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ABSTRACT

The document describes the implementation (Phase Two) of the Vocational Educational module--one component of an educational management information system. Phase Two entails the technical effort of final system design, final output specifications, edit specifications, system software selection, computer programing, systems documentation and the user effort of user-oriented education through seminars and the preparation of detailed user manuals. Three main topics are dealt with: 1) the approach to Management Information System (MIS) in Rhode Island Education; 2) the vocational MIS component of the overall system; and 3) standards and processing methods. It is suggested that the data bases will be helpful for administrators and educators to facilitate planning, management and control of the vocational education area. (CH)

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# The Vocational Education Component of the Rhode Island Educational Management Information System

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000 341

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# Introduction

The report entitled " Management Information System-Vocational Education Module, Phase I-Systems Analysis and Design" dated July 31, 1973 was a report of activities which represented an unusually high level of user, administrative, and professional participation in the design of one component of an educational management information system. Completed by the consultant firm of Arthur Young and Company, the report is available from the Office of Research, Master Planning and Evaluation in the Rhode Island Department of Education. Phase Two of the project, which entails the technical effort of final system design, final output specifications, edit specifications, system software selection, computer programming, systems documentation and the user effort of user-oriented education through seminars and the preparation of detailed user manuals is described herein. In effect, phase two might be appropriately termed the implementation phase of the project, up to the point that actual input documents are beginning to be processed through the data processing center.

The Rhode Island Education Acts of 1969 and 1973 both specify creation of a systematic process of information gathering and processing addressed to every level, form, and aspect of education in the state. This mandate, coupled with the now nationally acclaimed Rhode Island Management Information System Policies and Procedures Manual formed the basis for information system planning, design and development in education in Rhode Island. No better "pilot" for the overall system could have been selected than the field of Vocational Education. The mission of Vocational Education in Rhode Island as it relates to manpower training, career education and to the role of expanding the career choice horizons of individual students at the secondary and post-secondary levels, provides a dynamic information challenge to administrators and

educators alike, who are faced with optimizing the student's needs and program offerings within the Rhode Island environment. Thus a basic system of information processing has been designed to help meet this challenge to facilitate planning for, management and control of the Vocational Education area. Of necessity, systems definitions were selected through a process of group consensus, administrative review, statutory and program requirements analysis, all of which constrain the ability of the MIS to answer questions related to broadened or modified definitions. Over time, refinement of this system will afford a greater degree of system responsiveness as will the incorporation of several simulation models, which can draw on environmental data to answer "what if" types of questions.

Acknowledgements for project progress to date are due to Mr. Henry W. Stevenson, Jr., Assistant Commissioner, Research, Master Planning and Evaluation; Dr. Cynthia Ward, Education Research Specialist; Dr. Nelson Ashline, Associate Commissioner, Development and Operations; the Rhode Island State Advisory Council on Vocational Technical Education, specifically through the efforts of Mr. Robert Rahill, past executive director; the Pawtucket-Blackstone Valley Chamber of Commerce, specifically through the efforts of Mr. James Westmoreland of the Chamber; the firm of Arthur Young and Co., with principal management design efforts from Mr. Robert Hoysinton and Mr. J. Cumming; the system analysis and programming project team of Rhode Island Junior College under the leadership of Mr. Ronald LaChance; Mr. Peter Bowen, Coordinator of Federal Programs, Mr. Frank Pontarelli, Vocational Education Specialist; Mr. Raymond Vellino, input-output specialist; all vocational area coordinators for Rhode Island; superintendents of area and state vocational

schools; Dr. Arthur Pontarelli, Executive Assistant Commissioner for Planning and Management; Dr. Thomas C. Schmidt, Assistant Commissioner Organization and Management; principals of vocational schools in Rhode Island; Dr. Richard Purnell, Director of Graduate Programs in Education, University of Rhode Island; and many others who have contributed considerable effort toward making this project a success.

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TABLE OF CONTENTS


| | | PAGE |
|---|---|---|
| 1. | The Approach to MIS in Rhode Island Education | |
| | General Description | 1 |
| | Definition | 2 |
| | Participants | 4 |
| | System Proponent | 4 |
| | System Participants | 4 |
| | Basic Guidelines | 5 |
| 2. | The Vocational MIS Component of the Overall System | |
| | Mandate | 8 |
| | Definition | 8 |
| | Objectives | 9 |
| | System Design | 10 |
| | Data Base Structure and "Links" | 11 |
| | Identifiers | 13 |
| | Data Maintenance Characteristics | 15 |
| | Special Considerations | 16 |
| 3. | Standards and Processing Methods | |
| | Data Standardization | 17 |
| | System Software | 17 |
| | Turn-around Concept | 18 |
| | Input Methods | 19 |
| | Input Batch Identifiers | 20 |
| | File Maintenance Procedures | 22 |
| | Current Output | 24 |
| | Student Follow-up | 25 |
| | Data Flow | 26 |
| | System Testing | 26 |
| | User Education | 28 |
| | Documentation | 28 |
| 4. | Conclusion | 30 |
| | Footnotes | 31 |

Chapter One

## The Approach to MIS in Rhode Island Education

### General Description

Any system of information gathering processing, and analysis in education in Rhode Island is viewed first as a process to serve the three principal requirements of the educational enterprise in relation to the needs of both administrators and educational personnel as they, in turn, relate to the needs of learners and programs for learners. These requirements are as follows:

1. Information for Control Purposes - this type of information deals with the individual and discrete items necessary for the day to day running of educational systems and programs. Such information might include such diverse terms as school district, student name, requisition number, curriculum content, and building classroom number.

2. Information for Management Purposes - this type of information deals with the collective or individual items necessary for the management of various educational functions. Such information might include such diverse items as numbers of English teachers, quantity of textbooks available or inventoried, subject or course, classroom or building capacities, enrollment figures, higher education departments and degree programs and the like.

3. Information for Planning Purposes - this type of information deals with items necessary for planning policies and programs for education and learners. Such information might include such diverse items as needs assessment data, census data, economic trend data, facilities planned for construction data, and the like.

Some information is overlapping, in that it can serve each of the above purposes, while other information is unique to a specific purpose. In building a management information system, at whatever level desired, be it at the local school district level, in the continuing education, in higher education, for the Department of Education, etc., care must be taken in the design stages to give due regard to each purpose. For example, budgeting requires information for each of the three purposes. For control purposes, it is necessary to have line items available for review by administrators and legislators alike, to answer such questions

as, "How much did we spend on textbooks last year or what is the cost of teachers' salaries in a particular school system?" For management purposes, the budget requires information aggregated to specific organizational functions so that the performance in terms of the process can be available to administrators and legislators alike, to answer questions such as, "How much did you spend for English instruction last year or what was the cost of building maintenance?" This type of information relates to a concept known as performance budgeting.

Finally, for planning purposes budgeting requires information about educational goals and objectives and how the resources allocated to them served to meet those goals and objectives. As such, information must answer questions relative to output for administrators and legislators such as, "How did costs last year for instructional improvements meet the objectives of reducing dropout rates or how did the career education program do with respect to its objectives of increasing attendance rates and finding employment for graduates?" This type of information relates to the type of indicators and output measures required in program budgeting. It is important to note that a well conceived management information system designed along the lines presented will serve each of these three purposes through a single process.

Definition

Recent surveys, conducted by the Society for Management Information Systems, indicate that the response to the question, "What is MIS?" revealed an almost 50-50 split among those surveyed. (Note: This survey was conducted for SMIS by the University of Michigan in 1969. Inquiries may be addressed to Society for Management Information Systems, Two First National Plaza-Sixth Floor, Chicago, Illinois 60670). Some felt that MIS was an equipment configuration of fast response computers with

a large data base. Others felt that MIS was a concept relating to an organization's information processing equipment.

For Rhode Island education, the definition of MIS which is being used represents somewhat of a compromise between these two positions. The Rhode Island Educational Management Information System is a computer-oriented concept, though not entirely computer-based, which embraces the overall information requirements of the public educational enterprise, including those of administrators, educational professionals, faculty, teachers, students, and discernible clients of education. An emphasis on "system" is appropriately placed, so that information is organized in such a way as to be available in reasonable time to enable a decision to be made.

This element of reasonability embraces an optimization problem which places the concept of a universe of educational information in Rhode Island and the requirement for a maximum amount of it, for a purpose, within a specified time frame versus the cost of collecting such information, the availability of it, the respondent burden such collection requires, and the limits of human and financial resources available to education for the information system process itself. This cost-benefit problem is a continual one which is resolved through an orderly administrative process of policies and procedures for the Management Information System itself. In order that the reader might understand the nature of participation in the Rhode Island Educational Management Information System, and the overall guidelines for organizing information within the system, the following four paragraphs will deal with these topics.

Participants

Maximum public involvement and that of administrators at every level in the Rhode Island Public Education System is encouraged in the planning process for the MIS. Such steering committees, task forces, or other bodies as may be convened by the planning team of the educational open systems planning process for the Department of Education shall pass on major developments or policy recommendations for the Rhode Island Educational Management Information System before such recommendations are placed before the Commissioner of Education or the Board of Regents.

System Proponent

The major sponsor of the Rhode Island Educational Management Information System is the Rhode Island Department of Education. A system proponent is a major administrative level in Rhode Island Education which also sponsors a computer-oriented management information system to satisfy its administrative requirements, goals, and objectives in terms of students and programs. Systems proponents as defined by this paragraph include the following:

Rhode Island Department of Education (Major Sponsor)
University of Rhode Island
Rhode Island College
Rhode Island Junior College
Local or Regional School Districts.

System Participants

The term system participant refers to any administrative level responsible for supporting any aspect of the development, implementation, and operation of an educational management information system. System participants include: (1) Those responsible for providing input data to the system (2) Those responsible for supporting the planned design, development or implementation of the system, (3) Those responsible

for providing support to the planned operation of the system and (4) Those requiring information output from the system. For example, the Rhode Island Department of Education as a proponent of the Rhode Island Educational Management Information System, may have as participants, each of the institutions of higher education in Rhode Island, all local and regional school districts, the U. S. Office of Education, other states or regional boards, and possibly other Rhode Island state agencies.

Basic Guidelines

The Rhode Island Educational Management Information System at the Department of Education (major sponsor) level will be comprised of five major functional sub-systems of information. These are:

Student Services Subsystem - In this subsystem all information that is required for control, management, and planning about individual students will be found. In other words, from your perspective, what do you need to know about individual students (or aggregate data about students) to satisfy your own, your clientele, state law, federal program, and intergovernmental program control, management, and planning requirements.

Educational Personnel Subsystem - In this subsystem, all informat that is required for control, management, and planning about teachers, educators, Department employees, and miscellaneous categories of personnel in the education enviroment will be found. In other words, from your perspective, what do you need to know about education personnel (or aggregate data about education personnel) to satisfy you own, your clientele, state law, federal program, and intergovernmental program control,

management, and planning requirements.

Financial Subsystem - In this subsystem, all information that is required for control, management, and planning about finances will be found. In other words, from your perspective, what you need to know about finances (or aggregate financial data) to satisfy your own, your clientele, state law, federal program, and intergovernmental program control, management, and planning requirements.

Facilities Subsystem - In this subsystem, all information that is required for control, management, and planning about educational facilities will be found. In other words, from your perspective, what do you need to know about facilities (or aggregate facilities data) to satisfy you own, your clientele, state law, federal program, and intergovernmental program control, management, and planning requirements.

Educational Services Subsystem - In this subsystem, will be found all information that is required for control, management, and planning for educational services. Computer and communications technology in this subsystem will also be utilized for the actual provision of services. In other words, from your own perspective, what do you need to know and provide in the way of educational services (or aggregate data about such services) to satisfy your own, your clientele, state law, federal programs, and intergovernmental program control, management, and planning requirements.

In addition to these functional subsystems of information, an Analytical Program Budgeting System (PPBS) will draw information from these subsystems for program information purposes. Classification and coding for all subsystems will

follow, as closely as possible, those found in the federal handbook series and like items which are federally compatible, such as those in the WICHE (Western Interstate Commission for Higher Education) data element dictionaries. As discrete data systems specifications are developed, requirements for inputs will be generated to the system proponents previously mentioned. For planning purposes, system proponents will be participants in the Rhode Island Educational Management Information System to the extent that input and feedback of information are now required and as they are further developed.

## Chapter Two

## The Vocational MIS Component of the Overall System

### Mandate

According to the master plan for education in Rhode Island, efforts in the Rhode Island Department of Education are being expended to create a Rhode Island Educational Management Information System. This system is being developed to "create and implement a systematic program of information gathering, processing and analysis, etc." as prescribed in the general laws of Rhode Island, H1821A, Section III, Paragraph 16-49-5. The Vocational Education module described herein has been designated as the "pilot for this system."

### Definition

A project proposal dated March 1972 was written describing the following four basic componenets of initial systems definition: 1) The identification of data inputs; 2) The generalized structure of a programming, accounting, and budgeting system; 3) The definition of system outputs; and 4) The system design as related to hardware and processing requirements. The firm of Arthur Young & Company was selected through competitive bidding to perform the initial systems design. Their first task was to delineate a detailed work plan. A project committee was convened consisting of members of all levels of education within Rhode Island. The work plan created enabled the project sub-committee and other educational officals to monitor progress of the systems definition. During this definition process, the Arthur Young & Company conducted a significant number of interviews with educational personnel throughout the state. Periodic reports were made to keep the Vocational Educational Project Committee members apprised of progress. Signigicant to this process was the fact that four of the five member Arthur Young team were management

and educational administration consultants. The remaining member was a technical information systems consultant. This mix is felt to have given proper weight to the administrative and staff viewpoints with little technical bias or constraint.

OBJECTIVES

Three major objectives of the systems definition arose from this phase. 1) To centralize and integrate to the extent possible the collection, processing, and dissemination of all information related to Vocational Education; 2) To recognize the user's needs in the Department of Education and at the local educational agency level, especially as those needs related to the decision-making process; 3) Consistent with present data availability, to begin laying groundwork necessary to establish a planning, programming, and budgeting system.[1] This phase of systems definition also included a description of the limits, types, and quantities of data to be included into the module. The various parts of this definition were reviewed with key educational personnel as they were developed.

Alcorn has stated the need for such information systems very well. He states:

> Educators have come a long way in developing new methods of obtaining more essential data about the learner and the learning process, and they have been successful in actually collecting such data. However, this information-seeking process will have to continue at an increasing rate, in both quality and quantity, if American education is to keep pace with the knowledge and population explosions. The key to being able to keep pace now depends upon a total information system, whose development must increase at an exponential rate or else we will fall far behind.[2]

The Vocational Education module of the overall Rhode Island Educational Management Information System is, as was stated earlier, a pilot system. It has been designed to be expandable upward such that the structures within the data base have the capability to be easily modified. These structures also have been designed in a modular fashion so that they are adaptive to multiple purposes.

System Design

Detailed system design and implementation was subcontracted by the Department of Education to the Computer Resource Center of Rhode Island Junior College. The Rhode Island Junior College facility had previously been chosen to be the lead computer site for Rhode Island Department of Education data processing applications.

The detailed design phase was conducted with the user in mind. The computer technicians and consultants took great pains to design a system that satisfies the needs of its users. As was stated earlier, the initial systems design was accomplished virtually independent from software and/or hardware considerations. The result is that the capability of a systems module, such as the Vocational Educational module, to be adapted for other educational situations, relates to the fact that the designers were constrained that re-design should be held to a minimum when the data base need be expanded.

Therefore, the detailed design of the data base was careful to include data elements both pertinent to Vocational Education and those which describe and can link to other educational information requirements. The ease with which data can be added, deleted, or changed, and the capability to link elements of data logically within the data base also was a major consideration. Included was the

capability to change or add new programs to the system and a capability for the user to understand the need for changes and/or new programs.

The result of these considerations is a "module" of educational information consisting of many data associations which will require a minimum of re-design and/or programming for transferability and/or adaptability to other educational information requirements or other educational organizations within Rhode Island, perhaps nationally. The underlying problem to the Computer Resource Center designers was that of structuring a data base in which the data was not only interrelated but also was easy to both retrieve and use. Additionally, the design was specific enough to provide for efficient maintenance of both data elements and/or program needs.

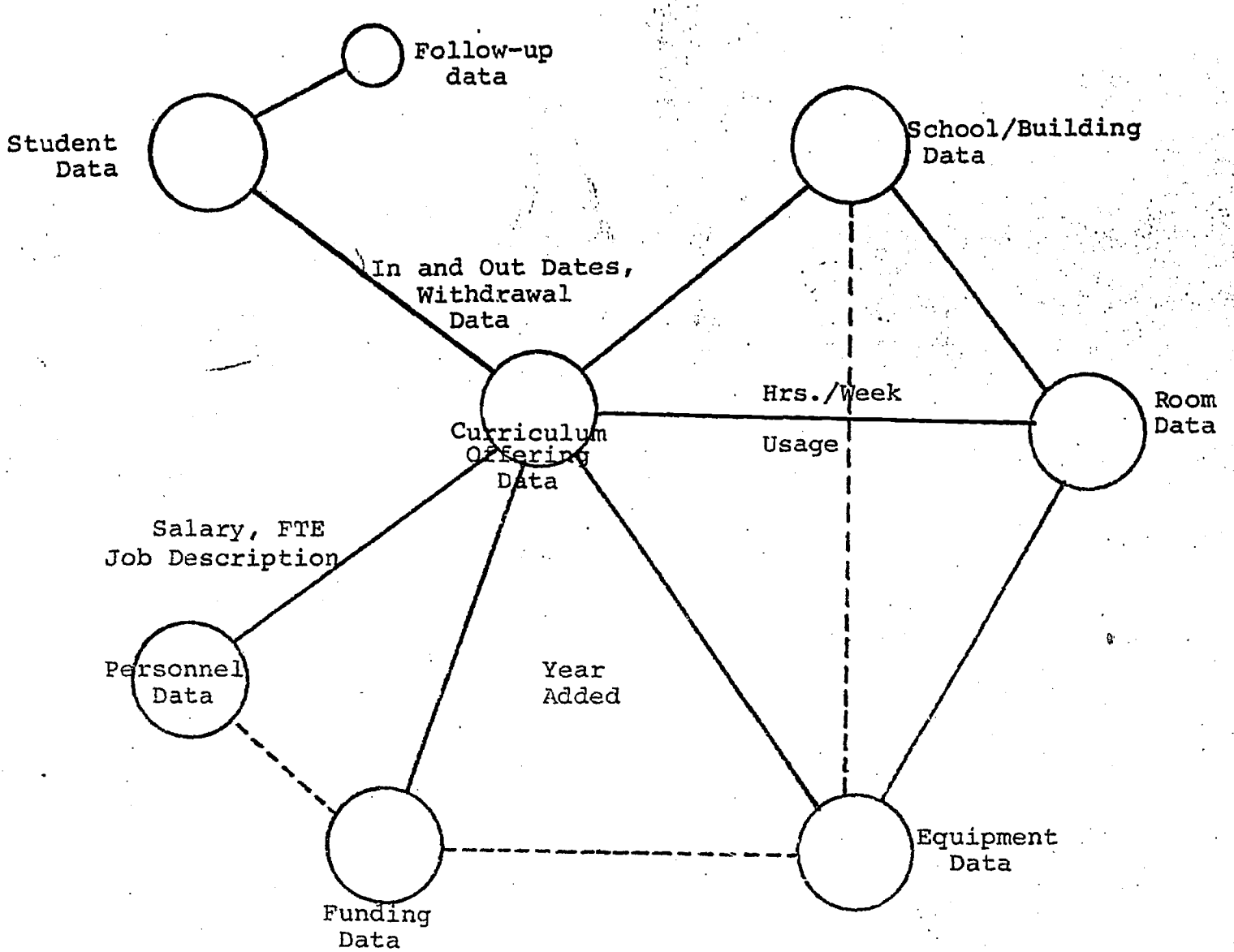
Data Base Structures and "Links"

Figure 1 shows the interrelationship of those groupings of data that comprise the data base. In the center of the diagram is the Curriculum Offering data. Linked to it are the other files or groupings of data. These links comprise the interrelationship between the two ends of that link, and in fact, comprise another data organization entity. The interrelationships are shown and represent the link files. A good description of what constitutes link data is illustrated by the link between the Personnel File and the Curriculum Offering File. Given that a person is employed in performing a task to complement a given Curriculum Offering, he will be linked from his data on the Personnel File to that particular curriculum in which he is working. It is possible however for this person to hold multiple jobs, in fact, they may be in multiple curricula. The particular association of one man to one curriculum implies data such as job title, full time

Rhode Island Educational Management Information System

Vocational Module

Data Base Organization



equivalency, and salary. This is data descriptive not of the man nor of the Curriculum Offering but data which describes the particular "link" between that man and that Curriculum Offering.

Identifiers

Each of the circles in Figure 1 is considered a Master File because the data resident within this particular association are those data elements that uniquely describe each entry. Each has a unique identifier for maintenance purposes. Every effort has been made in systems design to have the unique identifiers for each of the data files be as representative of everyday data as possible.

The Student Data File has as its identifier the particular student's last name, first name, middle name, and date of birth. Statistically, with this ID structure, 3/10 of 1% of the total student population in Rhode Island would be non-unique, or duplicate. For file processing purposes, it was necessary to append additional data to the identifier to make the student record unique. The particular school code the student is currently attending was added. This places the burden of unique identification upon the reporting school that has two students with the same name, born on the same day. This, remote chance, however, complicated file processing procedures. If the student changes school, he must either be entered again onto the file or have his previous identifier changed. Both procedures (with and without school code) have disadvantages. Since duplication of records for an individual is undesirable, the only alternative is to provide flexibility within the total system for ID changing. This meant that for those identifiers that were structured with the integration of multiple data fields, the capability for change of each part had to be provided in the Vocational Educational module.

In identifying a school within Rhode Island, usage of the Rhode Island Census Enumerators Handbook was made. This handbook is published by the Office of Research, Master Planning and Evaluation of the Rhode Island Department of Education. It displays, in coded fashion, Rhode Island school districts, and within school types, assigns unique codes for each school. Therefore, it is possible by combining the district number, the school type and the school number to uniquely identify every school within Rhode Island. This coding system along with one more digit, which was added to identify the particular school building within the school, became the identifier for the School/Building Data File. Appended to the School/Building identifier is a four digit room number creating the identifier for the Room file.

For the Equipment file, the systems team decided to utilize tag numbers that may be assigned to equipment. Since the Data Base incorporated state-wide data, it was possible to have duplicate tag numbers from community to community. Prefixed to the tag numbers, then, is a district number (the same code as used above) which represents the agency issuing the tag number.

The Source of Funds file data is currently being automatically extracted from the file of Fiscal Appropriations maintained by the Rhode Island Department of Education Fiscal Office. The particular records being extracted are those which apply to the Vocational Educational section of the Rhode Island Department of Education. The implication is that the financial data currently existing on the Source of Funds File is only that data accumulated at the state level. It remains that methods of inputting local school district program financial data must be implemented. The identifier for this file consists of a grant number, assigned by the Vocational Educational Office

and the codes for district, type and school number, extracted from the Census Enumerators Handbook.

The Curriculum Offering identifier is comprised of a multiple of data fields. The first is the coding for the particular school at which the curriculum is being offered. The type of instruction is signified by a ten digit code extracted from the United States Office of Education Handbook VI.[3] Codes indicating the amount of time the curriculum meets, the part of the Vocational Educational Act under which the curriculum is being funded, and the academic year the program is offered are the remaining parts of the identifier.

Data Maintenance Characteristics

Even though the data base consists of large accumulations of data into seperate categories called "files", a decision was made to have a single program written to perform the maintenance of all data elements. This is the only program in the system that has the capability to modify the data base in any manner. This method was chosen to insure that data integrity within the data base would be maintained. As can be imagined, this File Maintenance program is very large. To lower internal storage overhead, it is phased in an overlay manner. Since each phase is for one of the files within the data base, a requirement exists that the input to the File Maintenance be sequenced in a manner that would eliminate reversals of transactions from one file to another. This is accomplished by preceding the File Maintenance with sort programs which have the capability of sequencing the data identifiers not only within files but by a transaction date, thereby producing, within the File Maintenance, a type of daily update. Within each day the types of transaction (add, delete, change) are sequenced allowing the users to manipulate data daily, if required.

Special Considerations

In using data base systems, certain associations between files become the data links between those files and are easily reportable. In other words, in the Vocational Educational module, it becomes quite easy to list the students within a given curriculum showing the teacher, the room, and building along with any equipment and monies that support that particular curriculum. Certain conditions had to be added to the files, however, to allow for some of the special characteristics that exist within Vocational Education in Rhode Island.

When linking equipment to a room it was noted that in many cases movable equipment does not stay resident in a singular room. It, therefore, followed that somehow, equipment needed to be linked to the School/Building file directly. This was performed by logic within the File Maintenance program stating that when a given building is added to the School/Building file, there will be automatically added to the Room file a matching "dummy" room record representative of that building. Movable equipment, therefore, was not linked to a particular room but was associated to the dummy room of a building. This procedure made it possible to note not only equipment housed in particular rooms on a permanent basis, but all equipment within a given school building.

In like manner, it was noted that certain administrators and support staff work within the Vocational Educational Organization but do not directly support a given curriculum. Since the "linkage" arrangement links a person to a curriculum in the data base it was evident that "dummy" Curriculum Offering entries were needed. Thus, state and local administrative personnel are linked to these dummy Curriculum Offering entries.

## Chapter Three

## Standards and Processing Methods

### Data Standardization

Both the data elements and the codes for the data elements were structured to be as compatible as possible to a variety of nationally published data standards. The primary documents used for standardization were those published by the United States Office of Education, National Center for Educational Statistics, as the Handbook series.[4] As was noted earlier, the curriculum identification had as its basis the Handbook VI curriculum codes. Along with the codes from the Handbooks, the design staff of the Computer Resource Center used the standard Data Element Dictionaries as published by the National Center for Higher Education Management System at WICHE (NCHEMS) as well as a variety of other nationally published data base educationally oriented systems standards.

When local codes were needed, every effort was made to find and use a coding structure already in existence. Such a case was the school number code as extracted from the Census Enumerator's Handbook.

### System Software

The standards for hardware and software were difficult to establish due to the wide variety of equipment use in the local education environment. Thus, a decision was made to design a system which was hardware independent and to utilize standardized software packages.

ANS COBOL was selected to be the language for applications programs. In deciding which data base structure to use, the staff of the Computer Resource Center conducted a study to determine the relative benefits of a variety of data base languages compatible with the DOS system to be used. The data base system TOTAL from Sincom Systems

was selected as that which allowed the greatest hardware independence yet yielded software flexibility. The application language within TOTAL was ANS COBOL, and this satisfied the software standard need. A major factor in the selection of TOTAL was the constraint that there could be no interruption of present operations at the Computer Resource Center. This meant that the data base language would have to interface with the present I/O controlling method as well as not interfering with general purpose batch and Computer Assisted Instruction (Coursewriter III) partitions presently in extensive use.

Turn-Around Concept

Once the structure of the data base and the associated data elements were formulated, the design team focused on the method of data collection. A turn-around concept was selected. Input data collection forms were devised for each of the major files within the data base. These forms were to be used both for input acquisition and output display of current status. The primary advantage of this method is to provide the input originator residing at a school with the most flexible method of input possible, as well as providing him a status indicator of those data fields for which he is responsible. With this turn-around concept, data is recorded at the originating source as it is derived. The data is entered as indicated by the originator onto the appropriate files by the File Maintenance. New forms are then returned to the originator for audit purposes and are hand filed at the school location for reference. When a change is to be entered into the data base, the form is pulled, appropriate changes are indicated, and they are sent to the Rhode Island Department of Education Management Information System data editor for processing.

As records within the data files are updated, a date of last update entry is recorded such that upon completion of the update, only those records that are updated within a particular update cycle will be generated on the turn-around form. Data records that have remained static and not updated will remain within the data base. Those forms generated from the last cycle a particular record of data was updated, remain filed at the user's location. A great deal of effort was made by the systems team to organize the particular data elements on the form to make them as easy as possible to use.

While many of the data fields associated with each logical entity or file are "fillable entry" type data fields, (i.e., names and numbers), many of the data fields have multiple code entries. Most of these data fields that house codes are structured such that the code encompasses the most possible options. In all but two cases, code entries are signified on the form. The user, therefore, need not know the particular code but merely checks the appropriate classification. The result of this is that the use of codes is strictly for internal processing purposes and does not burden the non-technical user.

Input Methods

Consideration was given to create the turn-around forms as optical sensing inputs. Since each manual entry position required as many as 36 possible positions for alphanumeric fields, this form of input was non-acceptable for the "fillable" entries needed. It would have required that multiple forms rather than a single form be designed to collect the same amount of data. The Computer Resource Center weighed the volume of input versus extensive cost devices such as those that read handwritten entries, and decided

that they were not cost effective at this time. It was, therefore, decided to maintain the keypunch card method of input for all but the employment follow-up form.

Each of the forms represents an accumulation of data (record) within a file. Therefore, there is a set of forms for each file within the data base. Each has a heading printed in a unique color to identify the forms of that file of data. This file identification color is useful in manual sorting and filing. Data were organized on the forms according to the collection source. Since the form represents a total record within one of the files, some data elements on the form originate from other than the primary input source and appear as "pre-prints" on that form. Particular pastel color codings on the form are used to indicate areas of responsibility. The forms were deliberately chosen to be pleasant to the eyes which, in turn, helps the user to think of them as easy to use and not as an added burden. Figure 2 is an example of the form designed.

Input Batch Identifiers

As described earlier, the File ID in some cases was a rather long sequence of data fields. This unique identifier obviously has to be entered to initiate record creation. The designers saw no reason for the user to have to re-enter this full identifier each cycle of processing. Upon original entry into the data base, a record is assigned a batch number within each file. This batch number is printed on the output turn-around document. It is neither identified nor placed in an area of user significance. While the user is not cognizant of its existence, it does require that the turn-around form be the only method of input data acquisition. When the user submits a change, it is this batch number that is punched into the

CONTINUOUS INTERFOLDED

## OWNERSHIP

CD 2 (30-32)

| FEDERAL % | STATE % | LOCAL % |
|---|---|---|
| (33-35) | (36-38) | (39-42) |

## STUDENT CAPACITY

| TOTAL | VOC. ED. |
|---|---|
| (43-46) | |

## NUMBER ROOMS

| TOTAL | VOC. ED. |
|---|---|
| (47-49) | (50-52) |

## AREA

CD 3 (18-23)

| GROSS SQ. FT. | NET SQ. FT. | VOC. ED. NET SQ. FT. |
|---|---|---|
| (24-29) | (30-35) | |

## CONSTRUCTION

| YEAR COMPLETED | COST IN THOUSANDS |
|---|---|
| (36-37) 19 | (38-43) $ ,000.00 |

## LOCATION TYPE

CD 3 (44)

- 1 STANDARD METROPOLITAN STATISTICAL AREA (SMSA)
- 2 CENTRAL CITY (INCLUDES SMSA)
- 3 NEITHER

## BUILDING CONDITION

(45)

- S SATISFACTORY

ALTERATIONS NEEDED

- A LESS THAN 25% OF REPLACEMENT COST
- B FROM 25-50% OF REPLACEMENT COST
- C OVER 50% OF REPLACEMENT COST
- D DEMOLITION

IS LONG RANGE PLANNING FOR VOC. ED. IN EFFECT? CD 3 (46) Y YES / N NO

IS A PLACEMENT SERVICE AVAILABLE? CD 3 (47) Y YES / N NO

IS VOCATIONAL GUIDANCE AVAILABLE? CD 3 (48) Y YES / N NO

IS BLDG. IN ECON. DEPRESSED AREA? CD 3 (49) Y YES / N NO

## TYPE OF SCHOOL IF POST-SECONDARY

(50)

- D COMMUNITY COLLEGE
- E TECHNICAL INSTITUTE
- F VOCATIONAL TECHNICAL, OTHER

FORM # VE-02

RHODE ISLAND EDUCATIONAL

# VOCATIONAL EDUCATIONAL SUB-SYSTEM

RHODE ISLAND CRC COMPUTER RESOURCE CENTER JR. COLLEGE

## SCHOOL/BUILDING AUDIT

PRINT DATE

DATE OF LAST UPDATE

COLS. 1-2 **VB**

TRANSACTION DATE

COLS. 3-8 M O D A Y R

COLS. 9-14

(15) ACTION TAKEN A ADD C CHANGE D DELETION

CD 1 (18-27) SCHOOL NAME

(28) BLDG. NUMBER

SCHOOL DISTRICT (29-30)

SCHOOL TYPE (31)

SCHOOL NUMBER (32-33)

SCHOOL DISTRICT

## ADDRESS

CD 1 (34-39) STREET NUMBER

(40-59) STREET NAME

CD 1 (60-74) CITY

(75-76) STATE

CD 2 (18-22) ZIP CODE

(23-29) PHONE NUMBER

MOORE BUSINESS FORMS, INC., M M MR MS

keypunched input. In most cases, the forms produce multiple cards, i.e.: the term batch number. The programming system receives the batch ID, searches a random table, finds the appropriate File ID, and creates a transaction record. The batch ID to File ID conversion was done for two primary reasons. First, to eliminate the need for the user to re-submit the File ID on each transaction, thereby eliminating the multiple gathering of ID's which tends to pose problems in many file maintenance systems. Secondly, it is envisioned that the Vocational Educational module as well as the overall Rhode Island Educational Management Information System will eventually be an on-line system. The batch ID to File ID conversion is a compromise to an assignment of an arbitrary shortened ID structure (student number) to replace the multiple data fields File ID (last name, first name, etc.). The systems team felt that when the module for an overall system goes on-line, the batch ID method of input can be dropped and the multiple part file identifiers, which would be needed for data retrieval or modification, can be entered in an "interactive inquiry" manner.

File Maintenance Procedures

The file maintenance procedure is initiated by a pre-edit program, primarily responsible for searching the input records for keypunch and other manual input errors. A following edit program performs the ID conversion task outlined previously. The File Maintenance program scans each individual data element of the total data base for acceptable entries and/or limits. An overall systems flow shows how this sequence is performed (Figure 3).

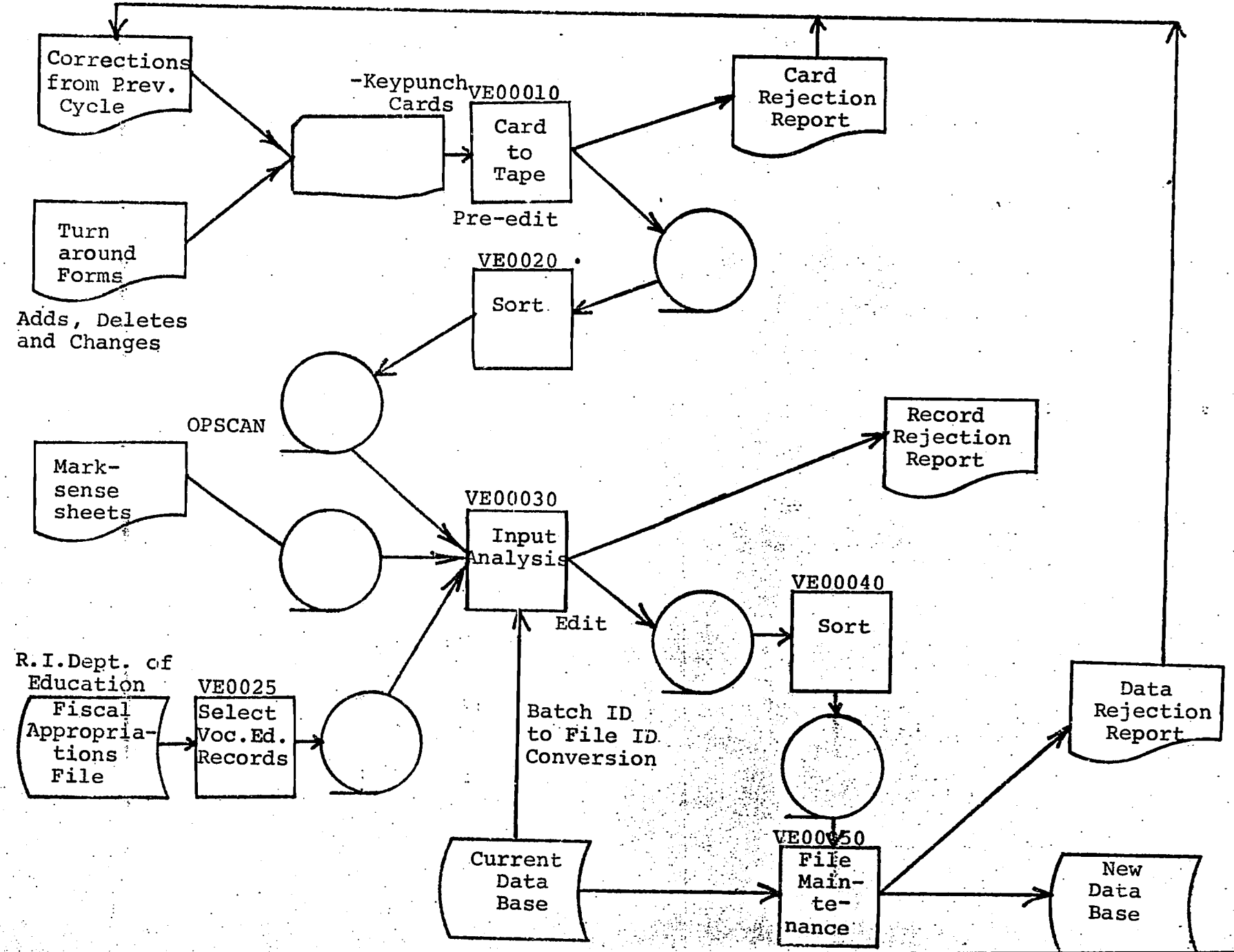
The Vocational Educational module, in its initial design, is a system consisting of batch input and batch output reporting.

RHODE ISLAND EDUCATIONAL MANAGEMENT INFORMATION SYSTEM

VOCATIONAL MODULE

SYSTEMS FLOW

FILE MAINTENANCE PROCEDURES



Most of the data files are relatively static and therefore, require updating on an infrequent basis. With this in mind, the system team established seven file maintenance cycles each academic year. Within each cycle, based upon the time of the academic year, a major objective exists for updating one of the files of the data base. These objectives were designed to best meet administrator's needs and/or data availability of that time of the academic year. Many of the output programs described below are scheduled for execution within the cycles only once or twice within the academic year.

Current Output

There are presently defined 22 output programs within the system. Included in this total are output prints for each of the eight turn-around documents. As one of the primary advantages of any data processing system is to lessen the burden of the user to report data repetitively, the designers considered the automatic generation of some of the United States Office of Education mandated reporting requirements. Annually, the Vocational Education administrators report placements, expenditures, status of teachers, administrative staff and enrollments. These specific reports now will be generated as by-products of the data base in the formats required.

As the reader can surmise, the variety of data elements in the files all within a singular data base gives the capability to produce a substantial amount of output. The determination of particular reports to be generated in the first year of operation of the system was limited by the financial constraints of the initial development grant. Most of the initially defined reports were those needed to report data in a manner such that originator of that data will have the capability for audit.

Examples of such reports are:

-Student Characteristics Profile
-Student Status
-Equipment Lease/Warranty Schedule
-Equipment List by Room/Building
-Quarterly Expenditure Analysis
-Curriculum Offering Monitoring Schedules.

With the extent of data collection and reporting so large, outputs such as "per pupil costs" and "like program cost analyses" were also included to give administrators both at the local and state level better measures of accountability.

The outputs described are not singular file outputs but those which result from functional associations of data. Only with data base design can these types of reports easily be generated. As can be seen, there are a wide variety of reports possible. The ones defined are only an initial attempt at providing educational administrators within Vocational Education better management decision making capability.

Student Follow-up

On an annual basis, it is the responsibility of each of the schools to survey previous students. One of the primary measures of accountability in Vocational Education is the success that a given curriculum has in the production of employable candidates. This survey, as taken by each school, determines how many of their previous students are employed, whether the employment is within the occupation for which they were trained, or whether the student has gone on to further education. The systems team saw this as an area where direct computer assistance could be provided. The system, therefore, was designed to produce a turn-around form on an annual basis which can be mailed directly to the student to conduct this survey. This form like all of the others was structured so that the

user, namely the student in this case, need not have any data sophistication. It was decided to abandon the keypunch input method for this form and utilize an optical scanning mark sense device resident at the Computer Resource Center for input. The form was designed utilizing the mark sense input method with relative ease since most of the data required is of a check box variety.

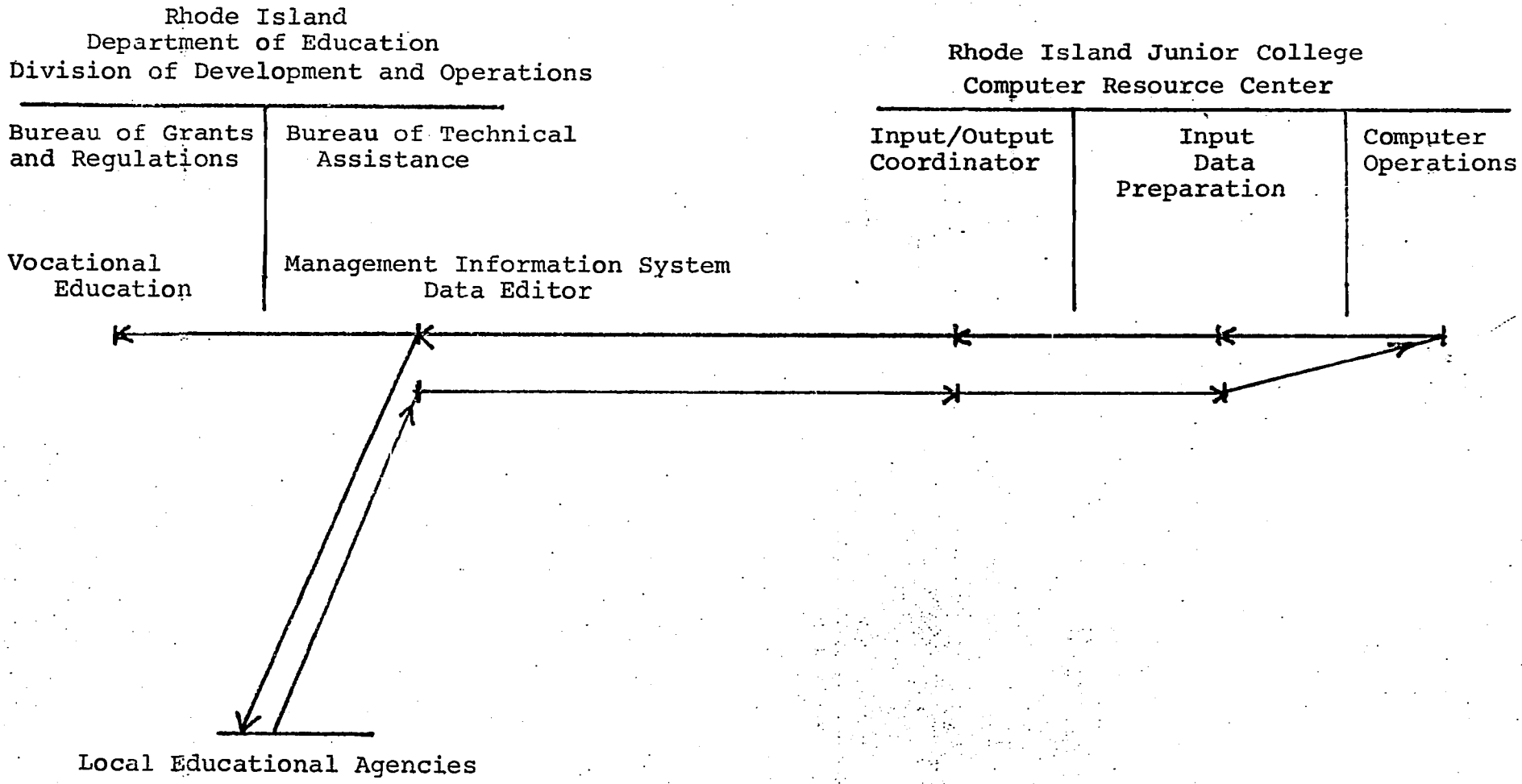
Data Flow

As illustrated in Figure 4, information that originates at local schools is transferred to the Management Information System data editor. This central point for information collection and dissemination, acts as a buffer between the local schools and the processing site, R. I. Junior College Computer Resource Center. The primary responsibility of assuring that appropriate data handling takes place exists with the data editor. He also has the responsibility for scheduling the File Maintenance procedures and in turn, the dissemination of the output resulting from each of the seven operating cycles.

System Testing

Because of the newness in utilizing data base concepts, system testing involved many new techniques not previously utilized. The systems analysis team completed input forms for test data which involved full use of all codes within all data elements. This has meant extensive inputs have been inputted to the File Maintenance procedures in a test mode. It also allows that all outputs from the system can be generated from this controlled condition. Following steps will involve the changing of data monitored for deviations from norms. As of this writing, complete testing has been made of the 22 output programs and the full File Maintenance cycle.

# Rhode Island Educational Management Information System
## Vocational Module
## Data Flow



User Education

As part of the overall process of designing and implementing a management information system, a collateral effort of user-education was designed into the project. The firm of Arthur Young and Company worked with the Department of Education and Rhode Island Junior College Computer Resource Center staff to design a detailed manual which would enable input personnel to handle data in an easy manner. This manual was supplemented by a series of workadays and seminars for local school district superintendents, area vocational coordinators, school principals and input personnel to give both a broad overview of the capabilities of the system along with detailed step-by-step procedures for handling forms. This manual is available for separate review from the Education Budget Office of the Department of Education.

Documentation

The Computer Resource Center completed extensive in-house documentation. This documentation considered of two levels of sophistication. The first consisted of descriptions of the management purposes of each of the programs within the system. The second was the actual program definition and the necessary in-house documentation for execution. Once the system was proven through the extensive testing process, and fully documented, it was turned over to the operations section of the Computer Resource Center. Figure 4 also shows that an Input/Output Co-ordinator at the processing site serves as the collection point from the Data Editor at Rhode Island Department of Education. This co-ordinator also

follows the forms and resulting machine readable records through the Computer Resource Center such that all outputs at the completion of cycle execution are properly distributed back to the Data Editor at the Department of Education.

## Chapter Four

### Conclusion

As has been stated, the principle reason for the implementation of the Vocational Education module as well as the overall Rhode Island Educational Management Information System has been to introduce accountability. It is imperative that educational administrators receive more data for the decision-making process.

A system of the scope of the Vocational module described is designed to provide not only additional data but more timely data. It is hoped that with this additional data, capable of many forms of manipulation, the decision-making process will be enhanced. While the system cannot reverse decisions that have been made, it is hoped it will provide educational administrators with better information for future decisions. In summary, the Vocational Educational module of the Rhode Island Educational Management Information System is a data base which is an on-going system that has been designed both to grow and to be modified to meet the needs of local and state administrators in the management of Vocational Education within Rhode Island.

FOOTNOTES

[1]Rhode Island Department of Education, Management Information System-Vocational Education Module-Systems Analysis and Design, Arthur Young and Company, July 31, 1973, p. 4.

[2]Automated Educational Systems, Enoch Haga, editor. "The Concept of Total Systems in Education," Bruce K. Alcorn, The Business Press, Elmhurst, Ill., 1967, p. 7.

[3]National Center for Educational Statistics, U. S. Department of Health, Education and Welfare. Standard Terminology for Curriculum and Instruction in Local and State School System. Handbook VI, OE-23052, 1970, pp. 107-152.

[4]Handbook Series
- II - Financial Accounting, Classification and Standard Terminology
- IV - Staff Accounting
- V - Standard Terminology for Pupil Information
- VI - Standard Terminology for Curriculum and Instruction
- VII - The State Education Agency

[5]"TOTAL Data Base Management System" (Total/7), Cincom Systems, Inc., Cincinnati, Ohio.