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Date 5/21/76

A SURVEY OF DATA PROCESSING INSTRUCTION IN THE BUSINESS EDUCATION CURRICULUMS OF THE SECONDARY PUBLIC SCHOOLS IN MONTANA

by

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ABSTRACT

The purpose of this study was to determine the status of data processing instruction in the business education curriculums of the public secondary schools in Montana during the school year 1975-1976. The study was designed to examine general information pertaining to data processing instruction, course content, facilities and equipment, and teacher qualifications.

The population for this study consisted of the 173 chairmen of the business education departments in the public secondary schools of Montana. In some instances the department chairmen was arbitarily determined since none had been designated. The data was analyzed by the number responding to the individual question and placing this on a percentage basis. Since every respondent did not answer each question, the percentage was determined by the total number who did answer the particular question.

The conclusions of this study were the following: (1) Although at the time of this study, a significant percentage of the business education departments did not offer any form of data processing instruction, a large number of departments anticipated the inclusion of such instruction by 1978, (2) The majority of business departments offered data processing instruction in the form of a unit in another business course, (3) The study of flowcharting and input/output devices was considered of significant importance in all of the departments that offered data processing instruction, (4) The primary objective of the departments offering data processing was to provide students with a general knowledge of data processing, and (5) The majority of departments did not have any data processing equipment available for instructional purposes.

The recommendations of this study were the following: (1) Provide summer workshops and inservice training to give business educators and administrators an awareness of the need for teaching data processing concepts, (2) Data processing instruction should be offered in some form to all students in the business education department, (3) Establish guidelines for a data processing curriculum, (4) Investigate every possible means for exposing students to data processing equipment, (5) Re-evaluate teacher education programs to insure future business teachers are receiving the methodology for teaching data processing, and (6) Conduct local surveys to determine the need for vocational data processing.

CHAPTER I

INTRODUCTION

The development of the electronic computer for commercial purposes in 1954 introduced a new era in information processing which has exerted a tremendous influence on the business world. Realizing the significance of computers in the handling of data, business and industry have utilized its potential for the past two decades and will continue to do so in the future. Automated data processing has become a part of most large businesses and many small ones and is a common term in the business sector.

The impact of computers in the business environment has been indicated by it phenomenal growth. According to a survey by the Diebold Group, 4500 computers were in use in 1960. This number increased to 30,000 in 1965 and to 90,000 in 1970. (Administrative Management, 1970:58) There are over 100,000 computers in operation today, and it is estimated that 400,000 will be in use by 1980. (Cashman, 1975:26)

The processing of data by computers in the business world revolutionized the practices and procedures of handling information in the office. The introduction of automated data processing made some jobs obsolete, created many new ones, and virtually changed the role of the

office employee.

The influence of data processing in business and industry has created new directions for business education in the public secondary schools. The general opinion of writers and experts in the field is that curriculums should be updated to meet the demands of the new technology.

> The high schools have an obligation to both the college bound and the pupil preparing for employment in the business world. Each must be thoroughly prepared for the future he has chosen or into which he is being guided. (Pactor, 1965:187)

The President's Science Advisory Committee has stated:

> No matter what his/her specialty, the student must be given the opportunity of using computers in learning and in doing, and the faculty member must be able to use computers in teaching. (Brotherton, 1975:5)

A knowledge of data processing and its application is a topic which should be included in the business education curriculums of secondary schools because it affects the daily lives of all individuals and is an important aspect of business, industry, and government. Gocker indicated the importance of including data processing in the high school business education curriculum when he stated:

> As business educators, we must make our students aware of the increasing importance of data processing, especially the computer. They need to know the tremendous effect data processing has had and will have on business and industry, coupled with the strong emphasis being placed on it. Many authors feel that the greatest contribution secondary schools can make is to develop a general understanding and appreciation of the role the computer plays in business. This must definitely

> be done, and if the computer is available, we must expose our people to a taste of the future. (Gocker, 1970:18)

Despite the recognized need by leaders in business and education for including data processing instruction in the curriculums of secondary schools, business educators have been slow and cautious about instituting programs. Only about 2,000 out of 24,000 high schools in the United States have made a definite attempt to incorporate this training in their curriculums. (Brotherton, 1975:5)

The courses that have been developed by high schools are called by different names, offered at various levels, and include divergent subject matter. Confusion over course content together with a lack of materials and trained teachers have made many schools hesitate to include data processing in their curriculums. Haga in commenting on these problems said:

> . . . each school has had to shift for itself, not only in course design but in implementation as well. The hardware--punched card machines or computers--as often as not has been nonexistent . . . Naturally, in the face of these many difficulties, courses were developed and inserted into whatever places they seemed to fit. Specific content depended upon the availability or nonavailability of hardware, textbooks, and trained teachers. (Haga, 1968:16)

The need for the inclusion of data processing instruction in the public secondary schools has been established, but the problems and obstacles to be overcome have caused high schools to carefully consider the feasibility of offering data processing in their curriculums.

STATEMENT OF THE PROBLEM

This study was designed to examine data processing instruction in the business education curriculums of the public high schools in the state of Montana during the 1975-76 school year. Specifically, the study investigated the following kinds of questions:

1. Was data processing instruction offered by the business education department, and if so, was it in the form of a separate course and/or a unit in another business course.
2. What were the future plans of the business education department for including data processing instruction in its program.
3. What was the content of the data processing courses and/or units offered by the business education department.
4. What facilities and equipment were available to the business education department for use by its students.
5. What were the instructors' qualifications for teaching data processing.

NEED FOR THE STUDY

It is the concensus of most authors writing in current business education literature that data processing instruction should be included in the curriculums of secondary schools. It is no longer a question of inclusion but rather what should be the objectives of data processing instruction at the secondary level.

There is a lack of knowledge and agreement among leaders in the field of business education, school administrators, and individual

teachers as to the offerings in data processing at the high school level. Some advocate a separate, non-specialized course that teaches only data processing concepts; others, a separate, vocational course or courses that provide experience on unit record and/or electronic data processing equipment; and still others, the integration of data processing concepts and/or hands-on experience into existing courses.

An example of this disagreement is shown by Reese when he contended that teacher and student time were best served by deferring separate, specialized courses to the post-secondary level and integrating data processing concepts into existing courses. Students should be given only a general understanding and appreciation of computers and the role they play in business according to Reese.

> It is more important for students to have an understanding of basic fundamentals such as English, mathematics, social studies, and basic business understandings than a superficial understanding of data processing equipment and its operation. (Reese, 1970:153)

Thompson agrees with Reese when he advocated the integration of data processing into existing courses, but he is also concerned with the student who has an aptitude and an interest in data processing as an occupation. He believes that the public secondary schools can provide these students with training.

> . . . the high schools can provide meaningful data processing training for business education students; and that the focal point of data processing training should be programming and problem-solving, with machine operation of secondary importance. (Thompson, 1971:148)

Many serious problems exist in data processing education today throughout the United States. Gary B. Shelly, business data processing consultant and author of several data processing textbooks, speaking on "Business Data Processing Education—A Decade of Failure" at the 1974 National Computer Conference, cited a number of these problems. (Cashman, 1975:28)

1. Inadequate or obsolete hardware.
2. Lack of experienced and knowledgeable faculty.
3. Lack of in-depth training in courses offered.
4. Failure to train students in areas other than computer programming.
5. Education often fails to respond rapidly enough to changing technology.

These and many other problems clearly indicate the need for research to determine the status of data processing instruction in high school curriculums in Montana in order that administrators and faculty may make intelligent decisions concerning data processing instruction in their curriculums. In addition, higher education institutions in the state of Montana involved in teacher preparation need information in order to update and develop new courses and methods that will properly prepare the prospective teacher of business education subjects. Finally, the Montana Department of Public Instruction could utilize this study to advise school officials regarding data processing equipment and course content, as well as provide a

basis for further study in data processing curriculum, methods, and equipment.

This study will show what is being offered in data processing instruction in the public secondary schools in Montana and will attempt to make suggestions that will be helpful to school administrators and educators.

LIMITATIONS

This study considered the status of data processing instruction as it applied only to business education curriculums in the public secondary schools of Montana. No attempt was made to survey other areas of the high school curriculum where data processing might be taught.

This study was further limited to the responses of the individuals who returned a completed questionnaire, and the results were applicable only to the population surveyed.

DEFINITION OF TERMS

1. Automated data processing - The recording, classifying, sorting, summarizing, calculating, transmitting, and storing of information through the use of electronic and electro-mechanical equipment, such as computers and unit record equipment. Also referred to as electronic data processing.

2. Data processing course - A course which has as its objective the understanding of the principles and concepts of automated or electronic data processing with or without the use of automated

equipment.

3. Computer - A device making automation possible. It is the central processing unit in a data processing system and is capable of making simple decisions and modifying instructions.

4. Data processing unit of instruction - A unit of instruction in data processing which is incorporated in another business education course with or without the use of automated equipment.

5. Business education teacher - A teacher who is certified by the Montana Office of Public Instruction as qualified to teach business education subjects at the high school level.

6. Business education curriculum - An organized sequence of courses in business education which leads to competence in business and qualifies the student for high school graduation.

7. Unit record or punched card equipment - Electromechanical machines such as: (a) key punch, (b) sorter, (c) collator, (d) reproducer, (e) interpreter, (f) accounting machine or tabulator, (g) other card-handling equipment. Each machine has a particular function or series of functions to contribute to the whole.

8. Computer programming language - The breaking down in complete detail of the work to be electronically processed in a language that can be understood by the computer.

9. Terminal - Common terminology for input/output equipment connected to the computer by cable or telephone lines.

CHAPTER II

REVIEW OF RELATED LITERATURE

INTRODUCTION

A review of literature related to data processing was made from 1965 to the present. Studies relevant to the writer's study were examined and some of the more significant findings and conclusions are presented in this chapter. The chapter is divided into four sections.

Section I is devoted to relevant research findings regarding employment requirements and opportunities for positions in data processing and the opinions of businessmen in the profession toward data processing instruction on the secondary school level.

Section II emphasizes related research directed toward the determination of data processing programs, types of courses, and course content.

Section III explores research studies conducted on the national level to determine the status of data processing instruction in selected schools throughout the United States.

Section IV deals with research studies conducted on the state level to determine the status of data processing instruction in various states throughout the United States.

SECTION I

Section I deals with research findings regarding the employment requirements and opportunities for positions in data processing and the opinions of businessmen in the profession toward data processing instruction on the secondary school level.

Wenner Study, (1965)

In 1965 James F. Wenner conducted an investigation to determine the minimum employment requirements for positions in the field of electronic and mechanical data processing in selected businesses in the state of Iowa, and also to design an introductory course in data processing to be taught at the high school level based on the minimum employment requirements.

Two questionnaires were used in the study. One was sent to 20 high schools, and the other was mailed to 144 member firms of the Data Processing Management Association and the Administrative Management Society. A response of 111 firms or 77.08 percent was received.

Wenner concluded the following:

1. A high school diploma is necessary to successfully perform the varied tasks related to the particular job classification in the field of data processing. In rare cases, there is an opportunity for a person without a high school diploma; however, 12 years of education is still needed. It is important, therefore, to emphasize that data processing is not a field for the high school dropout. These persons will not be considered for jobs in data processing.

2. For all the data processing job classifications, a college degree or some college education would be beneficial. There are, however, four job categories for which no college education is necessary—keypunch and verifier operator, auxiliary equipment operator, console operator, and equipment operator.

3. Company schools and equipment manufacturers' schools are an important adjunct to the education and training of data processing employees. It can be concluded from this that most employers seeking data processing employees are not successful in recruiting persons who have the proper background for positions in this field. Consequently, many of these individuals must be given further training at the expense of the employer.

Bangs and Hillstad Study, (1968)

The study conducted by Bangs and Hillstad in 1968 under a research proposal developed by Delta Pi Epsilon investigated the implications of integrated data processing for the preparation of office workers as it affected the development of office occupation curriculums in public secondary and post-secondary institutions offering less than a baccalaureate degree. The study compiled information to form the basis for modification of existing data processing programs and for the establishment of new programs. The study included 353 businesses and 176 school systems throughout the United States with data collection made through interviews and questionnaires.

The following are some significant findings made by Bangs and Hillestad concerning jobs and job opportunities in data processing:

1. High school graduates from data processing programs may enter the following data processing jobs: keypunch operator,

unit record operator, tape librarian, and computer operator.

2. Graduates of two-year post high school institutions may enter the same jobs as those who graduate from high school data processing programs, but in addition, the following jobs are available to them: programmer, systems analyst (with some further experience and training), and supervisor of data processing (with experience and possibly further training.)

3. Generally, the jobs in data processing will become more complex rather than proliferate.

4. Computer manufacturers indicated that little change would take place in computers in the next three to ten years except for miniaturization and greater memory unit capacity; thus, many of the jobs now available will continue to be prevalent for several years to come.

5. With the relative decrease in the use of punched cards as input, the proportion of keypunch and verifier operators will decrease.

6. Advances in the software will be extensive in the next three to ten years; consequently, opportunities will expand for persons trained in the use of the new software as it is developed and accepted.

7. Unit record equipment is being phased out with the installation of smaller computers. The position of unit record equipment operator will not be as prevalent in the near future as it has been in the past.

8. Programmers will not need to be as technically trained as is presently true. Graduates of two-year post high school programs will be adequately trained for programming positions. However, the programmer as he is known today will become important to the business organization if he is prepared to move into the position of systems analyst. Business will want their programmers to have the necessary background training to move into the position of systems analyst, or expect the programmer to continue his training on the job so that he may move into the higher level position.

9. As the use of time-sharing increases, more and more business employees will need to understand automated data processing.

> In a time-sharing installation many of the regular clerks will be responsible for originating and putting data into the automated data processing system. They will be required to be a part of the total system but will not necessarily hold a job classified as a data processing position.

Kovach Study, (1969)

Sharron Dale Kovach designed a study to identify the present status and future outlook for employment of the high school graduate in the field of data processing.

The sample consisted of members of the Data Processing Management Association in 1968. Fourteen firms were interviewed, and questionnaires were mailed to 205 firms. A final return of 41 percent or 87 usable returns were received.

The following are significant findings of the study which are relevant to the business education curriculum of the secondary school and to high school graduates desiring a data processing position:

1. The highest educational level required for keypunch operators, tabulating machine operators, tape librarians, and other clerical workers was high school completion.

2. The majority of respondents required only a high school education for console and computer operators, programmers, and control clerks while in systems and management, less than 50 percent required only high school completion.

3. All jobs except tape librarian, control clerk, and miscellaneous clerical required data processing knowledge and training before hiring.

4. In all occupations except systems analyst, the majority of respondents had no preference for any particular training

institution when asked to choose between high schools, private business schools, manufacturers' schools, and colleges.

Bunch Study, (1969)

John M. Bunch conducted a study in 1969 to determine what businessmen in the Charlotte-Mecklenburg, North Carolina area thought should be offered in instructional data processing in the secondary schools. This survey was a joint operation of the Charlotte-Mecklenburg school system and the Charlotte Chamber of Commerce.

A 20-question survey instrument was developed and sent to 800 business firms. Returns were received from 320 respondents or 40 percent of the total mailing list. Of these respondents, 101 companies had data processing equipment, and 219 had no data processing equipment. Of the firms which did not have data processing equipment, 19 percent planned to acquire equipment in the foreseeable future. Sixteen percent planned to have equipment installed within the next five years.

The survey determined that firms with data processing equipment had 678 keypunch positions and 1,077 programming staff members. Fifty-five percent of these firms indicated that they trained their own keypunch operators.

Of the most significance for secondary schools was the fact that 95 percent believed that public schools should train keypunch

operators. In addition, 91 percent wanted public schools to train students in the basic concepts of programming for vocational purposes.

Hurst Study, (1971)

Delbert B. Hurst's study was conducted to determine the knowledge and skills needed by office occupation students who desired a career in business electronic data processing.

An interview guide was sent to 79 computer installations in Atlanta, Georgia, to determine the skills and business courses needed by students before entering the job search for employment in data processing installations. The guide listed the position titles of tape librarian, verifier operator, keypunch operator, computer-peripheral equipment operator, card-tape-converter operator, and control clerk. After the guide was completed, an interview was set up to clarify answers.

Hurst found that more than one-third of all employees located in data processing clerical positions believed that prerequisite business and mathematics courses necessary in their vocation should be taught in high schools or junior colleges. Clerical employees handled cards and tape; operated the computer, keypunch, and verifier; file; and scheduled jobs.

Basic courses in typewriting, business mathematics, filing, accounting, and office machines were recommended by directors; and

most of the employers stated that a knowledge of COBOL is required more frequently than any other language. The majority of employers also preferred that programmers know two languages with COBOL being the principal language.

Zapach Study, (1972)

The purpose of Joseph B. Zapach's study was to recommend curricular revisions for high schools regarding electronic data processing based on data obtained from members of the Data Processing Management Association in Maricopa County, Arizona. The study was concerned with the following questions: (1) present utilization of electronic data processing equipment and supporting software, (2) minimum employment requirements for selected electronic data processing positions, (3) data processing concepts for inclusion in a high school data processing course, and (4) opinions of businessmen relative to offering data processing at the secondary school level.

A questionnaire was sent to 93 members of the DPMA. A total of 84 returns or 90.3 percent were received of which 68 or 73.1 percent were considered usable for the study.

Zapach found that the predominant unit-record equipment in use were the keypunch, verifier, sorter, and the interpreter. Over one-half of the respondents had no plans for phasing out their unit record equipment. In addition, 119 computers were reported in use by

the responding companies.

The computer programming language used most extensively by the DPMA member firms was COBOL. Over three-fifths of the business firms reported its use.

Among the companies surveyed by Zapach an apparent lack of agreement existed as to the type and degree of minimum experience, education, and training necessary for employment in various data processing positions. For example, minimum experience required for programmers and supervisors of computer operations ranged from one month to 60 months among responding firms. The range of education required for card-tape-converter operator and keypunch and verifier operators extended from a minimum of two years of high school to four years of college. In addition, in-company training for employees ranged from a minimum of one or two weeks to six or 12 months. No clear-cut pattern of specific minimum experience, education, and training requirements evolved.

More than 50 percent of the respondents reported four positions for which they would hire high school graduates. These included coding clerk, computer-peripheral equipment operators, keypunch operator, and verifier operator. Additional positions opened to high school graduates as indicated by 42 to 48 percent of the respondents included the card-tape-converter operator, data typist, and sorting machine operator.

Sixty-one percent of the reporting firms felt the major emphasis of a high school data processing course should be preparation for advanced study or training. Vocational preparation and general education ranked next in order.

Perhaps Zapach's most important finding as it relates to the secondary school curriculum was that 65 of the 68 responding companies reported the need to offer data processing instruction on the secondary school level.

Curless Study, (1973)

The purpose of Jack Camp Curless' study was to make a comparative analysis between 1969 and 1973 of the minimum educational requirements necessary for entry into thirteen types of electronic data processing positions. The opinions of managers of data processing were sampled concerning the educational level required for the thirteen positions at the two periods of time to determine if the same companies had altered over the four year period.

A questionnaire was mailed in 1969 to 1149 companies located in the metropolitan area of Chicago. From this a total of 416 usable replies were obtained. The questionnaire was updated in 1973 but with the thirteen data processing positions remaining the same. The modified questionnaire was mailed to the 416 companies that responded in 1969. A total of 167 companies responded with usable replies.

The most important finding that had significance for the curriculum of the secondary school business education department was that a high school diploma was sufficient training for computer operators, tabulating and peripheral equipment supervisors, and tape librarians. In addition, the study indicated that there presently existed a period of stablization in terms of educational level requirements for various types of data processing positions.

Rall Study, (1974)

DeForest J. Rall conducted a study designed to identify understandings about electronic data processing and computer applications which should be developed as part of the general education curriculum in secondary schools.

A questionnaire was mailed to 250 respondents selected from the ten occupational categories of the registration list of the American Records Management Association. Twenty-five individuals, randomly selected from each category, were mailed the questionnaire. In addition, twenty personal interviews were conducted with company and agency executives who worked directly with computer installations.

Some of the significant recommendations made by the researcher on the basis of the findings were these:

1. High school students should develop an electronic data processing and computer terminology vocabulary.
2. Greater efforts should be given to creating an awareness of

job opportunities in the electronic data processing and computer labor market.

3. In order that all high school students can develop the necessary understandings about electronic data processing and computers, a course such as Introduction to Data Processing should be required so that every student will acquire the recommended understanding as they progress through a school's general education curriculum.

SECTION II

Section II of the review of related literature chapter emphasizes research directed toward the determination of data processing programs, types of courses, and course content.

Wenner Study, (1965)

James Frank Wenner designed an introductory high school data processing course based on the minimum employment requirements desired by Iowa businesses. His suggested one-semester course utilized no machines and included (1) history and evolution of data processing, (2) tabulating cards and tabulating card equipment, (3) electronic computers, (4) computer programming, (5) systems analysis and design, and (6) social aspects of automation and data processing.

The implications of Wenner's study were of tremendous importance for administrators and teachers. He concluded that administrators should realize that the general knowledge acquired from data processing instruction will be used by high school students in any vocation they

chose. Secondary school administrators should seek to implement data processing instruction as a separate course in the curriculum, but where this is not practical, consideration should be given to the inclusion of a concentrated unit into an existing course.

In addition, school administrators should seriously consider the research completed and currently in progress indicating that the present demand for trained data processing personnel not only exists, but all projections point to an increasing demand. It is important, therefore, that the opportunity for instruction in data processing be given to secondary school students.

Bangs and Hillstad Study, (1968)

The Bangs and Hillstad study is one of the most important research works in recent years to contribute to an understanding of the impact of data processing upon the high school curriculum. The study was designed to provide guidelines for school administrators and business educators in developing data processing curriculums at the secondary and post-secondary levels.

Bangs and Hillstad recommended a one-half unit of data processing for sophomores to include a course content of the history of records systems and manual data processing, tabulating cards and equipment, electronic computer logic, flow charting, and computer operation. A one-unit computer concepts and systems course for juniors and a

one-half unit course on a cooperative basis for seniors should be part of the data processing program of the business education curriculum.

In addition, high school data processing teachers should receive at least part of their data processing education by attending manufacturers' schools; and to satisfy business requirements, students should have an opportunity to be trained in data processing.

Two basic recommendations made by Bangs and Hillstad were that key school personnel should exert more effort in inaugurating and updating data processing curriculums, and the two principal methods for increasing the number of data processing teachers should be by summer programs and inservice training programs.

The authors recommended a curriculum designed to prepare students to enter a beginning job in data processing at the completion of high school. The following data processing courses were suggested:

Introduction to Data Processing (10th Grade - 1/2 Unit)

1. History of record systems and manual data processing
2. Tabulating cards and equipment
    a. Card layout and design
    b. Equipment (purposes and operation, excluding panel wiring)
3. Electronic computer logic
    a. Memory
    b. Input of data
    c. Calculation (mathematics)
    d. Output

4. Flow charting

5. Computer operation (using a type and mode of computer and a symbolic language for which the teacher and student have access)

Computer Concepts and Systems Development (11th Grade - 1 Unit)

1. Review of electronic digital computers and principles of data processing

2. Computer logic

3. Logic development through problem solving in general

4. Procedures development

5. Forms design

6. Computer languages (two languages: COBOL and one other, possibly Autocoder)

7. Computer business applications

Data Processing Applications (12th Grade - 1/2 Unit)

1. Systems analysis and design

2. Programming essentials

3. Report writing and analysis from computer printout

4. Gaming (simulation)

5. Laboratory (or on a coop basis)

    a. Forms design
    b. flow charting
    c. Writing the programs
    d. Operating computer
    e. Debugging
    f. Running of live work

The authors also recommended various business and general courses

for providing background in how business is organized, how it operates, and how its records are kept along with good communication skills and knowledge of human relations. Under business and general courses are included:

Bookkeeping (11th Grade - 1 Unit)

This course should emphasize the use of electronic data processing equipment for compiling the records of a business and should relate a systems approach in accounting to data processing accounting procedures.

Business Organization and Management (12th Grade - 1/2 Unit)

This course should introduce the student to the business firms through a total systems approach by interrelating the functional areas of business, such as accounting, management, finance, marketing, and production. Through this, the student will discover that no business activity, no matter how detailed, is an isolated event.

Business and Office Procedures and Data Processing Applications (12th Grade - 1/2 Unit)

Ideally, these two courses should be offered as a block during the last semester of the senior year. Through these courses, the data applications can be closely related to the total business system through a more thorough analysis of the flow of data in a continuous sequence from its origin to its ultimate use.

Human Relations (12th Grade - 1/2 Unit)

This should be a business psychology course. Employees must relate to all persons in the business organization; therefore, understanding people and knowing the principle of human relations are very important for data processing personnel.

Written Communications (12th Grade - 1/2 Unit)

This course should emphasize expository writing for the purpose of developing the ability to express oneself clearly and concisely in writing.

Zapach Study, (1972)

Joseph B. Zapach surveyed members of the Data Processing Management Association to determine what businessmen felt should be included in a high school data processing course and what were their opinions toward offering data processing instruction at the high school level. Based on the data gathered a number of recommendations were made to secondary school personnel including administrators, counselors, business education department heads, and business educators.

Zapach recommended that in view of the positive response to the need for a high school electronic data processing course and the willingness of employers to hire graduates of a high school data processing course for selected positions, courses in data processing should be offered on the secondary school level. The overall objective of the high school data processing program should be preparation for

advanced study with additional emphasis directed toward vocational preparation.

The following essential content material should be included in data processing courses offered at the secondary school level:

1. Electronic Record Systems
2. Card Design
3. Purposes of Keypunch
4. Input
5. Arithmetic Logic
6. Control
7. Memory
8. Output
9. Console
10. Printer
11. Tape Drives
12. Block Diagrams
13. Flow Charts
14. Decision Tables
15. COBOL
16. Program Debugging
17. Systems Analysis
18. Alphanumeric and Numeric Coding System
19. Decimal Number System

20. Binary Number System
21. Hexidecimal Number System
22. Nature of Automated Data Processing System
23. Major Uses of Data Processing Systems
24. Types of Data Handling
25. Importance of Automation and Data Processing to Society
26. Structure of Data Processing Department
27. Purposes of the Reproducer and Collator
28. Future of Data Processing

SECTION III

Section III examines research studies conducted on the national level to determine the status of data processing instruction in selected schools throughout the United States.

MacMillan Study, (1969)

Margaret Wilson MacMillan in 1969 completed an important study which had the following two purposes: (1) to ascertain selected business education curriculum practices in public secondary schools of the United States during 1967-1968; and (2) to compare implemented practices with theoretically established ideal criteria.

A questionnaire was sent to business education personnel in selected public secondary schools throughout the United States. A

return of 73.4 percent revealed that nearly a 50 percent increase occurred from 1963 through 1968 in the number of schools offering some form of instruction in automated data processing. More than one-third of the high schools incorporated data processing as a unit of instruction with another business subject.

MacMillan concluded that support should be given to the relatively new field of data processing in the high schools, and secondly, that leaders in business education should promote workshops in junior colleges to provide adequate numbers of business teachers in computer courses.

Greene Study, (1969)

Richard S. Greene conducted a study in 1969 to determine what educational institutions throughout the country were doing in data processing. A questionnaire, mailed to each state supervisor or director of business and office occupations, inquired about the number and length of data processing courses at the high school, vocational-technical school, and junior college levels.

Of the 34 questionnaires that were returned, most of the information concerned the high school programs. Some of the general findings about the high school programs in data processing included the following:

1. Twenty-five states offered data processing courses without

the use of equipment. Some schools integrated these materials with other business courses.

2. Twenty-seven states offered data processing courses involving the use of unit record equipment only. Some courses were restricted to offerings utilizing card punch equipment.

3. Four states offered data processing courses with the use of computers only.

4. Fifteen states offered data processing courses involving the use of both unit record equipment and computers. These courses ranged from one semester to three year programs.

5. The most popular computer languages taught were COBOL, FORTRAN, Autocoder, Easycoder, and RPG.

State directors saw future trends in data processing to include:

1. Consideration to a total system approach to data processing involving not only business education but also mathematics, science, and school administration.

2. Time-sharing methods using remote terminals connected to large computers.

3. Expanding computer training in schools previously equipped with unit record equipment.

4. Offering programming to high school students using software rather than hardware.

5. Computer "hands on" experience at the high school level.

6. Greater demand by businesses for data processing programs in high schools.

7. Offering basic data processing as a semester course in the eleventh grade with a full year course at the senior level to teach programming.

Smith Study, (1974)

The primary purpose of this study was to examine data processing

instruction in selected public secondary schools in the United States during the 1972-73 school year. Specifically, Alfred E. Smith's study investigated which departments offered data processing instruction and what courses were offered, what was the course content, what facilities and equipment were used, and what were the teacher qualifications.

A two-part questionnaire was mailed to 750 randomly chosen high schools selected from the four United States Directories of All Public Elementary and Secondary Day Schools for 1968-69. Of the schools returning the questionnaire, 551 principals completed Part I with 241 data processing instructors completing the remainder of the questionnaire.

Some of the findings from this study were of particular significance to this writer's study. Smith found that 39 percent of the responding schools offered courses in data processing. Of these 19 percent offered one-year programs, 9.9 percent offered two or more years, and more than 50 percent offered units of data processing. More than one-fourth of the respondents anticipated computer instruction in course offerings by 1978.

Over one-half of the respondents indicated that the business department had the responsibility for data processing instruction. The equipment within the reporting schools was controlled primarily by the business and mathematics departments. Although data processing was offered at all high school grade levels, the curriculum was geared

primarily to the upper two grades.

The findings concerning course content, facilities and equipment, and teacher qualifications were provided by the 241 responses obtained from the data processing instructors. General findings in these areas showed that the three most frequently mentioned separate courses in data processing instruction were Introduction to Data Processing, Data Processing Applications, and Programming. Units in data processing were offered most often in the business course offerings of Bookkeeping/Accounting and Clerical Practices. The principal languages taught in the responding public secondary schools were FORTRAN, BASIC, and COBOL.

Data processing instructors mentioned the lack of equipment as their primary instructional problem. Most instructors were prepared to teach data processing through colleges which offered courses and workshops. The majority of the data processing instructors indicated that they try to keep up-to-date by reading data processing periodicals.

Several major recommendations were made by Smith at the completion of his comprehensive study. Smith considered of major importance the recommendation that data processing instruction should be offered in all high schools and at the junior and senior levels. Schools anticipating the offering of data processing instruction for the first time should give consideration to offering this instruction as a unit

in another class. A unit in the Bookkeeping/Accounting, Office Practice, Secretarial, or Clerical Practice courses seemed to be the most appropriate place for such instruction to begin in the business department.

In addition, Smith recommended that more effort be exerted by high school principals and data processing instructors to initiate programs in data processing instruction and to update existing programs. Instructors and state officials must work together to create viable guidelines in keeping with developments in the constantly changing field of data processing.

SECTION IV

Section IV deals with research studies conducted on the state level to determine the status of data processing instruction in various states throughout the United States.

Giles Study, (1967)

The purpose of the study completed by Wayne E. Giles was to determine the status of data processing instruction in the business curriculums of the Illinois public secondary schools.

Questionnaires were sent to 200 public secondary schools of which 160 replied. The data revealed that 94.4 percent of the schools did not offer a separate course in data processing. A one-semester course

offered to students at the eleventh and twelfth grade levels was most prevalent in those schools with a separate course. It was also found that the schools that offered data processing as a unit included it most often in Office Practice.

The predominant data processing equipment available to business students included the IBM simulator, calculator, and keypunch machine.

Giles found that almost as many business teachers were self-educated in data processing as are college prepared. In addition, the college-prepared teachers had only three to six semester hours in data processing courses.

Chotiner Study, (1968)

The study conducted by Allan I. Chotiner surveyed selected public schools in the counties of Arlington and Fairfax, Virginia, and Montgomery and Prince George, Maryland to determine the present and future utilization of data processing instruction.

Chotiner's findings indicated that the development of data processing in school systems lagged behind its use in business and industry. Some high schools added data processing as an enrichment class, but the lack of qualified teachers made it difficult for data processing to be included in curriculums. In addition, equipment cost and the lack of instructional materials were other factors hindering the inclusion of data processing instruction.

Chotiner concluded that school systems could achieve a more realistic cost factor by pooling their resources. Furthermore, administrators and supervisors must be made aware of the applications of data processing and more instructors need to be properly educated for teaching data processing. Finally, to provide more data processing programs to schools, a national effort should be made through various fund sources and regional centers.

Farrell Study, (1969)

James M. Farrell conducted a study to determine what types of data processing equipment were in use and what types of data processing courses were being taught in the public high schools of Wisconsin. In addition, the future plans of administrators in data processing and teacher preparation were studied. A total of 87.1 percent of the respondents returned the questionnaire.

Farrell found that during the school year of 1969 less than one half of the high schools in the state offered any form of data processing instruction to their students. The majority of the schools offering separate courses in data processing were primarily aimed at supply the students with background knowledge. In addition, the business education department offered data processing instruction as a unit in an existing course more than any other department.

Even though the need for teachers of data processing in Wisconsin

would increase, many teachers had no formal training in the area of data processing at institutions of higher education. Teachers felt they should have more hands-on experience with data processing equipment and, if possible, work experience in data processing installations.

Two important recommendations made by Farrell were that all public high schools in the state of Wisconsin not offering any data processing instruction should take a close look at their programs to see where either a unit or at least some concepts relating to data processing could be introduced, and secondly, teachers should not be allowed to graduate from an institution of higher education without at least one course in electronic data processing.

Robison Study, (1970)

The purpose of Marylee Robison's study was to obtain information indicating the extent to which data processing was taught in the public secondary schools of Oklahoma. Questionnaires were sent to 56 public secondary business education instructors with a total of 43 responding.

The compiled data revealed that 40 percent of the schools surveyed offered a course in data processing instruction with a one-year course being most prevalent. The data processing course was most often available to students in the twelfth grade although some schools offered it at the tenth and eleventh grade levels. The Office Practice

class was the course in which a unit was most often offered to students.

Robison concluded that every business department in schools located in cities with a population of 10,000 or more should offer at least a one-semester course in data processing. Furthermore, schools that do not offer a separate data processing course should incorporate a unit on data processing in another business course.

Moyer Study, (1970)

Bruce C. Moyer conducted his study of secondary schools in Oregon with a student population of 1000 or more. In addition, he surveyed a number of experts in the field of data processing. His objectives for this study included: (1) to determine the basic reason or reasons for establishing the stated goals or objectives for computer related courses or units offered in the high schools of Oregon, (2) to determine if the high schools were actually teaching the specific courses or units that experts in the field believed should be offered to attain the specified objectives, and (3) to determine the methods used by the high schools to measure the degree of success or failure in achieving these goals or objectives.

The major findings derived from the data collected from the high schools were the following. Data processing instruction had not become a well established, separate program in most high schools; rather the

vast majority of schools presented this instruction within the business and mathematics departments. Only two respondents indicated evidence of comprehensive planning in developing courses of study.

Schools were most concerned with providing students with a general understanding of data processing and the most popular course for accomplishing this objective was an introductory course in data processing. In addition, schools were concerned with providing students with an adequate background for the college-bound student, and the most popular course for accomplishing this objective was a programming language, either BASIC or FORTRAN. The most popular method in the high schools for developing vocational skills was the keypunch machine.

Many of the schools relied on weak, invalid considerations, such as "Availability of Outside Funds" and "Recommendations from Certain Individuals and Committees," as the sole basis for providing data processing instruction. The procedures and methods utilized in evaluating the degree of success or failure in meeting specified objectives were found to be inadequate.

The information collected from the data processing authorities revealed that there was no general consensus as to what goals should be sought for high school data processing other than providing a general knowledge and understanding of the field. High school personnel and the data processing authorities did agree that an

introductory course in data processing should be offered for general knowledge, including information on data processing career opportunity and as a background for college entrance. Vocational competency should be included on unit record equipment, especially the keypunch.

Lewis Study, (1971)

Jere G. Lewis' study was designed to determine the status of data processing instruction in the business education curriculums of the public high schools in the 15 counties of the Upper Peninsula of Michigan. Questionnaires were mailed to 57 high school business education departments. Replies from a total of 53 schools were received. Of the schools responding, nearly one-third had student enrollments of less than 300 and were in towns of less than 2000 population.

Lewis found that only one two-semester course in data processing was offered by one school in the Upper Peninsula of Michigan in 1971. The enrollment of the school offering this course was over 4000.

Twenty of the schools offered 25 separate units of instruction in other business courses. Over two-thirds of these units were offered in Clerical Office Practice or Bookkeeping and were from one to two weeks in length.

Of the 53 schools surveyed, 10 indicated that they planned to offer courses in data processing in the next one to five years, but

43 of the schools had no plans to offer a course in data processing. Schools that did not plan to offer data processing instruction gave lack of equipment and lack of trained teachers as the major contributing factor.

SUMMARY

This chapter presented the findings of studies and research projects related to data processing and its implications for the public secondary schools. The chapter was divided into four sections.

Section I was devoted to research findings regarding employment requirements and opportunities for positions in data processing and the opinions of businessmen in the profession toward data processing instruction on the secondary school level.

The findings indicated that as a result of the increased personnel needs in the computer industry, firms are looking to the secondary schools to accept additional responsibility for training potential data processing personnel. Several entry level data processing positions are available to high school students graduating from data processing programs.

Businessmen generally agreed that some form of data processing instruction should be offered at the high school level. There is some disagreement as to whether this instruction should be vocational, general knowledge, or college preparatory.

Section II emphasized related research directed toward the development of data processing programs, types of courses, and course content in the business education department of secondary schools.

Most educators agreed that it is no longer a question of should data processing instruction be offered in the high school but rather what form this instruction should take. A one-semester introductory course was considered desirable, but where this was not feasible, a unit should be incorporated into an existing business course. Again, there is disagreement among educators as to whether data processing instruction should be vocational, general preparation, or college preparatory.

Section III explores research studies conducted on the national level to determine the status of data processing instruction in selected schools throughout the United States.

Nationally, data processing instruction at the high school level has increased significantly in recent years. The majority of schools offer this instruction as a unit in an existing business course rather than as a separate course. Business departments across the United States have the primary responsibility for data processing instruction. The principal languages taught by secondary schools included FORTRAN, BASIC, and COBOL.

Section IV deals with research studies conducted on the state level to determine the status of data processing instruction in

various states throughout the United States.

Many schools throughout the United States are offering some form of data processing instruction, primarily as a unit in a business course. The most commonly mentioned instructional problem by educators in various states was the lack of equipment and materials to teach data processing. In addition, the lack of trained teachers made it difficult to include data processing in curriculums.

CHAPTER III

PROCEDURES

The purpose of this study was to determine the status of data processing instruction in the business education curriculums of the public secondary schools in Montana during the school year 1975-76. To accomplish this objective, a survey was conducted of the business education departments in the public secondary schools of Montana. The study was designed to examine general information pertaining to data processing instruction, course content, facilities and equipment, and teacher qualifications.

POPULATION DESCRIPTION

The population for this study consisted of the chairmen of the business education departments in the public secondary schools of Montana. The list of chairmen was compiled from the Montana Business and Office Education Personnel for 1975-76, a publication prepared by the Superintendent of Public Instruction's office in Helena, Montana. Although 175 public secondary schools are listed in the publication, two schools were omitted from this study because no business education department personnel was given for those schools. In some instances the department chairman was arbitarily selected since

none was designated on the list. A total of 173 business education department chairmen were surveyed.

CONSTRUCTION OF SURVEY FORM

Based on the review of related literature which identified elements considered important to include in the survey, a questionnaire was constructed. The questionnaire contained modified questions from those originally developed by Alfred E. Smith. A copy of the instrument used is found in Appendix C.

The questionnaire was submitted to selected faculty and graduate students in the Business Education Department at Montana State University; and as a result of their suggestions, changes were made in the instrument. The resulting questionnaire was a four-part instrument designed to gather information about data processing instruction in the business education departments of the respondents' high schools.

ADMINISTRATION OF SURVEY INSTRUMENT

The initial cover letter and questionnaire (Appendix A and C) were mailed to the 173 business education department chairmen on February 23, 1976. A total of 125 or 72.25 percent returns were received from this mailing. On March 8, 1976, two weeks after the initial mailing, a follow-up letter (Appendix B) was sent to those department chairmen who had not responded. From this mailing a total

of 27 questionnaires or 15.61 percent were received. A final total of 152 questionnaires or 87.86 percent were received from the responding schools. Table 1 shows the number of mailings made and the percentage of responses for each mailing.

Table 1

SURVEY RESPONSES

	Number Sent	Number Received	Percent
Original Mailing	173	125	72.25
Follow-up Letter	48	27	15.61
Totals		152	87.86

ANALYSIS OF DATA

The objective of this study was to ascertain the status of data processing instruction in the business education curriculums of the public secondary schools in Montana during the school year 1975-76. No attempt was made to examine data processing instruction in any other departments of the high schools.

The survey instrument was divided into four parts:

Part I, General Information, contained questions pertaining to information such as school enrollment, current offerings, and future plans.

Part II, Course Content, was concerned with courses and units of instruction in data processing and their content.

Part III, Facilities and Equipment, sought to determine what equipment the business education department had available for use by its students.

Part IV, Teacher Qualifications, contained questions dealing with the instructor of data processing.

All chairmen of the business education departments were asked to complete Part I of the questionnaire and then to complete Parts II, III, and IV only if they offered some form of data processing instruction within the department. For the purposes of this questionnaire, data processing instruction was defined as: (1) a separate course(s) without the use of the computer and/or terminal, (2) unit(s) of instruction in any business course(s) without the use of the computer and/or terminal, and (3) course(s) and/or unit(s) utilizing the computer.

Information provided in the questionnaires by the respondents was compiled and tables indicating total number of responses to the questions and equivalent percentages were prepared. Each question was analyzed by looking at the total number of responses to an individual question and converting this to a percentage basis. Since every respondent did not answer each question the percentage was determined by analyzing the total number who did answer the question.

The first column of each table listed the possible responses the department chairmen could have selected. The next four columns were a breakdown into the four school enrollment classifications as taken from the Montana Curriculum Guidelines and designated as the first question on the questionnaire. Each respondent was to check one category which included the following: Under 75, 75-200, 200-500, and Over 500. Each enrollment classification column was further broken down into number and percentage of responses. The last column listed the total number and percentage of responses for each possible response from column one. Each column of the table was totaled to the number who had actually responded to the particular question being analyzed. In addition, each column of the table was totaled to 100 percent with the 100 percent being the number who had responded to the question. A descriptive analysis was also presented with each table.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

This chapter presented and analyzed the data gathered from the returned questionnaires sent to 173 business education department chairmen of the public secondary schools in Montana. The purpose of the questionnaire was to collect information regarding data processing programs in the business education departments of the high schools in Montana.

The original mailing resulted in 125 returns or 72.25 percent responses. A follow-up letter sent two weeks later increased the number of returns by 27 or 15.61 percent bringing the total response to 152 or 87.86 percent.

The findings of this study are reported in this chapter under four headings. Part I is concerned with general information regarding data processing instruction. Part II deals with course content. Part III pertains to facilities and equipment, and Part IV covers teacher qualifications. The results of each question in a section are presented in the sequence in which the questions were stated on the questionnaire (Appendix C). Tables 2 through 31 are the resulting statistical information gathered by the researcher.

PART I

GENERAL INFORMATION

School Enrollment

The four school enrollment classifications were taken from the Montana Curriculum Guidelines and designated as the first question on the questionnaire. Each respondent was to check one category which included the following: under 75, 75-200, 200-500, and over 500.

Table 2 indicates that out of 152 responses, 45 were from schools with enrollment of under 75 students. The largest number of returns were from the 75-200 school enrollment category with 58 responses or 38.16 percent of the total. The 200-500 school enrollment category had a total of 28 returns, and the over 500 classification had the smallest number with 21 returns.

Table 2

SCHOOL ENROLLMENT CLASSIFICATIONS

Responses	Number	Percent
Under 75	45	29.60
75-200	58	38.16
200-500	28	18.42
Over-500	21	13.82
Totals	152	100.00

Courses in Data Processing in the Business Education Curriculum

Of the 45 schools responding in the under 75 school enrollment classification, only one indicated that they currently offered a course in data processing instruction. In the 75-200 category, two out of 58 responding schools reported offering a data processing course. Two of the respondent schools with enrollments of 200-500 indicated a separate course in data processing instruction. Of the 21 responding schools with enrollments over 500, seven or 33.33 percent presently offered a separate course in data processing instruction in the business education department curriculum.

As indicated in Table 3, of the 152 responding high schools throughout the state of Montana, twelve business education departments or 7.90 percent of the total offered a separate course in data processing instruction within their curriculums.

Table 3

NUMBER OF BUSINESS EDUCATION DEPARTMENTS OFFERING A SEPARATE DATA PROCESSING COURSE(S)

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75-200 No/%	200-500 No/%	Over 500 No/%	Total No/%
Yes	1/ 2.22	2/ 3.45	2/ 7.14	7/ 33.33	12/ 7.90
No	44/ 97.78	56/ 96.55	26/ 92.86	14/ 66.67	140/ 92.10
Totals	45/100.00	58/100.00	28/100.00	21/100.00	152/100.00

One-Year Programs in Data Processing

No one-year programs in data processing instruction were offered in the business education departments of schools with enrollments of Under 75, 75-200, and 200-500 of the responding schools. Only three or 1.97 percent of the total respondents offered one-year programs in data processing in the business education curriculum. These three programs were reported by business education departments in schools with enrollments of Over 500.

Table 4

NUMBER OF BUSINESS EDUCATION DEPARTMENTS OFFERING ONE-YEAR PROGRAMS IN DATA PROCESSING

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75-200 No/%	200-500 No/%	Over 500 No/%	Total No/%
Yes	0/ 0	0/ 0	0/ 0	3/ 14.29	3/ 1.97
No	45/100.00	58/100.00	28/100.00	18/ 85.71	149/ 98.03
Totals	45/100.00	58/100.00	28/100.00	21/100.00	152/100.00

Two-Year Programs in Data Processing

Over ninety-eight percent of the responding schools in all enrollment classifications did not include two-year data processing programs in their business education curriculums. Two of the business education departments in the over 500 enrollment classification had a

two-year data processing program.

Table 5

NUMBER OF BUSINESS EDUCATION DEPARTMENTS OFFERING TWO-YEAR PROGRAMS IN DATA PROCESSING

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75-200 No/%	200-500 No/%	Over 500 No/%	Total No/%
Yes	0/ 0	0/ 0	0/ 0	2/ 9.52	2/ 1.32
No	45/100.00	57/100.00	28/100.00	19/ 90.48	149/ 98.68
Totals	45/100.00	57/100.00	28/100.00	21/100.00	151/100.00

Anticipated Data Processing Course Offerings

Table 6 indicates the number of schools anticipating future courses. Three schools in the under 75 enrollment classification reported anticipating data processing courses in their business education curriculums during 1976-1978, whereas 39 or 92.86 percent did not expect to include a separate course in data processing within the next two years.

In the 75-200 enrollment category, nine schools responded affirmatively and 47 responded negatively to the possibility of a future separate data processing course.

Two business education departments in the 200-500 school enrollment classification indicated future plans for adding data processing

courses in 1976-1978, while 25 departments had no plans.

In the over 500 school enrollment category, six business education departments responded yes to anticipated data processing courses in 1976-1978. Eight departments gave a no response to this question.

Of the 139 business education departments responding, twenty or 14.39 percent anticipated starting a separate data processing course in 1976-1978. The remaining 119 departments or 85.61 percent had no plans during this time period for adding data processing courses.

Table 6

ANTICIPATED DATA PROCESSING COURSE OFFERINGS IN BUSINESS EDUCATION DEPARTMENTS FOR 1976-1978

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75-200 No/%	200-500 No/%	Over 500 No/%	Total No/%
Yes	3/ 7.14	9/ 16.07	2/ 7.41	6/ 42.86	20/ 14.39
No	39/ 92.86	47/ 83.93	25/ 92.59	8/ 57.14	119/ 85.61
Totals	42/100.00	56/100.00	27/100.00	14/100.00	139/100.00

Units of Data Processing Instruction in Other Business Courses

The data in Table 7 indicates that more than 50 percent of the responding business education departments offered a unit of data processing instruction in one of their business courses.

Of the 45 reporting business education departments in the under 75 enrollment category, 26 or 57.78 percent indicated that they offered a unit of data processing instruction in one of their business courses. Nineteen of the departments offered no such instruction.

Corresponding percentages were registered from the 75-200 and 200-500 enrollment classifications. Thirty-four or 58.62 percent in the 75-200 range and 15 or 53.57 percent in the 200-500 category offered units of data processing instruction.

In the over 500 enrollment classification, nine of the reporting 21 business education departments included a unit of data processing instruction in another business course.

Eighty-four or 55.26 percent of the 152 respondents reported that they included a unit of data processing instruction in their curriculums as opposed to 68 or 44.74 percent that did not offer such instruction as a unit in another business course.

As pointed out in the review of literature, many schools in the United States offer some form of data processing instruction, primarily as a unit in a business course. The business education departments surveyed in Montana tended to follow this trend.

Table 7

DATA PROCESSING INSTRUCTIONAL UNITS OFFERED IN ANY COURSE IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75-200 No/%	200-500 No/%	Over 500 No/%	Total No/%
Yes	26/ 57.78	34/ 58.62	15/ 53.57	9/ 42.86	84/ 55.26
No	19/ 42.22	24/ 41.38	13/ 46.43	12/ 57.14	68/ 44.74
Totals	45/100.00	58/100.00	28/100.00	21/100.00	152/100.00

Anticipated Data Processing Unit Offerings in Other Business Courses

In response to the question, "If the department does not offer a unit(s) in data processing in any other business course, do you anticipate that the department will offer such unit(s) within the next two years?", the percentages between the enrollment categories were closely corresponding. In both the under 75 and over 500 classifications, 50 percent of the reporting business education departments indicated that they intended to add a unit of data processing instruction in a business course during 1976-1978.

Twelve departments or 42.86 percent in the 75-200 range and seven departments or 41.18 percent in the 200-500 category also indicated plans to include a data processing unit during 1976-1978.

Of the 81 responding business education departments, 37 or 45.68

percent responded affirmatively to the anticipation of including a unit of data processing instruction in a business course during 1976-1978.

Table 8

ANTICIPATED DATA PROCESSING UNIT OFFERINGS IN BUSINESS COURSES IN THE BUSINESS EDUCATION DEPARTMENT FOR 1976-1978

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75-200 No/%	200-500 No/%	Over 500 No/%	Total No/%
Yes	12/ 50.00	12/ 42.86	7/ 41.18	6/ 50.00	37/ 45.68
No	12/ 50.00	16/ 57.14	10/ 58.82	6/ 50.00	44/ 54.32
Totals	24/100.00	28/100.00	17/100.00	12/100.00	81/100.00

Computer Instruction in the Business Education Curriculum

Instruction in the use of the computer is a part of the data processing programs in 29 of the 150 reporting business education departments in the state of Montana.

The over 500 enrollment category with 21 respondents had seven or 33.33 business education departments offering instruction in the use of the computer. The other enrollment classifications offered computer instruction in their business education curriculums in the following order: 200-500, five or 18.52 percent; 75-200, ten or 17.24 percent; and under 75, seven or 15.91 percent.

Table 9

INSTRUCTION IN THE USE OF THE COMPUTER IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75-200 No/%	200-500 No/%	Over 500 No/%	Total No/%
Yes	7/ 15.91	10/ 17.24	5/ 18.52	7/ 33.33	29/ 19.33
No	37/ 84.09	48/ 82.76	22/ 81.48	14/ 66.67	121/ 80.67
Totals	44/100.00	58/100.00	27/100.00	21/100.00	150/100.00

Anticipated Computer Instruction

Of the 121 responding business education departments, 27 had plans to institute computer instruction in their curriculums over the five year period of 1976-1981. Ninety-four or 77.69 percent had no future plans.

Over the next five year time period computer instruction will be offered by four departments starting next year, eight departments within two years, five departments within three years, four departments within four years, and six departments within five years.

In the under 75 enrollment classification, six departments out of 32 responding plan to incorporate computer instruction within the next five years. Eight business education departments in the 75-200 enrollment category, seven in the 200-500 range, and six in the over

500 classification have plans during 1976-1981 to offer computer instruction to their students.

Table 10

ANTICIPATED COMPUTER INSTRUCTION IN THE BUSINESS EDUCATION DEPARTMENT FOR 1976-1981

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75-200 No/%	200-500 No/%	Over 500 No/%	Total No/%
Next year	1/ 2.63	1/ 2.08	1/ 4.35	1/ 8.33	4/ 3.31
Two years	2/ 5.26	5/ 10.42	0/ 0	1/ 8.33	8/ 6.62
Three years	1/ 2.63	1/ 2.08	2/ 8.70	1/ 8.33	5/ 4.13
Four years	1/ 2.63	0/ 0	2/ 8.70	1/ 8.33	4/ 3.31
Five years	1/ 2.63	1/ 2.08	2/ 8.70	2/ 16.66	6/ 4.96
None	32/ 84.21	40/ 83.33	16/ 69.57	6/ 50.00	94/ 77.69
Totals	38/100.00	48/100.00	23/100.00	12/100.00	121/100.00

Data Processing Instructional Level

The grade level at which students obtained their data processing instruction varied from the freshman through the senior year. Many departments checked more than one response indicating that students are permitted to take the data processing instruction at different grade levels.

Only one business education department indicated that freshmen were allowed to enroll in data processing, and this was in the under 75 enrollment classification. Seven departments offered data

processing instruction to sophomores, four of which were in the under 75 category, one in the 75-200 range, one in the 200-500 population, and one in the over 500 classification.

The majority of business education departments that offer data processing instruction enroll primarily juniors and senior in their programs. Seventy or 34.15 percent of the departments offered this instruction to juniors, and eighty or 39.02 percent offered it to seniors.

Table 11

INSTRUCTIONAL LEVEL AT WHICH DATA PROCESSING IS OFFERED IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75-200 No/%	200-500 No/%	Over 500 No/%	Total No/%
Freshman	1/ 1.59	0/ 0	0/ 0	0/ 0	1/ .49
Sophomore	4/ 6.35	1/ 1.32	1/ 2.86	1/ 3.23	7/ 3.41
Junior	20/ 31.75	25/ 32.89	11/ 31.43	14/ 45.16	70/ 34.15
Senior	22/ 34.92	30/ 39.47	14/ 40.00	14/ 45.16	80/ 39.02
None	16/ 25.40	20/ 26.32	9/ 25.71	2/ 6.45	47/ 22.93
Totals	63/100.00	76/100.00	35/100.00	31/100.00	205/100.00

Departmental Responsibility for Data Processing Instruction

As indicated in Table 12, the business education department had the primary responsibility for data processing instruction in the responding high schools. Eighty-seven or 57.24 percent reported this

departmental responsibility in their schools. The math department with 34 or 22.36 percent of the total followed with this responsibility. Only six schools reported the science department assuming data processing instruction in their departments. Many schools checked more than one response for this question.

In the under 75, 75-200, and 200-500 enrollment classifications, the business education department had the major responsibility for the data processing instruction. The exception was in the over 500 category with ten or 40 percent of the business education departments having this responsibility compared to thirteen or 52 percent of the math departments maintaining this responsibility.

Table 12

DEPARTMENTAL RESPONSIBILITY FOR DATA PROCESSING INSTRUCTION

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75-200 No/%	200-500 No/%	Over 500 No/%	Total No/%
Business	27/ 61.36	35/ 61.40	15/ 57.69	10/ 40.00	87/ 57.24
Science	0/ 0	3/ 5.26	1/ 3.85	2/ 8.00	6/ 3.95
Math	6/ 13.64	10/ 17.55	5/ 19.23	13/ 52.00	34/ 22.36
Other	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
None	11/ 25.00	9/ 15.79	5/ 19.23	0/ 0	25/ 16.45
Totals	44/100.00	57/100.00	26/100.00	25/100.00	152/100.00

Departmental Control of Data Processing Equipment

Departmental equipment control was maintained primarily by the business and mathematics departments as shown in Table 13. In the under 75, 75-200, and 200-500 enrollment classifications, the responding schools indicated that the business education department had the major control of the data processing equipment. As with the instructional responsibility, the exception was in the over 500 enrollment category with five or 27.77 percent of the business education departments reporting responsibility for equipment control as opposed to ten or 55.55 of the math departments retaining this control. Several schools indicated that the different departments shared this responsibility.

Of the total schools responding to this question, 51 or 43.59 percent were found to have the equipment control in the business education departments. The mathematics department had this responsibility in 22 or 18.80 percent of the schools. Control was vested in the science departments in five or 4.27 percent of the schools. One school in the over 500 classification indicated that the equipment was maintained by the local vocational-technical school.

These statistics indicating that the business education department has primary responsibility for directing both data processing instruction and equipment in the state of Montana agrees with the findings in the review of literature which pointed out that this

department has the responsibility in schools throughout the United States.

Table 13

DEPARTMENTAL CONTROL OF DATA PROCESSING EQUIPMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75-200 No/%	200-500 No/%	Over 500 No/%	Total No/%
Business	19/ 54.29	19/ 41.30	8/ 44.44	5/ 27.77	51/ 43.59
Science	0/ 0	3/ 6.52	1/ 5.56	1/ 5.56	5/ 4.27
Math	3/ 8.57	7/ 15.21	2/ 11.11	10/ 55.55	22/ 18.80
Other	0/ 0	0/ 0	0/ 0	1/ 5.56	1/ .86
None	13/ 37.14	17/ 36.96	7/ 38.89	1/ 5.56	38/ 32.48
Totals	35/100.00	46/100.00	18/100.00	18/100.00	117/100.00

Reasons for Exclusion of Data Processing Offerings in the Business Education Department

In the under 75 enrollment classification 25 or 29.41 percent of the respondents mentioned cost as the reason for not offering data processing instruction in their business education curriculums. This was followed secondly by lack of available equipment and thirdly by lack of available materials. The most frequently mentioned reason by the ten respondents who checked the other response was that the school enrollment was too small to offer data processing.

Respondents in the 75-200 enrollment category listed the lack of

available equipment as the primary reason for not offering data processing instruction. Twenty-seven or 26.21 percent of the business education departments indicated this response. This was followed respectively by cost and lack of available materials. In the other response, statements such as not feasible or practical for all high schools, teacher already overloaded, and such courses become outdated too rapidly were given as reasons.

Lack of available equipment was mentioned by 13 or 26.53 percent of the respondents in the 200-500 enrollment range as the main cause for not including data processing instruction in curriculums. Cost and lack of available materials were listed next in order. The other response drew such statements as too specialized, no survey conducted in order to answer, and offered in the science department.

In the over 500 enrollment category, four or 22.22 percent of the business education departments indicated that the lack of qualified teachers and cost prevented the inclusion of data processing instruction. This was followed equally by lack of interest by students, lack of concern by administration, and other reasons. The other responses included specialization should be left to colleges and data processing instruction transferred to Career Education Center.

Sixty-five or 25.69 percent of the total responding business education departments in all enrollment classifications indicated that cost was the basic reason for not including data processing instruction

in their curriculums. Sixty or 23.72 percent of the respondents listed lack of available equipment as the second reason, and 36 or 14.23 gave the lack of available materials as the third reason. Other responses in their respective order were lack of qualified teachers, lack of interest by students, lack of concern by administration, and other responses.

Many business education departments indicated several responses to this question. The resulting statistics for this question are presented in Table 14.

PART II

COURSE CONTENT

Title and Length of Separate Data Processing Course(s)

Of the eighteen responding business education departments in the under 75 enrollment classification only one school offered a separate one-semester course entitled Data Processing. The 75-200 enrollment category also offered only one course entitled Unit Record Equipment and its length was for nine weeks. Two business education departments in the 200-500 enrollment range offered a separate course with both entitled Introduction to Data Processing. Each course was one semester in duration.

In the over 500 enrollment classification, a total of twelve data processing course titles were given and ranged in length from

Table 14

REASONS FOR EXCLUSION OF DATA PROCESSING OFFERINGS
IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75-200 No/%	200-500 No/%	Over 500 No/%	Total No/%
Lack of interest by students	11/ 12.94	7/ 6.80	1/ 2.04	2/ 11.11	21/ 8.30
Lack of concern by administration	3/ 3.53	10/ 9.70	4/ 8.16	2/ 11.11	19/ 7.51
Lack of qualified teachers	7/ 8.24	16/ 15.54	7/ 14.29	4/ 22.22	34/ 13.44
Lack of available equipment	17/ 20.00	27/ 26.21	13/ 26.53	3/ 16.67	60/ 23.72
Lack of available materials	12/ 14.12	16/ 15.54	7/ 14.29	1/ 2.04	36/ 14.23
Cost involved	25/ 29.41	24/ 23.30	12/ 24.49	4/ 22.22	65/ 25.69
Other	10/ 11.76	3/ 2.91	3/ 10.20	2/ 11.11	18/ 7.11
Totals	85/100.00	103/100.00	49/100.00	18/100.00	253/100.00

one semester through four semesters. Six of these courses were offered by one school. Introduction to Data Processing was indicated by four schools as the title of their data processing course. The two courses listed in the other response were entitled Data Processing and Getting to Computers.

Six business education departments indicated that the title of their data processing course was Introduction to Data Processing. Five were one-semester courses and one was for two semesters. The title Business Data Processing Applications was mentioned by two departments with one being two semesters in length and the other four semesters. Introduction to Computers was a one-semester course mentioned by one school. The titles Computer Programming and Computer Programming and Systems were listed by one school and each was a four-semester course. One school offered a one-semester course entitled Implications of Computers. The three courses indicated in the other response were all one-semester courses and entitled Data Processing and Getting to Computers. Finally, one school offered a nine-week course entitled Unit Record Equipment. The statistics for course titles are presented in Table 15.

As indicated in Table 16, ten one-semester courses in data processing were offered in the state of Montana during the school year of 1975-1976 in business education departments. One of these was in the under 75 enrollment classification, two in the 200-500 category,

Table 15

TITLES OF SEPARATE DATA PROCESSING COURSE(S)
IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75–200 No/%	200–500 No/%	Over 500 No/%	Total No/%
Introduction to Data Processing	0/ 0	0/ 0	2/ 25.00	4/ 22.21	6/ 10.35
Basic Data Processing	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
Business Data Processing Applications	0/ 0	0/ 0	0/ 0	2/ 11.11	2/ 3.45
Introduction to Computers	0/ 0	0/ 0	0/ 0	1/ 5.56	1/ 1.72
Unit Record Equipment	0/ 0	1/ 7.14	0/ 0	0/ 0	1/ 1.72
Computer Programming	0/ 0	0/ 0	0/ 0	1/ 5.56	1/ 1.72
Computer Programming and Systems	0/ 0	0/ 0	0/ 0	1/ 5.56	1/ 1.72
Implications of Computers	0/ 0	0/ 0	0/ 0	1/ 5.56	1/ 1.72
Other	1/ 5.56	0/ 0	0/ 0	2/ 11.11	3/ 5.08
No Separate Course	17/ 94.44	13/ 92.86	6/ 75.00	6/ 33.33	42/ 72.42
Totals	18/100.00	14/100.00	8/100.00	18/100.00	58/100.00

and seven in the over 500 range. In the over 500 category, two two-semester data processing courses were offered and three four-semester courses. The one response in the other category was a nine-week course.

Table 16

LENGTH OF SEPARATE DATA PROCESSING COURSE(S) IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75-200 No/%	200-500 No/%	Over 500 No/%	Total No/%
1 semester	1/ 5.56	0/ 0	2/ 25.00	7/ 38.89	10/ 17.24
2 semesters	0/ 0	0/ 0	0/ 0	2/ 11.11	2/ 3.45
3 semesters	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
4 or more semesters	0/ 0	0/ 0	0/ 0	3/ 16.67	3/ 5.17
Other	0/ 0	1/ 7.14	0/ 0	0/ 0	1/ 1.72
No separate course	17/ 94.44	13/ 92.86	6/ 75.00	6/ 33.33	42/ 72.42
Totals	18/100.00	14/100.00	8/100.00	18/100.00	58/100.00

Areas of Study Covered In Data Processing Courses

Of the twelve business education departments in Montana offering a separate course in data processing instruction, the areas of study covered within the course or courses covered by all departments included flowcharting and input/output devices. Ten departments presented the areas of job opportunities and business data processing

applications within their courses. Programming and numbering systems were included in the course content of nine departments. The unit record system was taught in the courses of eight departments and computer applications in other areas in six departments. Only five departments included in their data processing course the social implications of computers. In addition, systems analysis was taught in only three of the responding business education departments.

Table 17 presents the data gathered from this question.

Computer Programming Languages Offered in the Data Processing Program

The three languages offered by the responding business education departments were FORTRAN, BASIC, and COBOL. Ten departments or 28.57 percent taught the BASIC computer programming language in their data processing programs. This was followed by five departments offering the COBOL language and four teaching FORTRAN.

The BASIC language was offered by two departments in the 75-200 enrollment classification, three in the 200-500 range, and five in the over 500 category. Three departments in the 200-500 enrollment category and two in the over 500 range offered COBOL. FORTRAN was taught by one department in the 75-200 class and three departments in the over 500 enrollment classification.

The statistics for the computer programming languages is documented in Table 18.

Table 17

AREAS OF STUDY COVERED IN DATA PROCESSING COURSES
OFFERED IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75–200 No/%	200–500 No/%	Over 500 No/%	Total No/%
Unit Record System	1/ 11.11	1/ 12.50	2/ 18.18	4/ 7.14	8/ 9.52
Flowcharting	1/ 11.11	2/ 25.00	2/ 18.18	7/ 12.50	12/ 14.29
Input/Output Devices	1/ 11.11	2/ 25.00	2/ 18.18	7/ 12.50	12/ 14.29
Programming	1/ 11.11	1/ 12.50	0/ 0	7/ 12.50	9/ 10.71
Job Opportunities	1/ 11.11	1/ 12.50	1/ 9.10	7/ 12.50	10/ 11.91
Systems Analysis	0/ 0	0/ 0	1/ 9.10	2/ 3.57	3/ 3.57
Business Data Processing Applications	1/ 11.11	1/ 12.50	1/ 9.10	7/ 12.50	10/ 11.91
Numbering Systems (Octal, Binary, etc.)	1/ 11.11	0/ 0	2/ 18.18	6/ 10.71	9/ 10.71
Computer Applications in Other Areas	1/ 11.11	0/ 0	0/ 0	5/ 8.93	6/ 7.14
Social Implications of Computers	1/ 11.11	0/ 0	0/ 0	4/ 7.14	5/ 5.95
Other	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
Totals	9/100.00	8/100.00	11/100.00	56/100.00	84/100.00

Table 18

COMPUTER PROGRAMMING LANGUAGES OFFERED IN THE DATA PROCESSING PROGRAMS OF THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75-200 No/%	200-500 No/%	Over 500 No/%	Total No/%
FORTRAN	0/ 0	1/ 16.67	0/ 0	3/ 23.08	4/ 11.42
BASIC	0/ 0	2/ 33.33	3/ 33.33	5/ 38.45	10/ 28.57
PL/1	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
COBOL	0/ 0	0/ 0	3/ 33.33	2/ 15.39	5/ 14.29
RPG	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
APL	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
Other	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
None	7/100.00	3/ 50.00	3/ 33.33	3/ 23.08	16/ 45.71
Totals	7/100.00	6/100.00	9/100.00	13/100.00	35/100.00

Data Processing Units in Other Business Courses

As can be seen in Table 19, the inclusion of data processing units in other business courses most frequently occurred in Bookkeeping/Accounting courses with 79 or 61.72 percent of the respondents indicating this arrangement. This was also the case in each enrollment classification with the under 75 listing 27 of the total, 27 in the 75-200 range, 15 in the 200-500 category, and 10 Bookkeeping/Accounting courses in the over 500 classification.

The Office Practice class was next with 18 departments indicating the offering of data processing instruction in this class. Units of data processing instruction were offered in the following

Table 19

DATA PROCESSING UNITS IN OTHER BUSINESS COURSES
IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75–200 No/%	200–500 No/%	Over 500 No/%	Total No/%
Bookkeeping/Accounting	27/ 69.23	27/ 61.36	15/ 60.00	10/ 50.00	79/ 61.72
Shorthand	0/ 0	1/ 2.27	0/ 0	1/ 5.00	2/ 1.56
Typing	3/ 7.70	1/ 2.27	0/ 0	0/ 0	4/ 3.14
Office Practice	6/ 15.39	6/ 13.64	2/ 8.00	4/ 20.00	18/ 14.06
Secretarial Practice	1/ 2.56	1/ 2.27	3/ 12.00	4/ 20.00	9/ 7.03
General Business	1/ 2.56	3/ 6.82	4/ 16.00	0/ 0	8/ 6.25
Business Math	1/ 2.56	1/ 2.27	0/ 0	0/ 0	2/ 1.56
Office Machines	0/ 0	2/ 4.55	0/ 0	1/ 5.00	3/ 2.34
Other	0/ 0	2/ 4.55	1/ 4.00	0/ 0	3/ 2.34
Totals	39/100.00	44/100.00	25/100.00	20/100.00	128/100.00

courses listed in order of frequency: Secretarial Practice, General Business, Typing, Office Machines, Business Math, and Shorthand.

In the other response Business Law and Basic Business were given as two other business courses in which data processing instruction was offered. One respondent indicated that a two-week unit was offered at the local telephone company.

Length of Data Processing Units in Other Business Courses

Fifty business education departments in the state of Montana offered a two-week unit in data processing instruction in other business courses. A three-week unit was part of the curriculum in thirty business education departments, and a one-week unit was offered by twenty-six departments. The one-week, two-week, and three-week units comprised a total of 106 or 82.82% of the total respondents. The remaining departments indicated eleven six-week units, nine four-week units, and two five-week units.

In the under 75 enrollment category, the predominant length of time for a data processing unit was two weeks. A three-week unit was most frequently mentioned in the 75-200 category. In the 200-500 and over 500 enrollment classification, the two-week unit of data processing instruction was listed most often.

Table 20

LENGTH OF DATA PROCESSING UNITS IN OTHER BUSINESS COURSES IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75-200 No/%	200-500 No/%	Over 500 No/%	Total No/%
1 week	10/ 25.64	10/ 22.73	2/ 8.00	4/ 20.00	26/ 20.32
2 weeks	18/ 46.16	11/ 25.00	13/ 52.00	8/ 40.00	50/ 39.06
3 weeks	6/ 15.39	12/ 27.27	5/ 20.00	7/ 35.00	30/ 23.44
4 weeks	3/ 7.69	1/ 2.27	5/ 20.00	0/ 0	9/ 7.03
5 weeks	1/ 2.56	1/ 2.27	0/ 0	0/ 0	2/ 1.56
6 or more weeks	1/ 2.56	9/ 20.45	0/ 0	1/ 5.00	11/ 8.59
Totals	39/100.00	44/100.00	25/100.00	20/100.00	128/100.00

Areas of Study in Units of Data Processing Instruction

The study of flowcharting was the most frequently mentioned topic taught by the responding departments that offered data processing units of instruction in other business courses. Fifty-nine departments indicated this instruction in their curriculums. The study of input/output devices was offered by fifty-eight departments, and the study of the unit record system was presented by forty-nine business education departments.

In each enrollment classification, the inclusion of flowcharting, input/output devices, and the unit record system were also the three main areas of study in data processing units of instruction.

The primary importance of flowcharting and input/output devices as an area of study was also indicated in the curriculums of those schools offering a separate data processing course as shown in Table 17 on page 69.

The statistics for the areas of study in units of data processing instruction are listed in Table 21.

Primary Objective of Data Processing Instruction

The overwhelming primary objective of the data processing instruction provided by the responding business education departments was to provide general knowledge about data processing. Sixty-nine or 60 percent of the total indicated this data processing instructional goal for their students, as indicated in Table 22.

Providing general knowledge about data processing was also the primary goal of the data processing instruction in each enrollment classification. This objective was indicated by 19 or 61.29 percent in the under 75 range, 24 or 64.86 percent in the 75-200 category, 12 or 63.16 in the 200-500 classification, and 14 or 50.00 percent in the over 500 enrollment.

The second most frequently listed data processing instructional goal mentioned by 24 or 20.87 percent of the respondents was to provide knowledge of business application of data processing. This was also the results in each enrollment classification.

Table 21

AREAS OF STUDY IN UNITS OF DATA PROCESSING INSTRUCTION IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75–200 No/%	200–500 No/%	Over 500 No/%	Total No/%
Unit Record System	12/ 15.19	19/ 17.59	11/ 22.00	7/ 17.50	49/ 17.69
Flowcharting	19/ 24.05	22/ 20.37	11/ 22.00	7/ 17.50	59/ 21.30
Input/Output Devices	16/ 20.25	22/ 20.37	12/ 24.00	8/ 20.00	58/ 20.93
Business Data Processing Applications	10/ 12.66	13/ 12.04	5/ 10.00	6/ 15.00	34/ 12.27
Numbering Systems (Binary, Octal, etc.)	7/ 8.86	12/ 11.11	3/ 6.00	4/ 10.00	26/ 9.39
Programming	5/ 6.33	3/ 2.78	2/ 4.00	2/ 5.00	12/ 4.33
Job Opportunities	8/ 10.13	9/ 8.33	4/ 8.00	3/ 7.50	24/ 8.67
Computer Applications in Other Areas	1/ 1.27	5/ 4.63	1/ 2.00	0/ 0	7/ 2.53
Social Implications of Computers	1/ 1.27	3/ 2.78	1/ 2.00	2/ 5.00	7/ 2.53
Other	0/ 0	0/ 0	0/ 0	1/ 2.50	1/ .36
Totals	79/100.00	108/100.00	50/100.00	40/100.00	277/100.00

Table 22

PRIMARY OBJECTIVE OF DATA PROCESSING INSTRUCTION
IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75–200 No/%	200–500 No/%	Over 500 No/%	Total No/%
Vocational preparation of students	2/ 6.45	1/ 2.70	0/ 0	2/ 7.14	5/ 4.35
Provide general knowledge about data processing	19/ 61.29	24/ 64.86	12/ 63.16	14/ 50.00	69/ 60.00
Provide acquaintanceship skill in equipment operation	0/ 0	3/ 8.11	2/ 10.53	2/ 7.14	7/ 6.09
Provide knowledge of business application of data processing	5/ 16.13	8/ 21.62	3/ 15.79	8/ 28.57	24/ 20.87
College preparatory for students planning to major in data processing	0/ 0	0/ 0	0/ 0	2/ 7.14	2/ 1.74
Other	1/ 3.23	1/ 2.70	0/ 0	0/ 0	2/ 1.74
No formal goal at present	4/ 12.90	0/ 0	2/ 10.53	0/ 0	6/ 5.22
Totals	31/100.00	37/100.00	19/100.00	28/100.00	115/100.00

Instructional Problems In Operating Data Processing Programs

The most frequently mentioned instructional problem according to 50 or 43.86 percent of the respondents was a lack of adequate equipment. This was also the results in each enrollment classification. The next most serious instructional problems were in keeping updated and arranging field experiences as reported by 16 or 14.04 percent of the business education departments. Curriculum development was also a concern to 14 or 12.28 percent of the departments.

Twelve or 10.53 percent of the departments provided other responses which included statements such as not enough material given in textbook, long distance to a larger community where equipment would be available, not enough time in curriculum, lack of student interest, lack of need-realization on part of students, and lack of trained personnel.

Table 23 lists the statistics as tabulated for this question.

PART III

FACILITIES AND EQUIPMENT

Data Processing Equipment Available for Instructional Purposes

Sixty-seven or 72.04 percent of the responding business education departments did not have data processing equipment available for instructional purposes. Over 80 percent of the respondents in each enrollment category except the over 500 also reported having no data

Table 23

INSTRUCTIONAL PROBLEMS IN OPERATING DATA PROCESSING PROGRAMS IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75–200 No/%	200–500 No/%	Over 500 No/%	Total No/%
Curriculum Development	4/ 14.81	4/ 9.76	2/ 8.33	4/ 18.18	14/ 12.28
Scheduling students on equipment	0/ 0	0/ 0	0/ 0	3/ 13.64	3/ 2.63
Equipment outdated	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
Selecting students for program	1/ 3.70	0/ 0	0/ 0	0/ 0	1/ .88
Evaluating students' work in class	0/ 0	1/ 2.44	1/ 4.17	0/ 0	2/ 1.75
Keeping updated	2/ 7.41	6/ 14.63	6/ 25.00	2/ 9.09	16/ 14.04
Lack of adequate equipment	12/ 44.44	21/ 51.22	10/ 41.67	7/ 31.82	50/ 43.86
Arranging field experiences	6/ 22.22	4/ 9.76	3/ 12.50	3/ 13.64	16/ 14.04
Other	2/ 7.41	5/ 12.20	2/ 8.33	3/ 13.64	12/ 10.53
Totals	27/100.00	41/100.00	24/100.00	22/100.00	114/100.00

processing equipment. Six or 28.57 percent of the over 500 enrollment category indicated having no equipment available for instructional purposes.

Seven departments mentioned having the keypunch available with five of these being in the over 500 enrollment. A remote time-sharing terminal was available to seven business education departments with six of these being in the over 500 enrollment. The two other responses indicated the use of a keypunch simulator.

The data for this question is reported in Table 24.

Location of the Computer Used by the Business Education Department

In the under 75 enrollment classification, two business education departments reported having the use of a computer located in a community college or vocational school, and one department in the 75-200 category used a computer located in a community college or vocational school. No department in the 200-500 enrollment indicated having a computer available. In the over 500 range the available computers were located in the following places: community college or vocational school, college or university, business education department, another department in the school, and a time-sharing computer service center.

Five of the total respondents reported that the computers used by their departments were located in the community college or

Table 24

DATA PROCESSING EQUIPMENT AVAILABLE FOR INSTRUCTIONAL PURPOSES IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75–200 No/%	200–500 No/%	Over 500 No/%	Total No/%
Keypunch	1/ 3.33	1/ 3.57	0/ 0	5/ 23.81	7/ 7.53
Verifier	0/ 0	1/ 3.57	0/ 0	1/ 4.76	2/ 2.15
Sorter	0/ 0	0/ 0	0/ 0	1/ 4.76	1/ 1.08
Collator	1/ 3.33	0/ 0	0/ 0	0/ 0	1/ 1.08
Accounting machines	1/ 3.33	1/ 3.57	1/ 7.14	0/ 0	3/ 3.23
Independent computer	0/ 0	0/ 0	0/ 0	2/ 9.52	2/ 2.15
Reproducer	1/ 3.33	0/ 0	0/ 0	0/ 0	1/ 1.08
Interpreter	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
Remote time-sharing terminal	0/ 0	1/ 3.57	0/ 0	6/ 28.57	7/ 7.53
Other	0/ 0	1/ 3.57	1/ 7.14	0/ 0	2/ 2.15
None available	26/ 86.67	23/ 82.14	12/ 85.71	6/ 28.57	67/ 72.04
Totals	30/100.00	28/100.00	14/100.00	21/100.00	93/100.00

vocational school. Fifty-six departments responded that no computer was available for the use of their students.

The statistics regarding the location of the computer used by the students in the business education department are presented in Table 25.

Location of Data Processing Equipment Other than the Computer

Eleven or 15.71 percent of the business education departments reported that the equipment other than the computer was located in the business education department. Four departments indicated that it was maintained in another department in the school. Forty-nine or 70 percent responded that their department had no equipment available.

In the under 75 enrollment, the equipment was located in one business office, one business education department, and two community colleges or vocational schools. Three business education departments and one business office maintained the equipment used by the business education department in the 75-200 classification. In the 200-500 enrollment range, the data processing equipment other than the computer was housed in one school administration office, two business education departments, and one community college or vocational school. Five business education departments and four school administration offices maintained the data processing equipment in the over 500 enrollment classification. Table 26 contains the data for this question.

Table 25

LOCATION OF THE COMPUTER USED BY THE STUDENTS
IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75–200 No/%	200–500 No/%	Over 500 No/%	Total No/%
Business office	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
Government office	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
School administration office	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
Business education department	0/ 0	0/ 0	0/ 0	1/ 9.09	1/ 1.52
Another department in the school	0/ 0	0/ 0	0/ 0	1/ 9.09	1/ 1.52
Another school in the community	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
Community college or vocational school	2/ 8.00	1/ 5.26	0/ 0	2/ 18.18	5/ 7.58
College or university	0/ 0	0/ 0	0/ 0	2/ 18.18	2/ 3.03
Time-sharing computer service	0/ 0	0/ 0	0/ 0	1/ 9.09	1/ 1.52
Other	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
None available	23/ 92.00	18/ 94.74	11/100.00	4/ 36.36	56/ 84.85
Totals	25/100.00	19/100.00	11/100.00	11/100.00	66/100.00

Table 26

LOCATION OF DATA PROCESSING EQUIPMENT (OTHER THAN THE COMPUTER) USED BY THE STUDENTS IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75–200 No/%	200–500 No/%	Over 500 No/%	Total No/%
Business office	1/ 3.85	1/ 5.00	0/ 0	0/ 0	2/ 2.86
Government office	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
School administration office	0/ 0	0/ 0	1/ 9.09	0/ 0	1/ 1.43
Business education department	1/ 3.85	3/ 15.00	2/ 18.18	5/ 38.46	11/ 15.71
Another department in the school	0/ 0	0/ 0	0/ 0	4/ 30.77	4/ 5.71
Another school in the community	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
Community college or vocational school	2/ 7.69	0/ 0	1/ 9.09	0/ 0	3/ 4.29
College or university	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
Time-sharing computer service	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
Other	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
None available	22/ 84.62	16/ 80.00	7/ 63.64	4/ 30.77	49/ 70.00
Totals	26/100.00	20/100.00	11/100.00	13/100.00	70/100.00

Access to Equipment by Students for Processing Programs

In response to this question, 53 or 80.30 percent of the business education departments reported no programming in their data processing programs. Of those departments with programming, three indicated that students were transported to the equipment for processing of their programs. Four departments reported having a remote terminal located in the department, and two departments indicated having an independent computer in the business education department. Programs were transported through the mail by one department, and three departments responsed that their programming was done without the aid of the computer.

In the under 75 enrollment classification, two departments transported students to process programs. One department in the 75-200 range performed programming without the aid of the computer. One department in the 200-500 category transported students, and one department transported programs through the mail. In the over 500 range, four departments possessed a remote terminal in the department for processing programs, two departments maintained independent computers, and two departments programmed without the aid of the computer.

Table 27 presents the statistics gathered for this question.

Table 27

ACCESS TO EQUIPMENT BY STUDENTS FOR PROCESSING PROGRAMS
IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75–200 No/%	200–500 No/%	Over 500 No/%	Total No/%
Transport students	2/ 7.69	0/ 0	1/ 8.33	0/ 0	3/ 4.55
Transport data by courier	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
Remote terminal in department	0/ 0	0/ 0	0/ 0	4/ 36.36	4/ 6.06
Independent computer in department	0/ 0	0/ 0	0/ 0	2/ 18.18	2/ 3.03
Transport data by mail	0/ 0	0/ 0	1/ 8.33	0/ 0	1/ 1.52
Programming done without aid of computer	0/ 0	1/ 5.88	0/ 0	2/ 18.18	3/ 4.55
Other	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
No programming	24/ 92.31	16/ 94.12	10/ 83.33	3/ 27.27	53/ 80.30
Totals	26/100.00	17/100.00	12/100.00	11/100.00	66/100.00

PART IV

TEACHER QUALIFICATIONS

Instructors Qualified to Teach Data Processing

The use of the term "qualified instructor" in this question was left to the interpretation of the department chairman. A total of 70 instructors qualified to teach data processing was reported by the 93 business education departments responding to this question. Twenty-seven departments listed one qualified instructor, eleven departments reported two qualified instructors in the department, three respondents indicated three qualified instructors within the department, and three business education departments reported four qualified instructors.

The under 75 enrollment classification mentioned a total of nine qualified instructors, the 75-200 range a total of 21, the 200-500 a total of 12, and the over 500 a total of 28.

Forty-nine or 52.69 percent of the responding business education departments reported no instructors within the department qualified to teach data processing instruction. The under 75 enrollment listed 21 of these departments with no qualified instructors, the 75-200 reported 17 departments, the 200-500 indicated eight departments, and the over 500 responded that three departments had no qualified instructors.

Table 28

INSTRUCTORS QUALIFIED TO TEACH DATA PROCESSING
IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75-200 No/%	200-500 No/%	Over 500 No/%	Total No/%
One	7/ 24.14	12/ 36.36	5/ 31.25	3/ 20.00	27/ 29.03
Two	1/ 3.45	3/ 9.09	2/ 12.50	5/ 33.33	11/ 11.83
Three	0/ 0	1/ 3.03	1/ 6.25	1/ 6.67	3/ 3.23
Four	0/ 0	0/ 0	0/ 0	3/ 20.00	3/ 3.23
Five or more	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
None qualified	21/ 72.41	17/ 51.52	8/ 50.00	3/ 20.00	49/ 52.69
Totals	29/100.00	33/100.00	16/100.00	15/100.00	93/100.00

Qualified Instructors' Background for Teaching Data Processing

Forty-two or 51.85 percent of the total business education departments responding to this question indicated that the qualified instructors in their department acquired the background for teaching data processing from college classes. The under 75 enrollment range reported ten or 58.82 percent of these, the 75-200 listed 15 or 57.70 percent, the 200-500 reported 6 or 46.15 percent, and the over 500 responded with 11 or 44.00 percent obtained their background from college classes.

Fourteen business education departments indicated that their data processing instructors were self-taught. This included four from the

under 75 enrollment, five from the 75-200 range, two from the 200-500 category, and three from the over 500 classification.

The data processing instructors in thirteen business education departments obtained the background for teaching data processing by attending workshops. The under 75 enrollment reported two of these, the 75-200 listed two, the 200-500 responded with four, and the over 500 mentioned five.

In respective order the remaining methods of acquiring the background for teaching data processing were work experience in the field, attended manufacturer's school, and attended vocational-technical school.

Table 29 tabulates the data gathered for this question.

Credit Hours of College Preparation in Data Processing

Four through seven hours of college credit in data processing was acquired by the instructors in 28 or 45.90 percent of the responding business education departments. Twenty or 32.79 percent of the departments indicated that the instructors had from zero through three credits. The data processing instructors in five departments had from eight through eleven credits; the instructors in five departments had more than 20 credits; twelve through fifteen credits were reported by two departments; and sixteen through nineteen credits were listed by one department.

Table 29

QUALIFIED INSTRUCTORS' BACKGROUND FOR TEACHING DATA PROCESSING IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75–200 No/%	200–500 No/%	Over 500 No/%	Total No/%
College classes	10/ 58.82	15/ 57.70	6/ 46.15	11/ 44.00	42/ 51.85
Attended workshops	2/ 11.76	2/ 7.69	4/ 30.77	5/ 20.00	13/ 16.05
Attended manufacturer's school	0/ 0	0/ 0	0/ 0	3/ 12.00	3/ 3.70
Work experience in the field	0/ 0	4/ 15.38	1/ 7.69	3/ 12.00	8/ 9.88
Self-taught	4/ 23.53	5/ 19.23	2/ 15.38	3/ 12.00	14/ 17.23
Vocational-technical school	1/ 5.88	0/ 0	0/ 0	0/ 0	1/ 1.23
Other	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
Totals	17/100.00	26/100.00	13/100.00	25/100.00	81/100.00

In the under 75 enrollment classification, six instructors had from zero through three credits; nine instructors had from four through seven credits, and one had from eight through eleven credits. Seven instructors in the 75-200 range reported zero through three credits, eleven instructors with four through seven credits, one instructor with eight through eleven credits, and one instructor with sixteen through nineteen. In the 200-500 classification, three instructors had zero through three credits; three instructors had four through seven credits; two instructors had eight through eleven; and one had twelve through fifteen credits. The over 500 enrollment category reported four instructors with zero through three credits, five instructors with four through seven, one instructor with eight through eleven, one instructor with sixteen through nineteen, and five instructors with more than 20 credits.

Table 30 documents the statistics resulting from this question.

Table 30

CREDIT HOURS OF COLLEGE PREPARATION IN DATA PROCESSING OF INSTRUCTORS IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75-200 No/%	200-500 No/%	Over 500 No/%	Total No/%
0 - 3	6/ 37.50	7/ 35.00	3/ 33.33	4/ 25.00	20/ 32.79
4 - 7	9/ 56.25	11/ 55.00	3/ 33.33	5/ 31.25	28/ 45.90
8 - 11	1/ 6.25	1/ 5.00	2/ 22.23	1/ 6.25	5/ 8.20
12 - 15	0/ 0	0/ 0	1/ 11.11	1/ 6.25	2/ 3.28
16 - 19	0/ 0	1/ 5.00	0/ 0	0/ 0	1/ 1.64
More than 20	0/ 0	0/ 0	0/ 0	5/ 31.25	5/ 8.20
Totals	16/100.00	20/100.00	9/100.00	16/100.00	61/100.00

Methods Used by Data Processing Instructors to Keep Up to Date

Twenty-four or 26.67 percent of the total responding business education departments reported that their data processing instructors kept up to date by attending summer school courses or workshops. Four of these were reported from the under 75 enrollment classification, eight from the 75-200 range, five from the 200-500 category, and seven from the over 500 enrollment.

The second most frequently mentioned method for keeping up to date in data processing and indicated by 21 or 23.33 percent of the total was the reading of data processing periodicals. The under 75 reported three of these, five from the 75-200 range, five from the 200-500 category, and eight from the over 500 enrollment.

Listed in respective order, the following methods were also reported as means of keeping up to date in current changes in data processing: professional organizations, on mailing lists of equipment manufacturers, attended meetings of data processing organizations, summer work experience in data processing, manufacturers' schools, and adult education.

The other responses pertaining to keeping up to date in data processing included such statements as using an advisory committee and reading business magazines. Several instructors mentioned that they kept up to date through the material in the textbook, and several indicated that they did not keep up to date.

The data for this question is presented in Table 31.

Table 31

METHODS USED TO KEEP UP TO DATE BY DATA PROCESSING INSTRUCTORS IN THE BUSINESS EDUCATION DEPARTMENT

Responses	ENROLLMENT CLASSIFICATION				
	Under 75 No/%	75–200 No/%	200–500 No/%	Over 500 No/%	Total No/%
Data processing periodicals	3/ 17.65	5/ 20.83	5/ 31.25	8/ 24.24	21/ 23.33
Attend meetings of data processing organizations	1/ 5.88	1/ 4.17	1/ 6.25	3/ 9.09	6/ 6.67
On mailing lists of equipment manufacturers	3/ 17.65	3/ 12.50	0/ 0	3/ 9.09	9/ 10.00
Summer work experience in data processing	1/ 5.88	1/ 4.17	1/ 6.25	1/ 3.03	4/ 4.44
Summer school courses or workshops	4/ 23.53	8/ 33.33	5/ 31.25	7/ 21.21	24/ 26.67
Adult education	0/ 0	0/ 0	0/ 0	1/ 3.03	1/ 1.11
Vocational-technical school	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0
Manufacturers' schools	0/ 0	0/ 0	0/ 0	2/ 6.06	2/ 2.22
Professional organizations	3/ 17.65	1/ 4.17	1/ 6.25	6/ 18.18	11/ 12.22
Other	2/ 11.76	5/ 20.83	3/ 18.75	2/ 6.06	12/ 13.33
Totals	17/100.00	24/100.00	16/100.00	33/100.00	90/100.00

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The primary objective of this study was to examine the data processing instruction in the business education departments in the public secondary schools of Montana during the 1975-76 school year.

Continuous evaluation of the business education curriculum is of primary importance in this age of constantly changing technology, therefore, it is imperative that business departments examine and evaluate their programs in order to keep up to date and meet the needs of their students.

There is a lack of knowledge and agreement among educators regarding the purpose of data processing instruction in the secondary schools. Studies such as the one conducted by the researcher are important to help administrators and business education departments clarify the role of data processing instruction in the business education curriculum.

A search of related literature was made, and the significant findings and conclusions are presented in Chapter II of this study. Based on this review of selected literature, a questionnaire survey was designed to obtain information concerning the status of data processing instruction in the business education departments of Montana's secondary schools. A letter of explanation and the

questionnaire were mailed to 173 business education departments in the public secondary schools of which 152 or 87.86 percent responded.

SUMMARY

The summary of the findings of this study are reported in this chapter according to the four divisions of the questionnaire and utilized in Chapter IV to analyze and present the data received from the business education departments. The four section headings included General Information, Course Content, Facilities and Equipment, and Teacher Qualifications.

General Information

The significant findings under general information included the following:

1. Twelve or 7.90 percent of the business education departments of the public high schools in the state of Montana during the school year 1975-1976 offered a separate course in data processing instruction. One of these courses was in the under 75 enrollment, two in the 75-200, two in the 200-500, and seven in the over 500 enrollment range. Three or 1.97 percent of the departments offered one-year programs in data processing, and two or 1.32 percent offered two-year programs. The one and two-year programs were all in the over 500 enrollment category. Departments anticipating the inclusion of a separate data

processing course during 1976-1978 were 20 or 14.39 percent.

2. A majority of the respondents, 84 or 55.26 percent, indicated that they offered a unit in data processing in some other business course in the business education curriculum. Twenty-six of these departments were in the under 75 enrollment classification, 34 in the 75-200, 15 in the 200-500, and nine in the over 500 category. Thirty-seven or 45.68 percent of the departments anticipated adding a unit of data processing instruction in another business course during 1976-1978.

3. Instruction in the use of the computer was a part of the data processing programs in 29 or 19.33 percent of the respondents with the under 75 enrollment reporting seven of these, ten in the 75-200, five in the 200-500, and seven in the over 500 enrollment. Plans to institute computer instruction over the five year period of 1976-1981 were reported by 27 business education departments.

4. Although data processing instruction was offered at all high school grade levels, the curriculum was directed to the junior and senior grades with 150 or 73.17 percent of the respondents indicating instruction at these grade levels.

5. A majority of the respondents, 87 or 57.24 percent, specified that the business department had the responsibility for data processing instruction. In addition, departmental control of the data processing equipment was maintained by 51 or 43.59 percent of the business

education departments.

6. The basic reason for not including data processing instruction in the business education curriculum as reported by 65 or 25.69 percent of the total respondents was cost. Lack of available equipment and lack of available materials were given as the second and third most frequently mentioned reasons for excluding data processing instruction.

Course Content

An analysis of the responses concerning course content revealed the following information:

1. Introduction to Data Processing was the most frequently listed separate course title as reported by six or 10.35 percent of the business education departments. Two of these were in the 200-500 enrollment and four in the over 500 enrollment classification. The most common length of the separate data processing course was for one-semester.

2. Of the twelve business education departments in Montana offering a separate course or courses in data processing instruction, the areas of study covered by all departments included flowcharting and input/output devices. Job opportunities and business data processing applications were the next areas of study covered most frequently.

3. The three languages offered by the responding business education departments were BASIC (28.57 percent), COBOL (14.29 percent),

and FORTRAN (11.42 percent).

4. The inclusion of data processing units in other business courses occurred most frequently in Bookkeeping/Accounting courses with 79 or 61.72 percent of the respondents indicating this arrangement. This was also the situation in each enrollment classification.

5. A two-week unit in another business course was the most frequently mentioned length of a data processing unit as reported by 50 or 39.06 percent of the respondents. Each enrollment classification indicated a similar finding.

6. The primary areas of study in units of data processing instruction were flowcharting (21.30 percent), input/output devices (20.93 percent), and the unit record system (17.69 percent). These were also the three main areas of study in each enrollment category.

7. Providing students with a general knowledge about data processing was the primary objective of the data processing instruction as indicated by 69 or 60.00 percent of the respondents. Vocational preparation was the objective for only 5 or 4.35 percent of the business education department.

8. The most frequently mentioned instructional problem according to 50 or 43.86 percent of the responding departments was a lack of adequate equipment. This was also the results in each enrollment classification.

Facilities and Equipment

A summary of the responses to questions concerning facilities and equipment is given below:

1. The majority of the responding business education departments as indicated by 67 or 72.04 percent did not have any data processing equipment available for instructional purposes. The respondents in each of the enrollment classifications except the over 500 reported over 80 percent as having no data processing equipment. Of the 27.96 percent having some equipment, the keypunch and remote time-sharing terminal were most frequently listed.

2. The community college or vocational school was the location mentioned most frequently by those departments having a computer available for instructional purposes. Over 80 percent of the departments reported having no computer available for the use of their students.

3. Eleven or 15.71 percent of the departments indicated that the data processing equipment other than the computer was located in the business education department.

4. Over 80 percent of the responding business departments reported no programming in their data processing programs. Of those departments having programming, various means of access to the equipment for programming purposes were reported, but the most frequently indicated method was the use of a remote terminal located in the

business education department.

Teacher Qualifications

The major findings to the questions in this section were the following:

1. A total of 70 instructors qualified to teach data processing were reported by the responding business education departments. About 30 percent of the departments listed one qualified instructor. Over 50 percent of the respondents indicated that none of the business education teachers were qualified to teach data processing.

2. Forty-two or 51.85 percent of the business education departments responding to this question indicated that the qualified instructors in their department acquired the background for teaching data processing from college classes.

3. The credit hours of college preparation in data processing taken most often by instructors in the business education department were four to seven hours as reported by 28 or 45.90 percent of the respondents.

4. The most frequently mentioned ways of keeping up to date in data processing were by summer school courses or workshops (26.67 percent) and reading data processing periodicals (23.33 percent).

CONCLUSIONS

Based on the data gathered and analyzed for this study, the following conclusions were derived and are listed according to General Information, Course Content, Facilities and Equipment, and Teacher Qualifications.

General Information

The following conclusions were drawn from the findings in the general information section:

1. Although at the time of this study, a significant percentage of the business education departments in the public secondary schools of Montana did not offer any form of data processing instruction, a large number of departments anticipate the inclusion of such instruction by 1978.

2. The business education departments that offered data processing instruction did so primarily in the form of a unit in another business course.

3. Instruction in the use of the computer was offered by only a small percentage of the business education departments but an equal percentage anticipated adding computer instruction by 1981.

4. Data processing offerings were opened primarily to the upper two grade levels of secondary schools.

4. A majority of the respondents specified that the business

education department had the principal responsibility for data processing instruction as well as maintaining control of the data processing equipment.

6. Cost was the major reason for business education departments not including data processing instruction in their curriculums.

Course Content

The conclusions derived in this section concern the course content of data processing instruction.

1. Of those departments offering separate data processing courses, the title that occurred most often was Introduction to Data Processing.

2. One semester was the most common length of the separate data processing course.

3. The study of flowcharting and input/output devices was considered of significant importance in all of the business education departments offering separate courses as well as by the majority of of departments offering a unit of instruction.

4. BASIC, COBOL, and FORTRAN were the principal languages taught in the responding business education departments.

5. Data processing units were offered most frequently in the business course offering of Bookkeeping/Accounting.

6. A two-week unit was the most common length of a data

processing unit in another business course.

7. The primary objective of the business education departments that offered data processing instruction was to provide students with a general knowledge of data processing.

8. Lack of adequate equipment presented the major instructional problem to business education departments.

Facilities and Equipment

Conclusions concerning facilities and equipment are listed below:

1. The majority of responding business education departments did not have any data processing equipment available for instructional purposes. Of those departments that did have available equipment, the keypunch and remote time-sharing terminal were listed most frequently.

2. Most business education departments did not have a computer available for instructional purposes, but for those departments that did, it was located most often in the community college or vocational school.

3. The data processing equipment, other than the computer, was located most often in the business education department.

4. The most frequently mentioned access to equipment for programming purposes by the small percentage of departments that offered programming was through the remote terminal located in the business education department.

Teacher Qualifications

The conclusions derived from the questions on teacher qualifications are the following:

1. Many business education departments indicated one or more instructors qualified to teach data processing. A significant percentage, however, reported no instructors qualified to teach data processing.

2. The primary method of preparation for teaching data processing was through college classes.

3. Four through seven hours were the most common number of college credit hours taken by the instructors of data processing.

4. Most instructors of data processing attempted to keep up to date by attending summer courses or workshops and reading data processing periodicals.

RECOMMENDATIONS

Based on the findings of this study and the resulting conclusions, the following recommendations seem appropriate:

1. It is recommended that business educators and school administrators in Montana be made aware of the need for teaching data processing concepts in some form in the business education curriculum through summer workshops, inservice training, and other means.

2. It is recommended that guidelines for a data processing

curriculum be established by business educators and administrators in conjunction with the State Department of Instruction and institutions of higher education in the state of Montana.

3. Of significant importance is the recommendation that data processing instruction should be offered in some form to all students in the business education departments of the public secondary schools in Montana.

4. High school administrators and business educators need to exert more efforts to initiate programs in data processing instruction and to update existing programs.

5. All business education departments in the state should carefully examine their programs to determine the feasibility of including a separate course in data processing concepts in the curriculum; but where this is not practical, especially in small high schools, consideration should be given to offering such instruction as a unit in another business course.

6. Even though data processing equipment is not essential to the teaching of data processing concepts, business education departments should investigate every possible means including leasing, time-sharing, or purchasing in order to expose students to data processing equipment.

7. Where other departments in the school have responsibility for the data processing instruction and control of the equipment, the

business education department should work with those departments in planning the data processing curriculum.

8. Institutions of higher learning in the state should re-examine their teacher preparation programs in business education to insure that future business teachers are receiving the skills and methodology necessary for teaching data processing.

9. Local community and state surveys should be conducted to determine the need for vocational data processing courses in the business education department.

10. Additional study is needed in the following areas of data processing instruction to:

a. Determine if the data processing programs now in operation are doing an effective job both in terms of general and vocational education.

b. Determine how available data processing equipment can best be utilized by all users to obtain the fullest benefits.

c. Conduct an in-depth analysis of course offerings in the field of data processing.

d. Determine what should be the responsibility of the various institutions of learning regarding data processing instruction.

e. Determine the needs of business and industry in data processing as a basis for curriculum development.

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APPENDICES

APPENDIX A

The impact of data processing is being felt by many business teachers in Montana, as well as throughout the United States. I am sure you, like many other business teachers, feel a need to prepare young people to live and work in this age of automation.

In partial fulfillment of a Master of Science Degree in Business Education, I am conducting a study to determine the status of data processing instruction in the business education curriculums in the public high schools in Montana. Specifically, I am interested in determining if any type of data processing instruction is offered in the business education department. This instruction might include a separate course or a unit in another business course with or without the use of equipment. In addition, I am interested in the courses and units being offered, the course content, facilities and equipment used for instruction, teacher qualifications, and future plans. The results of this study should be of value to educators in updating present programs.

Won't you please take a few minutes to complete the enclosed questionnaire. Responses will not be identified with any school or individual. When the study is completed, a summary of the findings will be sent to any person desiring a copy.

I would be grateful if you would supply the necessary information and return the questionnaire by March 5 in the enclosed self-addressed, stamped envelope. Thank you for your cooperation.

Sincerely yours,

Mrs. Joan Kerley

Daniel G. Hertz

Dr. Daniel G. Hertz, Chairman
Business Education Department

Encs. (2)

APPENDIX B

A short time ago, I sent you a questionnaire concerning data processing instruction in the business education department of the secondary school. If you have already completed and returned the questionnaire, I would like to take this opportunity to thank you. If you have not had the time to complete it, please do so as soon as possible.

Your support is essential to the success of this research project. The few minutes needed to complete the questionnaire will assure this success.

For your convenience another questionnaire and stamped envelope are enclosed. Your reply by March 19 will be greatly appreciated.

Thank you for your cooperation.

Sincerely,

Mrs. Joan Kerley

Daniel G. Hertz

Dr. Daniel G. Hertz, Chairman
Business Education Department

Encs. (2)

A SURVEY OF DATA PROCESSING INSTRUCTION
IN THE BUSINESS EDUCATION CURRICULUMS
OF THE SECONDARY PUBLIC SCHOOLS IN MONTANA

For purposes of this questionnaire, data processing is defined as: (1) a separate course(s) without the use of the computer and/or terminal, (2) units of instruction in any business course(s) without the use of the computer and/or terminal, and (3) course(s) and/or unit(s) utilizing the computer.

APPENDIX C

PLEASE CHECK THE APPROPRIATE RESPONSE(S) FOR EACH OF THE FOLLOWING QUESTIONS AS THEY APPLY ONLY TO THE BUSINESS EDUCATION DEPARTMENT.

PART I - GENERAL INFORMATION

1. Indicate the number of students presently enrolled in your high school?

   Under 75 _____ 75 - 200 _____ 200 - 500 _____ Over 500 _____

2. Does the business education department currently offer a course(s) in data processing concepts?

   Yes _____ No _____

3. Does the business education department offer a one-year program in data processing instruction?

   Yes _____ No _____

4. Does the business education department offer a two-year program in data processing instruction?

   Yes _____ No _____

5. If your department does not offer a separate course(s) in data processing, do you anticipate that the department will offer such courses within the next two years?

   Yes _____ No _____

6. Does the business education department currently offer a unit(s) of data processing instruction in any other business course(s) in the department?

   Yes _____ No _____

7. If the department does not offer a unit(s) in data processing in any other business course, do you anticipate that the department will offer such units within the next two years?

   Yes _____ No _____

8. Does the business education department currently offer instruction in the use of the computer either in a separate course or as a unit in another business course?

   Yes _____ No _____

9. If the business education department does not offer instruction in the use of the computer, when do you plan to do so?

   Next year _____ Within 3 years _____ Within 5 years _____
   Within 2 years _____ Within 4 years _____ Not in future plans _____

10. Data processing instruction is or will be offered at what instructional level(s)?

    Freshman _____ Sophomore _____ Junior _____ Senior _____ None _____

(OVER)

11. Which department(s) in your school has or will have responsibility for directing data processing instruction and equipment?

Instructional:		Equipment:	
Business	_____	Business	_____
Science	_____	Science	_____
Math	_____	Math	_____
Other (Explain)	_____	Other (Explain)	_____
None	_____	None	_____

12. If the business education department is not planning to offer data processing instruction either as a separate course or as a unit in other business courses, indicate the reason(s):

Lack of interest by students	_____	Lack of available materials	_____
Lack of concern by administration	_____	Cost involved	_____
Lack of qualified teachers	_____	Other (Explain)	_____
Lack of available equipment	_____		_____

IF THE BUSINESS EDUCATION DEPARTMENT OFFERS DATA PROCESSING INSTRUCTION EITHER AS A SEPARATE COURSE OR AS A UNIT IN ANOTHER COURSE (EXAMPLE: A UNIT IN ACCOUNTING) WITH OR WITHOUT EQUIPMENT, PLEASE COMPLETE THE REMAINDER OF THE QUESTIONNAIRE AND RETURN TO ME BY MARCH 5 IN THE ENCLOSED SELF-ADDRESSED, STAMPED ENVELOPE.

IF THE BUSINESS EDUCATION DEPARTMENT DOES NOT OFFER DATA PROCESSING INSTRUCTION IN ANY FORM, PLEASE STOP HERE AND RETURN THE QUESTIONNAIRE TO ME BY MARCH 5 IN THE ENCLOSED SELF-ADDRESSED, STAMPED ENVELOPE.

PART II - COURSE CONTENT

1. If the business education department offers a separate course(s) in data processing, what is the title of the course(s) and its length in semesters?

Introduction to Data Processing	_____	1	2	3	4 or more
Basic Data Processing	_____	1	2	3	4 or more
Business Data Processing Applications	_____	1	2	3	4 or more
Introduction to Computers	_____	1	2	3	4 or more
Unit Record Equipment	_____	1	2	3	4 or more
Computer Programming	_____	1	2	3	4 or more
Computer Programming and Systems	_____	1	2	3	4 or more
Implications of Computers	_____	1	2	3	4 or more
Other (List) _____	_____	1	2	3	4 or more
_____	_____	1	2	3	4 or more
No separate course	_____				

2. If you offer a separate course(s) in data processing, what areas of study are covered?

Unit Record System	_____	Business Data Processing Applications	_____
Flowcharting	_____	Numbering Systems (Binary, Octal, etc.)	_____
Input/Output Devices	_____	Computer Applications in Other Areas	_____
Programming	_____	Social Implications of Computers	_____
Job Opportunities	_____	Other (Explain)	_____
Systems Analysis	_____		_____

3. Which computer programming language(s) is taught in your data processing program?

Fortran	_____	Cobol	_____	Other (Explain)	_____
Basic	_____	RPG	_____	None offered	_____
PL/1	_____	APL	_____		

4. In which of the following business courses is there a unit of data processing instruction and what is its length in weeks?

Bookkeeping/Accounting	____	1	2	3	4	5	6 or more
Shorthand	____	1	2	3	4	5	6 or more
Typing	____	1	2	3	4	5	6 or more
Office Practice	____	1	2	3	4	5	6 or more
Secretarial Practice	____	1	2	3	4	5	6 or more
General Business	____	1	2	3	4	5	6 or more
Business Math	____	1	2	3	4	5	6 or more
Office Machines	____	1	2	3	4	5	6 or more
Other (List)_____	____	1	2	3	4	5	6 or more
_____		1	2	3	4	5	6 or more
_____		1	2	3	4	5	6 or more

None ____

5. If the business education department offers a unit(s) of data processing instruction in other business courses, what areas of study are covered? Also please indicate the courses in which the areas of study are covered?

Unit Record System	____	_____
Flowcharting	____	_____
Input/Output Devices	____	_____
Business Data Processing Applications	____	_____
Numbering Systems (Binary, Octal, etc.)	____	_____
Programming	____	_____
Job Opportunities	____	_____
Computer Applications in Other Areas	____	_____
Social Implications of Computers	____	_____
Other (Explain)_____	____	_____
_____		_____

6. What is the primary objective of the data processing instruction in the business education department?

Vocational preparation of students	____
Provide general knowledge about data processing	____
Provide acquaintanceship skill in equipment operation	____
Provide knowledge of business application of data processing	____
College preparatory for students planning to major in data processing	____
Other (Explain)	____
No formal goal at present	____

7. What instructional problems have you found most serious?

Curriculum development	____	Evaluating students' work in class	____
Scheduling students on equipment	____	Keeping updated	____
Equipment outdated	____	Lack of adequate equipment	____
Selecting students for program	____	Arranging field experiences	____

Other (Explain)_____

PART III - FACILITIES AND EQUIPMENT

1. Does the business education department have any of the following data processing equipment available for instructional purposes?

Keypunch	____	Accounting machines	____	Remote time-sharing terminal	____
Verifier	____	Independent computer	____	Other (Explain)_____	
Sorter	____	Reproducer	____	_____	
Collator	____	Interpreter	____	None available	____

(OVER)

2. What is the location of the computer used by the students in your department?

Business Office	____	Community college or vocational school	____
Government Office	____	College or university	____
School administration office	____	Time-sharing computer service center	____
Business education department	____	Other (Explain)_____	
Another department in the school	____	_____	
Another school in the community	____	None available	____

3. What is the location of the equipment (other than the computer) used by the students in the business education department?

Business office	____	Community college or vocational school	____
Government office	____	College or university	____
School administration office	____	Time-sharing computer service center	____
Business education department	____	Other (Explain)_____	
Another department in the school	____	_____	
Another school in the community	____	None available	____

4. How do the business education students have access to equipment for processing programs?

Transport students	____	Programming done without aid of computer	____
Transport data by courier	____	Other (Explain)_____	
Remote terminal in department	____	_____	
Independent computer in department	____	No programming	____
Transport data by mail	____		

PART IV - TEACHER QUALIFICATIONS

1. How many qualified instructors do you have in the business education department to teach data processing?

One ____	Three ____	Five or more ____
Two ____	Four ____	None qualified ____

2. How did the qualified instructor(s) acquire the background for teaching in the field?

College classes	____	Self taught	____
Attended workshops	____	Vocational-technical school	____
Attended manufacturer's school	____	Other (Explain)_____	
Work experience in the field	____	_____	

3. If the instructor(s) had college classes, how many credit hours of college preparation did the teacher(s) have?

0 - 3 ____	8 - 11 ____	16 - 19 ____
4 - 7 ____	12 - 15 ____	More than 20 ____

4. How does the instructor(s) in data processing stay up-to-date on current changes in the field?

Data processing periodicals	____	Summer school courses or workshops	____
Attend meetings of data processing organizations	____	Adult education	____
		Vocational-technical school	____
On mailing lists of equipment manufacturers	____	Manufacturers' schools	____
		Professional organizations	____
Summer work experience in data processing	____	Other (Explain)_____	
		_____	

THANK YOU