	
	a. Lodging (70 participants for 1 night @ $22.00/night)	1,540
	b. Meals (70 participants for 2 days @ $12.00/day)	1,680
	c. Travel (70 participants for 1 trip @ $10.00/trip)	700
6.	Printing (Centralized system)	
	a. Secondary School Forms - 47,600 impressions @.05/impression	2,380
	b. Adult School Forms - 9,150 impressions @.05/impression	458
	c. Post Secondary School Forms - 740 impressions @.05/impression	37
7.	Data Processing (Centralized system)	

a.	Key punching (320 hours @ 7.14/hour)	2,285
b.	Verifying (200 hours @ 7.14/hour)	1,428
8.	Data Analysis	
a.	Computer programmer (100 hours @ $10.75/hour)	1,075
b.	Computer (20 runs @ $50.00/run)	
9.	Consultant Services	
a.	30 consultant days @ $100/day	3,000
b.	Consultant travel 10 trips @ $50.00/trip	500
10.	Dissemination	
a.	Postage, radio-TV tapes, telephone	2,000
	Total Cost	52,133

*NOTE: Budget line 4. Special Studies is a one time expense of $18,000 which can be deducted from the total cost leaving an on going annual operating cost of $34,133.

ALTERNATIVE SYSTEM II:

A COMPUTER-BASED MIS

PERSONNEL REQUIREMENTS

1. Management and Technical Staff - The minimum requirement for efficient and effective operation of the system will be at least one 0.5 FTE professional staff person. If the minimum staffing recommendation is followed, a sufficient amount of money should be budgeted to allow for the purchase of consulting assistance to supplement systems staff.

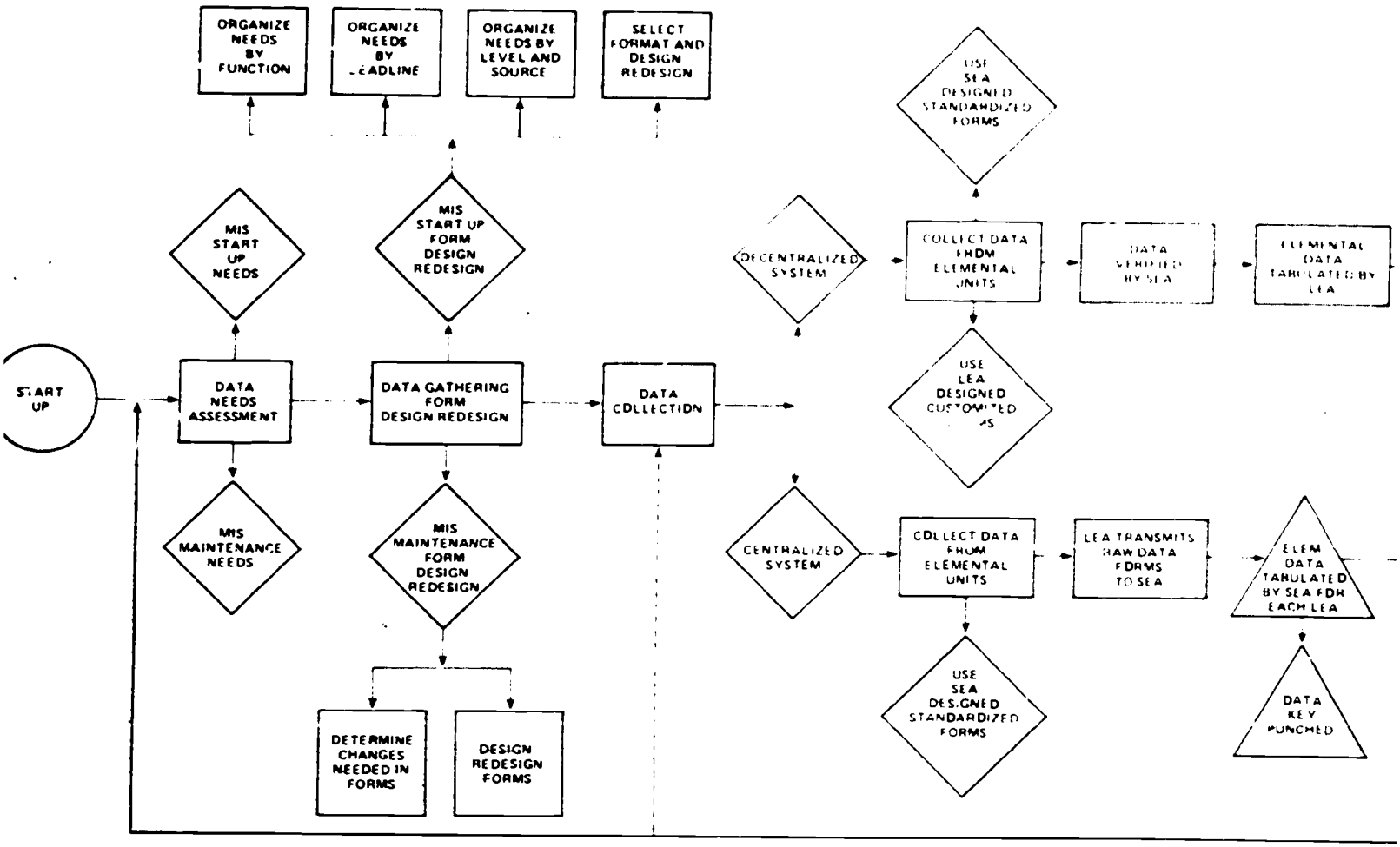
2. Clerical Assistance - Regardless of whether the centralized or decentralized organizational pattern is adopted there will be a need for a one-half time clerical assistant (0.5 FTE) to perform the following functions associated with the computer-based MIS:

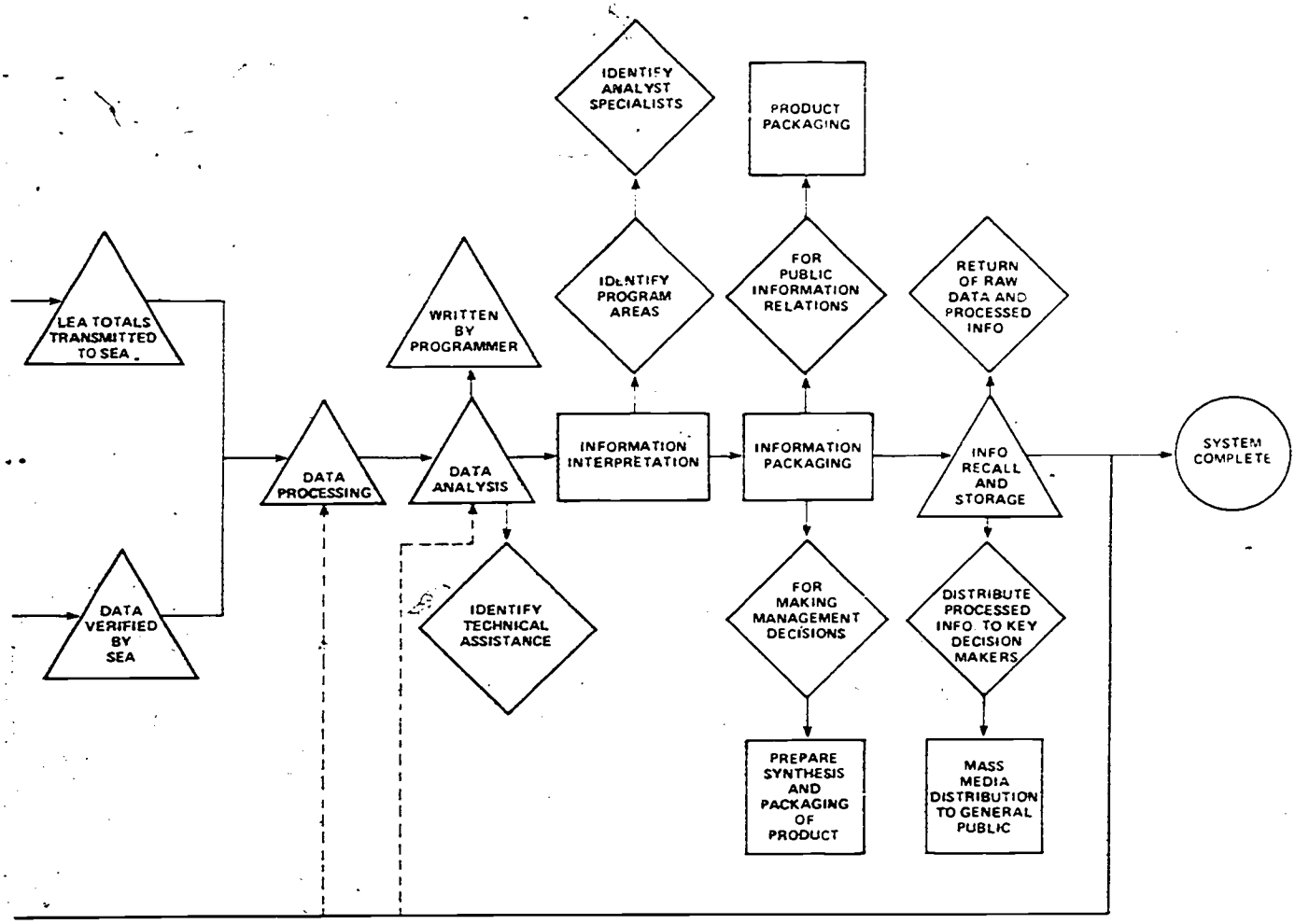
    A. Collection of raw and/or aggregate data
    B. Transmission of data to computer center
    C. Dissemination of information
    D. Recall of data/information

Financial investments in the MIS development and operation should not be justified on the basis of cost reduction, which is often irrelevant with an MIS, but on an estimate of the system's ability to help managers and others make more profitable program decisions. This type of cost benefit is impossible to measure with any degree of accuracy until an MIS is in place and operating. Even then, the

benefit derived from use will be in direct proportion to the amount of use decision-makers are willing to make of system output. Frequently the amount of use is directly proportional to the degree of understanding such decision-makers have about how to use the output and their personal attitude about the usefulness of data/information generated by the MIS.

FLOW DIAGRAM
FOR A
COMPUTER BASED MANAGEMENT INFORMATION SYSTEM




IDENTIFY ANALYST SPECIALISTS
PRODUCT PACKAGING
LEA TOTALS TRANSMITTED TO SEA
WRITTEN BY PROGRAMMER
IDENTIFY PROGRAM AREAS
FOR PUBLIC INFORMATION RELATIONS
RETURN OF RAW DATA AND PROCESSED INFO
DATA PROCESSING
DATA ANALYSIS
INFORMATION INTERPRETATION
INFORMATION PACKAGING
INFO RECALL AND STORAGE
SYSTEM COMPLETE
DATA VERIFIED BY SEA
IDENTIFY TECHNICAL ASSISTANCE
FOR MAKING MANAGEMENT DECISIONS
DISTRIBUTE PROCESSED INFO. TO KEY DECISION MAKERS
PREPARE SYNTHESIS AND PACKAGING OF PRODUCT
MASS MEDIA DISTRIBUTION TO GENERAL PUBLIC

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APPENDIX

EXHIBIT 1

Data Collection Needs Based

on

Vocational Education

Data System (VEDS)

VOCATIONAL EDUCATION DATA SYSTEM 1978-79

The Vocational Education Data System reporting system is designed to replace the current Bureau of Occupational and Adult Education reporting system and to collect mandated data. This data is facilitated with the help of the following forms:

1. Program Enrollment and Termination Report (NCES 2404) replaces Enrollments in Vocational Education Programs (DE Form 346-3);
2. Teacher-Staff Report (NCES 2404-1) replaces Number of Teachers, States of Teacher Training, and Local Administrative Staff in Vocational Education (OE Form 346-2);
3. Financial Status Report Form (OE Form 601-T is maintained and augmented by a one-page attachment (NCES 2404-2) obtaining persons served by each financial category;
4. Completer/Leavers Follow-up Report (NCES 2404-7) replaces Placement of Program Completions in Vocational Education Programs;
5. Employer Follow-up Report (NCES 2404-8) is a new report; and
6. Completer/Leaver Follow-up Form (NCES 2404-5) and Employer Follow-up Form (NCES 2404-6) contain items which are required of State/Local systems, however the actual forms design is left to the individual states.

A thorough analysis of VEDS data requirements - forms follow.

INFORMATION TO COLLECT UNDER

Program Enrollment and Termination Report (NCES 2404) replaces Enrollments in Vocational Education Programs (DE Form 346-3);

Part A

Section I. Total student enrollments and program completers and leavers by instructional program provides for unduplicated counts of the total cumulative enrollment in each program during the reporting year.

Section II. Unduplicated counts of cumulative enrollments by sex and racial/ethnic designation for each program. Provided only:

1. On high school students (grades 11-12)
2. Post-secondary students
3. Adults in long-term (over 500 contact hours)

Sex (male/female) under each racial/ethnic group.

Racial/Ethnic designation

1. American Indian/Alaskan Native
2. Asian American/Pacific Islander
3. Black Not Hispanic
4. Hispanic
5. White, Not Hispanic

Section III. Unduplicated counts of cumulative enrollments by level of the student for each instructional program.

Accountability by program level

1. High school (grades 11 and 12)
2. Post-secondary
3. Adult (long-term) (over 500 hours)

Section IV. Student enrollments by instructional program and program level:

a. Adult (short-term) (less than 500 hours)

SECTION V. Unduplicated counts of handicapped student enrollments by handicapping condition, limited English-speaking ability.

Disadvantaged students by economic and academic classification for each instructional program.

a. Handicapped

1. Mentally Retarded
2. Hard of Hearing
3. Deaf
4. Speech Impaired
5. Visually Handicapped
6. Emotionally Disturbed
7. Orthopedic Impaired
8. Other Health Impaired
9. Deaf-Blind
10. Multi-handicapped
11. Specific learning disabled

b. Limited English Speaking Ability

c. Disadvantaged: 1. Economically

2. Academically

Section VI. Unduplicated counts of cumulative enrollments in cooperative programs by instructional program.

Section VII.

(1) Program Completers - number of students listed by OE six digit code.

Racial/Ethnic designation and sex

1. American Indian/Alaskan Native Male-Female
2. Asian American/Pacific Islander " "
3. Black, Not Hispanic " "
4. Hispanic " "
5. White, Not Hispanic " "

Program Level

1. Grades 11 - 12 Secondary
2. Post-secondary
3. Adult (long-term) over 500 hours

Handicapped (total completers)

Section VII.

(2) Transfers reported by instructional program (sux dugut IE cide).

Section VII

(3) Program Leavers (students reported by six digit OE codes):

Racial/Ethnic designation and sex (same designation as previous categories)

Program Level

1. Students who completed more that 50% of program before leaving by:
   a. high school
   b. post-secondary
   c. adult (long-term)
2. Students who completed 50% or less of program by:
   a. high school
   b. post-secondary
   c. adult (long-term)

Handicapped completers and leavers (aggregate) (total students).

Part B — Occupational preparation programs or support programs for which VEDS follow-up activities are not required.

Section I through V are identical to Part A except for Section III and V.

Section III. Total student enrollment reported by OE six digit code (below grade 11).

Section V. Aggregate Special Needs counts (totals)

Handicapped

Limited English Speaking Ability

Disadvantaged

Part C — Total number of handicapped students by type of instructional setting.

Type of setting

1. Regular
2. Mixed
3. Separate
4. Separate Facilities
5. Other

INFORMATION TO COLLECT UNDER

Teacher-Staff Report (NCES 2404-1) replaces Number of Teachers, States of Teacher Training, and Local Administrative Staff in Vocational Education (OE Form 346-2);

Section I. Unduplicated head count by program assignments for Total Staff, Total Male and Female (instructional staff assignments to programs of less than 500 contact hours duration must be also reported).

Section II. Total Staff by Full-time equivalent (FTE) total male and female.

Section III. Total Staff (head count) by Racial/Ethnic group. (for all teachers in Section I - II)

American Indian/ALaskan Native
Asian/Pacific Islander
Black, Not Hispanic
Hispanic
White, Not Hispanic

INFORMATION TO COLLECT UNDER

Financial Status Report Form (OE Form 601-T is maintained and augmented by a one-page attachment (NCES 2404-2) obtaining persons served by each financial category;

Part A. Aggregate State expenditures on vocational education by legislative purpose.

Part B. Direct instructional expenditures by insturc-ional program area (OE two-digit program areas).

Agriculture
Distributive Education
Health Occupations Education
Occupational Home Economics
Home Economics (Consumer and Hmkng)
Industrial Arts
Office Occupations
Technical Education
Trades and Industry Occupations
Other Vocational Instruction

Part C. Number of persons who benefitted from selective legislative purpose categories in Part A.

Number of persons who directly benefitted from the corresponding expenditures (set asides) shown in Part A.

INFORMATION TO COLLECT UNDER

Completers/Leavers Follow-up Report (NCES 2404-7) replaces Placement of Program Completions in Vocational Education Programs;

Part A. Employment status of program completers and leavers for each program level by instructional program.

1. Employed in a field related to training (civilian - HS, PS, Adult).
2. Employed in a field related to training (military - HS, PS, Adult).
3. Employed in a field not related to training (civilian - HS, PS, Adult).
4. Employed in a field not related to training (Military - HS, PS, Adult).
   Not pursuing additional education.
5. Pursuing additional education (HS, PS, Adult)- Employed in a field not related to training, not in the labor force, or unemployed.
6. Unemployed (seeking employment), not pursuing additional education - HS, PS, Adult.
7. Not in the labor force, not pursuing additional education (HS, PS, Adult).
8. Status unknown (HS, PS, Adult).

- Employment status of leavers who completed at most 50% of the program by instructional program.

1. Employed in a field related to training (civilian - military).
2. Employed in a field not related to training, not pursuing additional education (civilian - military).
3. Pursuing additional education (employed in a field not related to training, not in labor force, or unemployed.
4. Unemployed (seeking employment) and not pursuing additional education.
5. Not in labor force and not pursuing additional education.
6. Status unknown.

Part B Employment status of program completers and leavers for each program level by racial/ethnic designation and sex.

Racial/Ethnic Designations and sex

1.	American Indian/Alaskan Native	Male-Female
2.	Asian American/Pacific Islander	" "
3.	Black, Not Hispanic	" "
4.	Hispanic	" "
5.	White, Not Hispanic	" "

Employment categories and civilian/military identical to Part A.

Part C Employment status of those individuals in the follow-up sample are handicapped.

Categories identical to Part A.

Part D Field of employment and average hourly salary of those individuals in the follow-up sample who were employed by program (Two digit SOC* classification) and by sex.

* SOC: Standard Occupational Classification

INFORMATION TO COLLECT UNDER

Employer Follow-up Report (NCES 2404-8) is a new report;

Part A — Employer (MEAN) ratings for each instructional program (six digit) with number of respondents upon which the MEAN was based.

Employer Ratings

1. Technical Knowledge
2. Work Attitude
3. Work Quality
4. Overall Rating
5. Relative preparation

Part B — Employer (MEAN) ratings and number of respondents provided for each racial/ethnic/sex category

1. American Indian/Alaskan Native	Male-	Female
2. Asian American/Pacific Islander	"	"
3. Black, Not Hispanic	"	"
4. Hispanic	"	"
5. White, Not Hispanic	"	"

Part C — Employer (MEAN) ratings and number of respondents by program level/completion status.

1. Completed Program (HS, PS, Adult)
2. Leaver, completed more than 50% (HS, PS, Adult)
3. Leaver, completed at most, 50% (HS, PS, Adult)

INFORMATION TO COLLECT UNDER

Completer/Leaver Follow-up Form (NCES 2404-5) and Employer Follow-up Form (NCES 2404-6) contain items which are required of State/Local systems, however the actual forms design is left to the individual states.

Completer/Leaver Follow-up Form (NCES - 2404-5)

1.	Current Education Status	Currently attending school
		Not currently attending school
2.	Current Employment Status	Employed (all employment)
		Full-time military service
		Unemployed (but seeking employment)
		Not in the labor force (not employed and not seeking employment because of choice, illness, full-time student status, retirement, pregnancy, other such reason)
3.	Name of Employer - Address and Supervisor	
4.	Job Information	Job Title
		Job Duties
5.	Job Relatedness to Training	Directly or closely related
		Remotely or not related at all

Employer Follow-up Form (NCES - 2404-6)

Employer Rating of Training

1. Rate training received by individual in:
   a. Technical knowledge
   b. Work attitude
   c. Work quality

   on a scale of 5 (very good) to 1 (very poor).

2. Overall rating of the vocational training received by individual as it relates to the requirements of his/her job (scale of 5 (very good) to 1 (very poor).

3. Rate preparation of the individual in relation to other employees in his/her work group who did not receive such training.
   1. No basis for comparison
   2. Individual is better prepared
   3. Both are about the same
   4. Individual is less prepared.

EXHIBIT 2

Data Collection Based on Vermonts

Current Data Elements

VERMONTS CURRENT DATA ELEMENTS

Regular Secondary Instructional Expenditures

Vocational education courses by six digit OE code and by course title (consumer and home making not included).

Total pro-rated salaries and fringe benefits.

Total travel costs.

Total costs of supplies and equipment.

Total number of teachers (F.T.E.)*

Handicapped Instructional Expenditures

Identical to Regular Secondary Instructional Expenditures form.

Special Programs - Finance

Consumer and Homemaking

Overall total cost for:

- Number of Teachers (F.T.E.)
- Pro-rated salaries (include fringe benefits)
- Travel
- Supplies and Equipment

Cooperative and Handicapped

- Project Number
- Number of Teachers (F.T.E.)
- Total Approved budget
- Federal cash-on-hand
- Total cost, federal share and local share by expenditures:

* F.T.E.: Full Time Equivalency

1. Salary (include fringe benefits)
2. Travel (staff)
3. Supplies
4. Miscellaneous (identify)
5. Total expended
6. Cash on hand

Data Regarding Public Summer Day Schools

Number of vocational, tuition or special pupils transported to other schools

Physical and Mental Health Information

Total number of pupils tested for hearing by grade levels (K - 12).

Total number of pupils tested for vision by grade levels (K - 12).

Annual School Statistics

General school information by school levels (totals) and type of residence.

Elementary

1. Resident
2. Non-resident

Secondary

1. Resident
2. Non-resident

Number of days school was in session.

Number of legal days school was closed.

Number of unscheduled days school was closed.

Length of school year in days, including legal holidays and others allowed by law.

Aggregate or total number of days of actual attendance.

Total number of days' absence of pupils.

Total days of membership.

Percent of attendance.

Total number of different enrolled pupils.

Net enrollment of pupils.

Net enrollment of both sexes.

Average daily attendance of pupils.

Average membership of pupils.

Total number of resident pupils attending schools outside their home district with tuition paid by district.

Number of different pupils that have attended school.

Number of different pupils who withdrew one or more times.

Number of cases of truance reported.

Number of handicapped students in school.

Type of provisions for health examinations of students.

Resident Elementary and Secondary Pupils

Total number of pupils sharing vocational time.

Non-Resident Elementary and High School Pupils

Elementary

Total number of pupils by sending school district and by range or grades.

Non-resident [illegible]ment by sending school districts.

Tuition money [illegible] individual school districts.

Tuition money [illegible] total pupils by social welfare

department.

Secondary

Total number of pupils by sending school district and by range of grades.

Non-resident net enrollment by sending school district.

Tuition money recieved by individual school district.

Tuition money received and total pupils by social welfare department.

Elementary Pupil Progress

Type of pupils progress by sex, and grade levels (K-8)(totals).

1. Number promoted
2. Number not promoted
3. Number of transfers
4. Number of Dropouts
5. Deaths

Total number of dropouts by sex and grade levels.

Secondary Pupil Progress

Type of pupils progress by sex and grade levels (K-8) (totals).

1. Number promoted
2. Number not promoted
3. Number transferred
4. Number of dropouts
5. Deaths

Total number of dropouts by sex and grade levels.

Allowable Tuition Charge and Cost Per Pupil

Specific expenditures/costs by elementary and secondary levels.

Excess Cost - Computation of Minimum Amount to be Spent on Handicapped Children

Specific expenditures by elementary and secondary levels.

Valuation, Indebtedness and School Costs

Total valuation of all types of school property.

1. Land
2. Buildings
3. Equipment

Total assets and liabilities by schools.

Total individual school costs.

Construction Accounts

Construction "Receipt" Accounts

District name

Total revenue and non-revenue receipts by code.

Construction Expenditure Accounts

Total construction expenditures by code and educational levels.

1. Elementary

2. Secondary

School District

School District Receipts

District name

Total revenue and non-revenue receipts by code.

School District Expenditures

Type of expenditures by code and by type of program and educational levels (totals)

Educational levels

1. Elementary

2. Secondary

Programs

1. Summer school

2. Adult Education

Staff Record for all Vermont School Personnel including Vocational Teachers

General Information: Name - Town and State -

Address - Social Security -

Date of birth -

School Personnel by sex and education attainment.

Number of years spent in this school system.

Total number of years in public school

Total number of years in non-public school.

Total number of years in Vocational Special school.

Personnel duties by grade levels and subject areas.

Duty: 1. Position - Title

2. Area of Responsibility

3. Level of Assignment

Grade Levels: 1. Lowest Elementary

2. Highest Secondary

Status of Employment: 1. Full time

2. Part time

3. Salaried

4. Hourly

Salary or Equivalent Annual Rate - Hourly Rate

Class teaching assignments:

1. Subject or activity code
2. Number of boys in class (totals)
3. Number of girls in class (totals)
4. Weeks per year (totals)
5. School number

Career Education

Awareness

1. Not aware of this concept.
2. Aware of this concept and use it in classroom activities.

Desire for in-service

1. Yes
2. No

Employer Evaluation of Vocational Program Graduates

General Assessment

Name of Emplcyer

Telephone

Name of person completing form - Title

Jobs held by past graduates.

Have you ever been contacted by a representative of the vocational center? - Yes

- No

Have you ever contacted the vocational center regarding vocational programs? - Yes

- No

Employees performance (ratings):

1. Technical Skills
2. Interpersonal Skills

Assessment of Student Competencies

Type of vocational program.

Name of teachers.

List of vocational skills that must be attained.

Development of list:

1. From teacher experience.
2. From textbook outlines.
3. From curriculum material.
4. From state competency lists.
5. From state advisory committee input.
6. From other

Date list last updated.

Advisory organization recommendations in relation to current employment needs and relevance of your program to meet these needs.

Attach student progress chart.

Identify desirable skills students are to have upon entry into your program.

Vocational Education Follow-Up

Program code.

Year of completion.

Completion code.

Employed (Yes - No)

Full time in Military Service.

Job title in Military Service.

Job title in employment.

Number of hours per week at work.

Name of town.

Relationship of job to training received in vocational school.

Determine if self-employed.

Name - Address of present employer.

Co-op or on-the-job experience part of students vocational program.

School attendance since completion of high school.

Ttype of education/training enrolled in:

1. Adult education
2. Two-year education

3. Four-year education
4. Apprentice program
5. Training in the military
6. Trade school
7. Other

Relationship of training content to high school vocational program.

Type of job skills acquired in vocational school by level of use in current job.

Former Student's Name.

Former Student's Address.

Student Services Survey

Names and titles of form completers.

Placement

Number of students placed by various sources.

1. Placement coordinators
2. Coop - coordinators
3. Teachers
4. Advisory group
5. School guidance
6. Job service
7. Other

Placement procedures description.

Student Records

Career guidance program by specific program activities (available to students) by grade levels.

1. Grades 5 - 8
2. Grade 9

Career Counseling Services

Career information flow and implementation of programs.

Identify contact persons.

Describe linkage of vacational guidance services to the area center with secondary schools.

Number of students who enter vocational education and have a documented occupational goal, by grade levels.

1. Grade 10
2. Grade 11
3. Grade 12

Feeder high schools participation at vocational center by grade levels.

Total

New students

Continuing students

Reasons given by students for not enrolling in vocational center.

Reasons given by students for not continuing at the vocational center.

Student Participation in Programs

Document coordination of center and secondary school calendars.

Document coordination of center and secondary schools daily schedule.

Identify the coordination of transportation to insure student accessibility to vocational center programs.

Percentage of students who have skills upon entry.

Determine how student acquired skills are communicated to potential employers.

Students ratings in youth group competitions.

Determine student mastery of necessary competencies.

1. Performance in youth group competition.
2. Demonstration before instructor.
3. Pencil and paper tests.
4. Other.

PROGRAM SUMMARY

Program characteristics:

1. Type of Program
2. Name of Supervisor
3. Name of Teachers
4. Name of Aides

Length of Program:

1. 1 year
2. 2 years
3. 2 years plus

Number of hours per day program is offered.

ENrollment levles by year.

Program Description.

Self-study findings:

1. Student competencies
2. Follow-up results
3. Employer satisfaction
4. Implications for program improvement

Vermont School Enrollment

School number.

School name.

Grade level by resident and non-resident and by sex (unduplicated totals).

Student enrollment by sex and race/ethnic categories. (total enrollments) and unduplicated totals.

1. American Indian/Alaskan Native
2. Asian or Pacific Islander
3. Not of Hispanic Origin - Black/Negro
   - Caucasian/White
4. Hispanic

Graduates Employed in Family-Owned Business

Program code - Year of completion

Completion code

Name of employing organization.

Type of jobs performed by (son-daughter).

New ideas or practices brought to the business by (son-daughter).

Practicallity of knowledge-experience acquired by (son-daughter).

Could a similar level of training have been acquired on-the-job in your business?

How can our vocational program be improved in your area of business.

Projected Secondary Program Enrollments and Completions (Table II)

Student enrollments by grade levels, shared-time, co-op., six digit OE code and program title (unduplicated count) (totals).

Number of persons expected to complete secondary/primary by six digit OE code and program title (unduplicated count) (totals).

Total number of handicapped students by grade levels, shared-time and co-op.

Total number of secondary completions by handicapped and disadvantaged students.

Projected Adult Enrollments (Regular Vocational Programs) Table II A

Total adult enrollment by type of class, by OE six digit code and course title (unduplicated count).

1. Regular
2. Handicapped/Disadvantaged
3. Sponsored Business/Industry
4. New and Expanding Industry

Total handicapped/disadvantaged adult enrollment by type of class.

1. Regular
2. Sponsored Business - Industry
3. New and Expanding Industry

Program Budget Table III

School Name.

Full teaching load per teacher per week.

Program title and six digit OE codes by secondary vocational activities costs (totals).

1. Number of Teacher Equivalents
2. Pro-rated Salary
3. Supplies
4. Travel
5. Equipment

Programs title and six digit OE codes by Adult Vocational activities costs (totals).

1. Salary
2. Disadvantaged/Handicapped Supplies

Budget - Ancillary Services and Other Costs

Service costs by administrative personnel (totals).

1. Number of full-time equipment (decimal).
2. Pro-rated salaries and fringe benefits.
3. Travel
4. Supplies
5. Moveable Equipment
6. Other

Other staff by service costs (totals).

Support staff by service costs (totals).

1. Secretary

Total service costs for vocational student groups.

Plant - total school costs

- square footage in high school building
- square footage devoted to vocational education
- vocational education share of the cost.

Student Information

Name

ID

Marital Status

Sex

Ethnic Background

Current Address

Student Status - Full-time, Part-time

1. Secondary
2. Post secondary
3. Adult

Financial Data

1. Approximate gross income
2. Number in household
3. Type of financial assistance household receives

Vocational Program Data

Type of vocational program - OE Code

Hours of instruction

Special Needs Information

Disadvantaged

Limited English Speaking

Handicapped

Special Services Provided

Date of staffing meeting

Type of program

1. Regular program, modified
2. Separate program (special)
3. Outside school placement

Termination Report Form

Student Name

Student ID

Type of program and O.E. Code enrolled in.

Termination date

Termination Action

Withdrawal codes:

1. unsatisfactory program performance
2. economic reasons
3. personal problems
4. lack of interest by student
5. student transferred to other vocational program
6. student transferred to college
7. student transferred to other educational institution
8. reason unknown

Program Completion Status

1. Completed 0 - 20% of objectives
2. Completed 20 - 49% of objectives
3. Completed more than 50% of objectives
4. Completed all objectives and received completion certificate

Student graduated

1. Placed (military)
2. Placed (civilian)
3. Unemployed
4. Status of student

Employer Follow-Up Report

Identical to VEDS (NCES - 2404-8).

Program Enrollment and Termination Report

Identical to VEDS (NCES - 2404) Part A - B.

Completer/Leaver Follow-Up Report

Identical to VEDS (NCES - 2404-7) Part A - B - C.

Enrollment Report for Adult Vocational-Technical Education

Total enrollments of adults by OE six digit code, course title, sex and type.

1. Regular
2. Handicapped

3. Disadvantaged
4. Preparatory
5. Supplemental

Total number of adult students by Racial/Ethnic groups and by sex.

Three-Year Follow-Up of Completers

Total number of completers employed by six digit code.

1. In field or related
2. Non-related
3. Vermont labor market area
4. Left Vermont labor market area
5. Part time
6. Full time
7. Self-employed
8. Not seeking employment

Number of completers furthering their education.

1. Related
2. Non-related
3. Military
4. Status Unknown

Number of Teachers, Status of Teacher Training and Local Administrative Staff in Vocational Education

Section I. Unduplicated (total) number of secondary teachers, by vocational programs by secondary teachers T.T.E.

Total number of adult teachers (unduplicated) by vocational programs.

1. Full-time
2. Part-time

Total number of staff members enrolled in in-service training by vocational programs and total numbe completing state plan requirements (in-service).

1. Completed certification
2. Associated degree
3. Baccalaureate degree
4. Master degree
5. Other

Section II. Unduplicated (total) number of secondary and adult local administrative personnel by vocational positions.

1. Full-time
2. Part-time
3. T.T.E.

Total number of administrative staff members who have completed state requirements and enrolled in in-service training by vocational positions.

Table II Enrollments in Vocational Education Programs

Section I Total (unduplicated) student enrollments in vocational programs by sex, OE codes and by grade levels.

1. Grades 9 - 10
2. Grades 11 - 12
3. Shared time

Total number of handicapped students by six-digit OE code.

Total number of enrollments of cooperative students by OE six-digit codes and program areas.

Number of secondary student completion by OE six-digit code.

1. Graduated
2. Left early with market skills

Instructional time in minutes per week for each six-digit programs.

Section II. Unduplicated total student enrollment by sex, grade levels and by students from non-profit schools only and students with LESA.

Total enrollment of persons with special needs by sex, grade levels, and student completions.

Female secondary student enrollment (total) by racial/ethnic groups.

Number of disadvantaged students by type of assistance.

Total dollars expended for special assistance given to disadvantaged students during the year.

EXHIBIT 3

States that Submitted

MIS Materials

for Review

States that submitted MIS descriptions and materials

STATE	PERSON CONTACTED	MAILING ADDRESS AND TELEPHONE NO.
California	Vincent Maddon	California State Dept. of Education 721 Capitol Mall, 4th Fl. Sacramento, Calif. 98514 Tel: (916) 445-3314
Colorado	Patrick J. Sheridan	Colorado State Dept. of Education, Division of Occupation Education Room 207 State Frances Bldg. 1525 Sherman St. Denver, Colorado 80203 Tel: (303) 839-3335
Delaware	Robert F. Boozer	Delaware Department of Public Instruction The Townsend Building P.O. Box 1402 Dover, Delaware 19901 Tel: (302) 678-4583
Illinois	Mary Ann Sweeny	Illinois Office of Education Planning and Reports Sec. Department of Adult Vocational and Technical Education 100 North First St. Springfield, Illinois Tel: (217) 782-4870
Iowa	C. R. Westfall	Iowa Dept. of Public Instruction Grimes State Office Bldg. Des Moines, Iowa 50319 Tel: (515) 281-3379
Maine	Whitney Newcomb	Department of Educational and Cultural Services Augusta, Maine 04333 Tel: (207) 289-2691
Maryland	Leo Lezzer	Maryland State Dept. of Education P.O. Box 8717, BWI Airport Baltimore, Maryland 21240 Tel: (301 796-8300

Massachusetts	John Manning	Massachusetts State Dept. of Education 182 Tremont St. Boston, Massachusetts 02111
New Hampshire	Jeffrey Luftig	New Hampshire State Dept. of Education Vocational-Technical Div. 105 Loudon Rd. Concord, New Hampshire 03301 Tel: (603) 271-3276
Ohio	Byrl Shoemaker	Division of Vocational Ed. State Dept of Education Room 907, Ohio Dept Bldg. 65 South Front St. Columbus, Ohio 43215 Tel: (614) 466-3430
Tennessee	Edward Lamberth	Tennessee State Dept of Education Office of Commissioner 132 E. Cordell Hull Bldg. Nashville, Tennessee 37219 Tel: (615) 741-1716
Virginia	Mary Herdin	State of Virginia Dept of Education Vocational Research Coordinating Unit P. O. Box 6 Q Richmond, Virginia 23235 Tel: (804) 786-1206

EXHIBIT 4

Persons Interviewed and Consulted

Resident Consultants

Vermont Management Information System Project

The following individuals were consulted for information and other input throughout the progress of this study.

STAFF MEMBERS IN THE STATE DEPARTMENT OF EDUCATION

Robert A. Withey, Commissioner of Education

Edward J. Babian, Deputy Commissioner of Education

Peter Ryan, Business Manager

Arthur J. McCann, Chief, Statistics and Information

Herbert J. Tilley, Director of Research and Development

Mark Hull, Assistant Director, Special Educational and Pupil Personnel Services Division

Joseph P. Kisko, Industrial Arts Consultant

Arthur W. Ericson, Director of Vocational Technical Education

Barbara M. Gutheil, Research Coordinating Unit Director

Thomas W. Watts, Agriculture Consultant

Elizabeth P. Carr, Consumer and Homemaking Education Consultant

Briggs P. Dunn, Office Occupations and D.E. Consultant

Richard F. Sargent, Trade and Industrial Education Consultant

Richard E. Higgins, Assistant Trade and Industrial Education Consultant

Walter L. Wimmer, Teacher Educator Consultant

Marie-Ann O'Connor, Health Occupations Consultant

Loreen O'Connor, Sex Equity Consultant

All of the above individuals were consulted regarding the types of information needed, the data already being collected and use made of the data, data collection and processing strategies, policies and procedures and the philosophy underlying the establishment of an MIS.

STAFF MEMBERS FROM OTHER STATE AGENCIES

Agnes Resue, Chief, Research and Statistics Section, Vermont Department of Employment Security

Jeremy Ingpen, Assistant Chief, Research and Statistics Section. Vermont Department of Employment Security

Sandra M. Harvey, Senior Systems Analyst, Division of State Information Systems

R. Bruce MacDonald, Chief, Central Computer Services, Division of State Information Systems

Dennis Malloy, Information Systems Specialist, State Planning Office

John Holmberg, Planning Specialist, State Planning Office

These individuals were consulted concerning the logistics and state policies and procedures which govern the collection and processing of program data.

OTHER STATE LEVEL PERSONS CONSULTED

Richard J. Collins, Executive Director, Vermont Advisory Council for Vocational-Technical Education

Charles Nichols, Executive Director, Vermont School Boards Association

Charles W. Kellogg II, Field Services Representative, IBM Corporation

These individuals were consulted on a variety of MIS related situations.

LOCAL SCHOOL SUPERINTENDENTS

William A. Lincoln, Superintendent, Washington West, Waterbury, Vermont

Houghton Pearl, Superintendent, Ludlow, Vermont

DIRECTORS OF AREA VOCATIONAL CENTERS

Robert E. Houle, Director, Mt. Anthony Union High School, Bennington, Vermont

Garton VanTassel, Director, North Country Union High School, Newport, Vermont

Alfred Persico, Director, Bellows Free Academy, St. Albens, Vermont

Louis Salebra, Director, Rutland High School, Rutland, Vermont

Edward L. Allen, Director, Hartford High School, White River Jctl, Vermont

VOCATIONAL EDUCATION TEACHERS

Al Corey, Cooperative Teacher, Bellows Free Academy, At. Albens, Vermont

Kathy Ross, President of Home Economics, Teacher Association, Mill River High School

John Adams, President of Vocational Agriculture Teachers Association, Addison County Area Vocational Center

Robert Bernreitter, Data Processing Teacher, Rutland Area Vocational School

Personnel from local educational agencies were consulted for information regarding their capabilities to provide the data needed by state vocational staff and the possible usefulness of information resulting from the aggregation of data and dissemination of the resulting information.