A COMPARATIVE STUDY OF BUSINESS DATA PROCESSING CURRICULUMS AMONG SELECTED JUNIOR COLLEGES WITHIN THE UNITED STATES

By

MARVIN DEAN WIER

Bachelor of Science

Oklahoma State University

Stillwater, Oklahoma

1972

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
MASTER OF SCIENCE
May, 1974

A COMPARATIVE STUDY OF BUSINESS DATA PROCESSING CURRICULUMS AMONG SELECTED JUNIOR COLLEGES WITHIN THE UNITED STATES

Thesis Approved:

Lloyd D Briggs
Thesis Adviser

O S Nulley

Cecil Dugger

N N Durham
Dean of the Graduate College

ACKNOWLEDGMENTS

I would like to express deep graditude to my major adviser, Dr. Lloyd D. Briggs, whose patience and guidance helped in making the development of this thesis possible. A note of appreciation is also extended to the members of my advisory committee, Dr. Donald S. Phillips and Dr. Cecil W. Dugger, for their guidance in this study.

Finally, I would like to express my graditude to my wife, Terita, and my son, James, for their sacrifices and encouragement during the preparation of this study.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

The fast growth of Business Data Processing in business, government, and industry has created a relatively large demand for trained personnel in this field. In order to develop a substantial source of supply to help meet this demand, a large number of educational institutions, mainly junior and community colleges, have established Business Data Processing curriculums. Examination of a limited number of junior college catalogs indicates that there may be considerable variation among the colleges, however, relative to the subject matter areas covered in those curriculums.

The Problem

The problem to which this study is directed, therefore, is the lack of sufficient information relative to content and distribution of subject matter in the technical, technical-related, mathematics, and general education courses of junior college curriculums for Business Data Processing.

Purpose Of The Study

The purpose of this study is to analyze and compare a

selected number of junior college Business Data Processing curriculums in the United States, and to report the results to the administrators of those and other institutions so they may revise and/or modify their Business Data Processing curriculums if they so desire.

Need For The Study

The United States Department of Labor reported in its Occupational Outlook Handbook for 1972 (17) that many thousands of new jobs for computer programmers will become available each year through the 1970's. In addition, the rise in employment is expected to be accompanied by considerable changes in the nature of work performed by programmers. The post-high school training programs of two years duration normally are expected to provide the educational background and expertise necessary for persons who will fill these positions.

Because most of the junior colleges in the Nation are controlled by separate boards of regents, their curriculums in Business Data Processing vary in regard to material, techniques, and approaches to the institutional program. A comparison and analysis of these curriculums will provide data to indicate whether there is a standard pattern of subject matter areas covered and will enable individual junior colleges to determine the extent to which they vary from this general pattern.

The need for this study is based on the assumption that

the information collected and synthesized will be helpful to those who will be designing or revising and administering other such programs in the future.

Research Questions

An effort was made in this study to obtain appropriate data to answer the following questions:

RQ1. Is there an identifiable pattern of subject matter content and distribution in curriculums of Business Data Processing among the junior colleges selected for this study?

RQ2. If there is a discernable pattern in Business Data Processing curriculums in the junior colleges included in this study, to what extent does it coincide with the subject matter content and distribution in the curriculum suggested by the U.S. Office of Education?

RQ3. To what extent do the junior college Business Data Processing curriculums vary in regard to the distribution of, and emphasis upon the various subject matter areas?

Limitations

1. Since some of the junior colleges in the United States do not offer curriculums in Business Data Processing, only those offering such curriculums will be considered in this study.

2. The number of junior colleges with Business Data Processing curriculums is very large; therefore, only two

institutions from each state as recommended by state supervisors of technical education are included in the initial contact list of institutions to be used for comparison in this study.

Definition Of Terms

A number of data processing terms are used throughout the narrative of this thesis. A partial listing of these terms and their definitions, which are currently accepted, is included for the reader's benefit to avoid confusion (11).

Applications study - Design of a system and related procedures plus development of equipment specifications to perform a certain job.

Business Data Processing - Processing of data for actual transactions-purchases, sales, collections involving file processing, calculations, and reporting; also includes processing planned transactions for budgeting and operating control purposes. Characterized by large volumes of input and output with limited amounts of computation during processing.

COBOL - Common business-oriented language; an English-like programming language designed primarily for business type applications and implemented for use with many different data processors.

Computer - Any device capable of accepting data, applying prescribed processes to them, and supplying the results of these processes. The word "computer" usually

refers to an internally stored program data processor; the term "processor" is preferable for business applications.

FORTRAN - Formula translating system; consists of a language and translator designed for programming problems expressed in a mathematical-type language.

Junior College - A two-year, post-secondary institution designed to provide its students with various college credited educational courses. Also referred to as a Community College.

Language - Expressions used to define the operations of a processor.

Programming - The process of creating a program; includes applications analysis, design of a solution, coding for the processor, testing to produce an operating program, and development of other procedures to make the system function.

RPG Language - Considered one of the most simple methods of programming, report program generator is used to read and punch cards, compute data, print, compute mathematical operations, and perform all of the same operations that are done by unit record equipment.

Systems Design - Formulation and description of the nature and content of inputs, files, and outputs in order to show how they are connected by processing procedures, and for the purpose of developing a new or improved system.

CHAPTER II

REVIEW OF LITERATURE

History

Until the early 1960's (12), very few educational institutions in the United States offered curriculums in Data Processing. Basically, only the knowledge of the operations of unit record equipment was needed for a person to be able to obtain a job in Data Processing in business or industry. Through rapid technological change, it became necessary to educate large numbers and many kinds of skilled computer operators and programmers.

When Federal support and funds for vocational and technical education became available under the Vocational Educational Act of 1963, various vocational-technical programs were established in many colleges and universities, especially in junior colleges. To help in the development of Business Data Processing programs, many educational authorities concentrated on the relationship of Data Processing and Education.

Data Processing In Education

To help clear up the controversy of the role of

education in Data Processing, Commissioner Ralph Flynt (4) of the United States Office of Education identified five factors of Data Processing education. According to Commissioner Flynt, these following factors "must be recognized and accepted if there is to be any successful modern Data Processing in education at all":

1. The development of a common technical language which can serve as a basis for communication in the area of educational Data Processing.

2. The need to keep units of information in Data Processing as small as possible. Commissioner Flynt stated: "You develop data for the large units from the smaller, but can rarely extract data for the smaller, if you start with the larger."

3. The importance of using modern machinery for transcribing, processing, and communicating data.

4. The need for understanding, acceptance and cooperation from all people associated with the phenomena of Data Processing.

5. The realization by the institution of education that it can well afford the costs in order to enjoy the benefits of this technological innovation.

In a later article, Thomas Keenan (6) reported:

> We must anticipate the day when an introductory computer science course will be as natural in science education as is a basic course in calculus or a foreign language, and as many as 100,000 college students will be annually enrolled in computer science courses.

Another authority on education, Sigeiti Moriguti (8),

stated in his report:

> Computer education without actual practices can hardly be useful. Therefore, there should be a good occupational facility and an adequate amount of machine time available to the students.

Curriculum Implementation

The three references mentioned above, plus many others, provided educators with varying philosophies to consider in developing Data Processing curriculums. One of those educators which recognized these philosophies was Francis R. Tuttle (10), Director of Vocational-Technical Education in Oklahoma, who led and helped in the design of a very complete computer education program. Dr. Tuttle stated that the goal of his computer education program is: "To produce well-rounded graduates, each qualified in computer operation, programming, and systems analysis." He also stated: "Overall, between 95 and 100 percent of our graduates get computer or computer-related jobs upon completion of the two-year curriculum."

Need For Change In Data Processing Curriculums

Now that Data Processing has started its second decade in education, new advancements in computer technology, greater demands from business and industry, and lack of interest from students have created a need for a change in the curriculums.

The United States Department of Labor (17) reported:

> Many thousands of new jobs for programmers

> will become available each year through the 1970's. Employment is expected to increase very rapidly, as the number of computer installations rises to meet the growing demand for data processing, and computers are put to new uses.

The Department of Labor also stated:

"For many of these positions, two years of post-high school training may provide a sufficient background."

In a report by Thomas Tirney (9), it was said:

> The educational aspects of the Electronic Data Processing profession had reached an all time low because of the small number of college graduates majoring in data processing were available for employment, the graduates of computer schools were unemployable, and education received in manufacturer's school was deteriorating.

In study by the Data Processing Management Association (14), both prospective employers and graduate students of junior college Business Data Processing curriculums agreed that the curriculums need to be improved. The employers suggested that:

1. Students should receive a light amount of training in unit record equipment, and greater emphasis should be placed on computer systems instruction.

2. A combination of formal and on-the-job training for students should be utilized.

3. They were willing to hire junior college students on an on-the-job, cooperative training basis.

The former Data Processing students recommended the need for:

1. More hands-on-experience with a computer terminal and other equipment.

2. Opportunity to transfer course credit to other educational institutions.

In conclusion of this study by the Data Processing Management Association, the following recommendations were cited:

1. There must be a continuous evaluation and development of curricula according to students needs and interest, and manpower needs in business and industry.

2. Current coursework in systems analysis and design should be further developed and expanded.

3. Coursework in BAL, RPG, and other computer languages should be considered when further developing coursework in programming languages.

4. More "hands-on" experience in data communications should be provided to the students.

Related Research

Recognizing the need for curricular guidelines of Business Data Processing in education, the United States Department of Education conducted a study of business needs and junior college educational opportunities in Data Processing (16). From the educational needs of business, the Department of Education developed the following training requirements of subject matter areas:

1. Data Processing Specialty
   a. Introduction To Data Processing
   b. Unit Record Equipment
   c. Computer Programming languages
   d. Statistics

2. Related Business
   a. Accounting I
   b. Accounting II
   c. Business Organization and Management

3. Mathematics
   a. Binary Math
   b. College Algebra

From the research on junior college education, the Education Department formed the following special requirements for technical curriculums:

1. The curriculum should have at least 30 credit hours of specialized technical course work, and from 15 to 20 credit hours of mathematics and science.

2. Not more than five courses should require extensive outside preparation in any single semester.

3. The specialized course work should be introduced in the first semester by at least one or two major courses.

4. The mathematics and science course work should appear to be correlated with the technical study during the first year of the curriculum.

5. The technical-related course should be included to support and broaden the student's understanding in the technology.

6. Provision should be made for individual work during the final phases of the program in the form of problem solving.

In the conclusion of the study by the U.S. Department of Education, a suggested Business Data Processing curriculum, (Appendix E), was presented for the reference and/or use of those educators wishing to develop a similar

curriculum in their junior colleges.

In another study by Bangs and Hillestad (1), interviews and questionnaires were used to determine the needs of business and industry in Data Processing, and what post-secondary institutions were doing to satisfy these needs. Questionnaires were also given to those students who graduated from Data Processing curriculums and to the teachers of those curriculums, to determine how the institutions could improve the curriculums. Of those students surveyed in the study, fifty-seven percent indicated that they had been adequately prepared to obtain and hold a data processing job in industry.

When the teachers were questioned on their respective junior colleges, more expressions of satisfaction were given than expressions of dissatisfaction. The major complaint of the instructors was that of lack of proper, up to date equipment and textbooks.

In the conclusion of the report, Bang and Hillestad made the following statements:

1. The educational institutions are not preparing enough persons to meet demands of business.

2. Many of Data Processing programs devote a considerable amount of time on wiring boards. This is a skill development that needs less emphasis in training for Business Data Processing.

3. Studies have not provided conclusive information that would help in deciding what offerings to include in a

Data Processing program.

4. To help school administrators and business educators establish some guidelines for Business Data Processing curriculums, a suggested curriculum (Appendix F) was developed.

Supporting Suggestions

To assist in the evaluation and redesigning of Data Processing curriculums in junior colleges, many authorities and researchers have developed suggestions to be considered. A few of these suggestions are:

1. Greater instructional use of the computer depends upon the reduced costs of computers, production and distribution of computer related materials, and attitudes about computers in education - F. W. Blackwell (2).

2. One of the major points in using a computer system in the junior college is program evaluation and review. The level of attainment of various course objectives must be evaluated - Raymond Pietak (7).

3. Mathematics should be included as part of a Data Processing program for its logic values rather than as mathematics per se - F. K. Bangs and M. C. Hillestad (1).

4. A continued analysis should be carried on for the program in Business Data Processing - Robert Cruce (3).

5. The Data Processing program should be broad enough to enable students to profit from on-the-job experience or to go on for further education - C. S. Grant (5).

6. Community college courses should be able to be accepted by a four year college or university, so the student would not face the "academic snobbery syndrone." -C. S. Grant (5).

Summary

Through extensive research, it was found that many theories supported the need for a change in Business Data Processing curriculums in education. Only two studies by Bangs and Hillestad (1), and the U. S. Department of Education (16) showed a direct relation to this paricular study. It can be concluded, therefore, that although the review of literature revealed only two similarly related research studies, many supporting and informative studies provided the author with a knowledgeable background of Business Data Processing Education and its use.

CHAPTER III

PROCEDURES AND ANALYSIS OF DATA

Introduction

Many of today's junior colleges, in the United States, offer curriculums in Business Data Processing. Technological advancement and changing business demands create a need to examine, compare, and possibly modify or reorient these curriculums so that graduates of such programs will be adequately prepared to meet the job requirements and demands which they will find in employment. The purpose of this study is to throughly compare the curriculums and provide a useful reference for the junior colleges whose administrators desire to organize or modify their Business Data Processing curriculums.

Design Of Study

This is a descriptive study which was designed to compare and analyze Business Data Processing curricula in selected junior colleges. The information obtained from the catalogs of those junior colleges, which were recommended by their respective state supervisors of technical education, provided a foundation that was used in the comparison and

analysis of their curriculums.

In the comparison of the Business Data Processing curriculums in the junior colleges, the required courses of the curriculums were compared with the curriculum suggested by the U. S. Office of Education. After the comparison was completed, an analysis of the curriculums was obtained through the establishment of the distribution of credit hours in the curriculums.

Population

From the replies of 33 state supervisors of technical education, a list of the names and addresses of 60 junior colleges was created. Although the majority of the state supervisors complied with the request of names of two recommended junior colleges in their state, a few state supervisors sent lists of more than two junior colleges. The two names for each of those states which supplied the multiple names of junior colleges were randomly selected through the use of a table of random numbers.

As indicated in Table I, 42 colleges from 27 states, or 70 percent, complied with the postcard requests and sent their college course catalogs. Table I also illustrates whether the communities, in which the various junior colleges are located, are rural or urban. The populations of those communities were obtained from the latest United States Census which was taken in 1970 (13), and they were then divided into the rural or urban status using 20,000 as

TABLE I

STATES AND TYPES OF COMMUNITIES
REPRESENTED BY THE
JUNIOR COLLEGES

State	Number of Institutions	Type of Community	
		Rural	Urban
Arkansas	1		X
Colorado	1	X	
Florida	1		X
Georgia	1	X	
Iowa	2	X	X
Kansas	2	X	X
Maine	2	X	X
Maryland	2	XX	
Michigan	2		XX
Missouri	1		X
Nebraska	2	X	X
New Hampshire	1		X
New Jersey	2		XX
New Mexico	1		X
New York	1		X
North Carolina	2		XX
Ohio	2		XX
Oklahoma	2	X	X
Oregon	2		XX
Pennsylvania	1		X

TABLE I (continued)

Rhode Island	1		X
South Carolina	2		XX
Texas	2		XX
Virginia	2		XX
Washington	1		X
West Virginia	1	X	
Wyoming	2	XX	

the breaking point between the two classifications. Although no supporting information was found to justify the arbitrary 20,000 figure as the breaking point between rural and urban communities in the table, it was felt that this number would be the easiest for the reader to associate with the size of the communities. From this table it is observed that a majority, or 71 percent, of the colleges were located in urban communities.

Procedure

To collect the descriptive data on the Business Data Processing curriculums in the junior colleges, a letter was mailed to the State Supervisor of Technical Education in each state (Appendix A) requesting the names and addresses of two junior colleges in their state which, in their opinion, have the more outstanding curriculums. After a few

weeks time, follow-up letters (Appendix C) were mailed to the supervisors in those states which did not respond from the original mailing of letters. The list of the names and addresses of those state supervisors which received the letters of inquiry was obtained from the Education Directory of State Governments (15).

Upon the receipt of the replies from the state supervisors, hand-written postcards (Appendix B) were mailed to the Registrar's office of each of the junior colleges. These postcards requested a college catalog and any additional information which might be available on the junior college's Data Processing curriculum. The curriculums published in these catalogs, and the additional information provided, were used as the basis for the comparison in this study. It was felt that this approach might yield more accurate and complete data than would a questionnaire.

Data Treatment

In the treatment of the data, such vital information as the number of technical, technical-related, mathematics, and general education courses and the total number of credit hours required was extracted and recorded from the Business Data Processing curriculums listed in the college catalogs. In addition, supplemental information, which might have a bearing on the nature of the curriculum, was also recorded from the catalog. The supplemental information consisted of the type of credential offered, departmental listing, and

generation of main computer.

Secondly, the percentage of total colleges that required specific courses in the technical, technical-related, mathematics, and general education areas was determined.

Next, the percentage of total credit hours and the distribution of those hours, for each subject matter area was calculated for each college. (Six of the colleges are not represented in the total credit hour percentage analysis because they did not provide complete data relative to the credit hours.)

Finally, the data was analyzed by calculating standard deviations to determine the extent to which the required credit hours in the categories listed above varied from the mean. If the standard deviation of the required credit hours in each category was found to be small in terms of percentage of the mean, then the distribution of those hours was more homogeneous than those hours in a category which has a standard deviation that is a large percent of the mean. When there was a homogeneous distribution of credit hours in a subject matter area, then it could be concluded that a trend toward an indentifiable pattern is indicated in the distribution of hours in that certain area.

CHAPTER IV

COMPARISON AND ANALYSIS OF CATALOG DATA

A comparison of the course offerings from the catalogs for each of the 42 junior colleges and an analysis of those 36 colleges which provided complete credit hour information, plus any additional information regarding those curriculums in Business Data Processing, is given in this chapter to determine if there is an identifiable pattern of subject matter areas covered in the curriculums.

Comparison of Catalog Data

To obtain an insight into the nature of the junior colleges in this study that offer Business Data Processing curriculums, supplemental information is included such as type of credential awarded to graduates, name of department in which the curriculum is located, and generation of main computer.

The data supplied in Table II represents the number of junior colleges that offer either a Certificate of Completion or an Associate Degree to their graduating students in Business Data Processing. It may be observed from the table

that the majority of junior colleges in this study offered an Associate Degree to their students.

TABLE II

CREDENTIALS OFFERED IN JUNIOR COLLEGES

Type of Credential	Number of Colleges	Percent
Certificate of Completion	3	7.2
Associate Degree	39	92.8
	n=42	100.0

From Table III it can be seen that the junior colleges, covered in this study, placed their Business Data Processing curriculums under the jurisdiction of three major categories of educational departments. Over one-half of the colleges indicated that they have a Data Processing Department.

Although the fourth generation computers are the most advanced in the computer industry, only a few junior colleges surveyed in this study indicated, as shown in Table IV that they had access to one. The majority of the junior colleges were using third generation computers in their curriculums, while a few junior colleges were still using the older second generation computers.

TABLE III

NAME DESIGNATION OF CURRICULUM
IN JUNIOR COLLEGES

Department Name	Number of Colleges	Percent
Business	13	31.0
Computer Science	4	9.5
Data Processing	23	54.7
Other	2	4.8
	n=42	100.0

TABLE IV

GENERATION OF MAIN COMPUTER
IN JUNIOR COLLEGES

Computer Generation	Number of Colleges	Percent
First	0	0
Second	2	4.7
Third	34	81.0
Fourth	6	14.3
	n=42	100.0

Tables V-IX indicate the types of technical, technical-related, mathematics, and general education courses required by the junior colleges in their Business Data Processing curriculums. Since some of the course titles varied from college to college, the author referred to the course description in the case of discrepancy from the general title. Each table indicates the number of junior colleges that require a certain course, what percent of the total colleges is represented by that number, the credit hour range and credit hour average for that specific course.

Table V illustrates the different types of technical courses required in the junior colleges in this study. The most common programming language courses covered by the colleges were Basic Assembler Language (BAL), Common Business Oriented Language (COBOL), Formula Translation Language (FORTRAN), and Report Program Generator (RPG). From this table it can also be seen that the most common non-language courses required by the majority of the colleges include Introduction to Data Processing, Unit Record Equipment, Business Applications, Field Project, and Systems Analysis.

When recording the number of credit hours offered for the technical courses, it was discovered that an unusually high number of hours were given to some of the Introduction to Data Processing and COBOL courses. Further investigation discovered that in the case of the introduction course, the larger credit hour numbered courses included the operation of unit record equipment. The reason for some of the COBOL

TABLE V

TYPES OF TECHNICAL COURSES REQUIRED IN JUNIOR COLLEGES

Type of Course	Number of Colleges	% (n=42)	Cr. Hrs. per Course* Range	Avg.
Introduction to Data Processing	42	100.00	2-6	4.0
Unit Record Equipment	24	57.1	3-5	4.0
Business Applications	31	73.8	2-5	3.5
Basic Machine Language	3	7.1	2-3	2.5
Basic Assembler Language (BAL)	39	92.9	3-4	3.5
Common Business Oriented Language (COBOL)	42	100.0	6-8	7.0
Formula Translation Language (FORTRAN)	35	83.3	1-4	2.5
Report Program Generator (RPG)	32	76.3	2-4	3.0
Programming Language/1 (PL/1)	13	30.5	3-4	3.5
NEAT 3 Language	1	2.4	3	3.0
Easycoder Language	1	2.4	3	3.0
Field Project	35	83.3	1-4	2.5
Systems Analysis and Design	38	90.5	2-4	3.0
Data Structures	4	9.5	2-3	2.5
Job Control Language (JCL)	3	7.2	2	2.0
Numerical Analysis	5	11.9	3	3.0
Keypunch	12	28.6	1-3	2.0

*Based on the 36 colleges whose catalogs listed the number of credit hours for courses.

course credit hours being high was that in some institutions the course extended through two semesters rather than being a one semester course.

In Table VI the types of technical-related courses, which are required in the representative junior colleges, are presented. The majority of junior colleges, (50 per cent or more), required the Accounting I, Accounting II, and statistics courses. Since there was a wide variety of business and economics courses required, the author grouped all of them into one technical-related category of business and/or economics courses.

TABLE VI

TYPES OF TECHNICAL-RELATED COURSES REQUIRED IN JUNIOR COLLEGES

Type of Course	Number of Colleges	% (n=42)	Cr. Hrs. per Course* Range	Avg.
Accounting I	42	100.0	3-4	3.5
Accounting II	40	97.6	3-4	3.5
Cost Accounting	17	40.5	3	3.0
Statistics	27	64.3	3-4	3.5
Business and/or Economics	42	100.0	3-4	3.5

*Based on the 36 colleges whose catalogs listed the number of credit hours for courses.

A representation of the mathematics courses required in the junior colleges is provided by Table VII. The majority of the colleges indicated that they required college algebra or data processing mathematics, and sometimes both, for the students in their Business Data Processing curriculums. The amount of coverage of material in the data processing mathematics courses varied from college to college, but a majority of the junior colleges included mathematics through the calculus and finite levels.

TABLE VII

TYPES OF MATHEMATICS COURSES REQUIRED IN JUNIOR COLLEGES

Type of Course	Number of Colleges	% (n=42)	Cr. Hrs. per Course* Range	Avg.
College Algebra	27	64.3	3-4	3.5
Data Processing Mathematics	29	69.1	3-4	3.5
Business Mathematics	12	28.6	3	3.0

*Based on the 36 colleges whose catalogs listed the number of credit hours for courses.

In Table VIII the types of general education courses required by the junior colleges is shown. The courses required by the majority of the colleges surveyed, include

English, technical report writing, human relations, and orientation. The English courses covered both the oral and written communication skills in the junior colleges.

TABLE VIII

TYPES OF GENERAL EDUCATION COURSES REQUIRED IN JUNIOR COLLEGES

Type of Course	Number of Colleges	% (n=42)	Cr. Hrs. per Course* Range	Avg.
American Federal Government	13	31.0	3	3.0
American History	3	7.2	3	3.0
English (communication skills)	42	100.0	2-4	3.0
Physical Education	19	45.2	0-1	0.5
Technical Report Writing	29	57.2	3-4	3.5
Typing	3	7.1	1-3	2.0
Human Relations	27	64.3	2-3	2.5
Orientation	32	76.1	0-1	0.5

*Based on the 36 colleges whose catalogs listed the number of credit hours for courses.

Although the technical report writing course is a written communication skill, it is considered as a separate course in most of the colleges. The human relations courses

cover such subject matters as psychology, sociology, and the humanities, while the orientation course provides the student with an orientation of the junior college and it's philosophy, policies, and procedures.

The total number of credit hours required by each junior college for its technical, technical-related, mathematics, and general education courses, plus their distribution from the mean and percentage of total curriculum credit hours is supplied by Table IX (Appendix D). The amount of credit hours for those curriculums in institutions on the quarter system were multiplied by two-thirds (2/3) in order to convert them to semester hours. Those curriculums using tri-mester hours were placed directly into the table and were considered in the same comparison as the semester hours.

Analysis of Catalog Data

In order to provide an adequate analysis of the distribution of semester credit hours among the four subject matter areas, (technical, technical-related, mathematics, and general education), Table X is supplied. From the table it is observed that the distribution of credit hours for each subject area and the total curriculum seems to approximate the pattern of a normal distribution curve.

With a range of 13 to 55 and a mean of 31, the standard deviation of distribution of the technical subject area is $\pm$ 8.24, (approximately 27 percent of the mean).

TABLE X

SEMESTER CREDIT HOUR DISTRIBUTION
AMONG SUBJECT MATTER AREAS

Subject Area	Range (n=36)*	Mode	Mean	Standard Deviation
Technical	13-55	33	31.1	± 8.24
Technical-Related	9-30	15	16.3	± 5.36
Mathematics	3-13	6	7.4	± 2.65
General Education	6-26	15	14.6	± 2.63
Total	60-94	67	69.3	± 8.69

*Based on the 36 colleges whose catalogs listed the number of credit hours for courses.

From this information, it is indicated that there is a relatively large variation in the number of credit hours in technical subjects among the Business Data Processing curriculums in the various junior colleges.

The technical-related subject matter area shows a range of 9 to 30, a mean of 16, and a standard deviation of ± 5.36 credit hours (34 percent of the mean.) The information also reveals a relatively large variation of credit hours required in the technical-related subject area in the junior colleges.

In the mathematics subject area the range is 3 to 13, with a mean of 7 and a standard deviation of ± 2.65, which is 38 percent of the mean. Since the standard deviation is

large, there is a relatively broad distribution of credit hours in the mathematics area.

In observing the distribution of credit hours in the general education subject matter area, there is an indication of a normal distribution pattern of credit hours in the junior colleges. The range is 6 to 26, with a mean of 15 and a standard deviation of $\pm$ 2.63 credit hours, which is 18 percent of the mean.

The number of credit hours for the total curriculum of the various colleges examined range from 60 to 94, with a mean of 69 and a standard deviation of $\pm$ 8.69, which is 13 percent of the mean. From the location of the mean, the distribution curve seems to be positively skewed, indicating that the majority of the total credit hours fall on or above the mean.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The primary purpose of this study was to analyze and compare a selected number of junior college Business Data Processing curriculums in the United States. The result of this analysis and comparison was then reported through the use of statistical tables. These tables were set up to show the courses required by the junior colleges in their curriculums and the percentage of the colleges that required them. This chapter will deal with the summary, conclusions, and recommendations of this study.

Summary and Conclusions

After the need for this study was established, an attempt was made to collect, compare, and analyse those Business Data Processing curriculums in the various recommended junior colleges. Although a moderate amount of information on those curriculums was collected, due to limited response, a good description of what junior colleges provide in their Data Processing programs was developed. An effort to answer the following research questions was made through reference to the descriptive data that was

developed.

RQ1. Is there a general pattern of subject matter content and distribution in curriculums of Business Data Processing among the junior colleges selected for this study?

In the technical subject matter area, it was found that the majority of the junior colleges required such courses as: Introduction to Data Processing, Unit Record Equipment, Business Applications, BAL, COBOL, FORTRAN, RPG, Systems Analysis and Design, and Field Project. Table X indicated that the range of the total hours for this area was 13-55 with a mean of 31 and a standard deviation of plus or minus 8.24.

From the technical-related subject matter area, it was discovered that the majority of junior colleges required Accounting I and II, statistics, and general business and/or economics courses. The total hour range was 9 to 30 for this area with a mean of 16 and standard deviation of plus or minus 5.36.

The mathematics subject area showed that college algebra and data processing mathematics courses were required by the junior college majority with a total area hour range of 3 to 13, mean of 7, and standard deviation of plus or minus 2.65.

In the general education subject matter area, such courses as English, technical report writing, human relations, and orientation was required by the majority of junior colleges. The range for this area was found to be from 6 to 26, with a mean of 15 and a standard deviation of

plus or minus 2.63.

In the total curriculum hours distribution it was found that the total credit hours ranged from 60 to 94, having a mean of 69 and a standard deviation of plus or minus 8.69.

Conclusion 1: From the distribution indicated for each subject area and total credit hours for the curriculum, it is concluded that there is an identifiable pattern in the subject matter content and distribution in the Business Data Processing curriculums in the selected junior colleges. Also, from the amount of credit hours that was indicated in the curriculums, a heavy emphasis was evident on both the technical and general education courses while there was only a light concentration on the technical-related and mathematics courses.

RQ2. If there is a discernable pattern in Business Data Processing curriculums in the junior colleges included in this study, to what extent does it reflect the subject matter content and distribution in the curriculum suggested by the U.S. Office of Education?

Since it was determined that there is an identifiable pattern found in the junior college Business Data Processing curriculums, there is also an indication that junior colleges can associate their curriculum content and distribution with that of the curriculum suggested by the Office of Education. It was found that the majority of the junior colleges required the same courses in the technical, technical-related, mathematics, and general education areas as recommended by the U.S. Office of Education.

Except for the mathematics area, all of the special

requirements of technical curriculums set by the Office of Education were met or exceeded by the majority of the junior colleges. The mean of the technical area credit hours exceeded that amount recommended by the Office of Education by one hour, specialized course work was introduced in the first semester of all of the junior colleges, the technical-related courses did seem to support and broaden the students' technical understanding, and a field project was required by a majority of the junior colleges. The mathematics area was low in credit hours, (with a mean of 7), as compared to the amount recommended by the Education Office.

Conclusion 2: The junior colleges showed an indication of an overall use of the suggested Business Data Processing curriculum of the U. S. Office of Education (16) in the development and implementation of their own curriculums.

RQ3. To what extent do the junior college Business Data Processing curriculums vary in regard to the distribution of, and emphasis upon the various subject matter areas?

As indicated in Table IX (Appendix D), some of the junior colleges varied in their distribution of, and emphasis upon the credit hours for each subject matter area. In the technical area, the credit hours ranged from 13 to 55 with deviations from the mean of 31 ranging from -18 to +24, respectively.

The technical-related subject matter area had a range of credit hours from 9 to 30, with deviations from the mean of 16 equal to -9 to +14. It should be noted that the most extreme deviations of the technical-related areas belong to

to the same colleges.

From Table IX it is also evident that the mathematics subject matter area has a credit hour range of 3 to 13, a mean of 7, and the deviations from the mean are -4 to +6. The general education area had a credit hour mean of 15, with a range of hours from 6 to 26 and mean deviations of -9 to +11.

Conclusion 3: The junior colleges tended to vary in their distribution of credit hours in, and emphasis upon the subject matter areas. The greatest amount of variation was evident in the technical and technical-related areas with credit hour variations of 42 and 21, respectively.

Recommendations

1. It is recommended that the administrators of those junior colleges, which indicate a small distribution of credit hours in the technical and technical-related subject matter areas of their Business Data Processing curriculums, consider a re-evaluation of their programs to provide more required courses in those areas.

2. It is recommended that the junior college administrators should require more mathematics courses in their Data Processing curriculums.

3. The educators and administrators of the junior colleges should be aware of the heavy amount of emphasis that is placed on the general education subject matter area and might consider re-evaluating the general education needs of

those students that are enrolled in their curriculums in Business Data Processing.

4. Finally, it is recommended that an occupational analysis be conducted in Business Data Processing to determine the competencies that are required in order that employees in the field may be adequately prepared.

SELECTED BIBLIOGRAPHY

(1) Bangs, F. Kendrick, and Mildred C. Hillestad. Curricular Implications of Automated Data Processing for Educational Institutions. Detroit: Management Information Services, 1968.

(2) Blackwell, F. W. The Probable State of Computer Technology By 1980, With Some Implications for Education. Washington: U. S. Office of Education, Government Printing Office, 1971, ED 057-605.

(3) Cruce, Robert Allen. "An Analysis of Post-High School Business Data Processing Curricula in Oklahoma." (Unpublished M. S. thesis, Oklahoma State University, 1970.)

(4) Flynt, Ralph C. M. "The Role of Data Processing." Higher Education, XX, No. 3 (November, 1963), pp. 7-10.

(50 Grant, C. B. S. "Data Processing For The Community College." Data Processing, Vol. II, No. 4 (April 1969), pp. 38-39.

(6) Keenan, Thomas A. "Computers and Education." Communications of the ACM. Vol. 7, No. 4. New York: Associations for Computing Machinery, 1964, pp. 205-209.

(7) Pietak, Raymond A. "The Computer and The Community College." Computers and Automation. Vol. 21, No. 1. Newtonville: Berkely Enterprises, 1972, pp. 9-10.

(8) Moriguti, Sigeiti. Computer Science Education. New York: United Nations, SPONS Agency, 1969.

(9) Tirney, Thomas R. "Education for Data Processing: Yesterday, Today, Tommorrow." Computers and Automation. Vol. 21, No. 7. Newtonville: Berkely Enterprises, 1972, pp. 9-10.

(10) Tuttle, Francis R. "Computer Education in Oklahoma." American Vocational Journal. Vol. 46, No. 1. Washington: American Vocational Association, 1971, pp. 26-28.

(11) VanHorn, Richard L., and Robert H. Gregory. Business Data Processing and Programming. Belmont: Wadsworth Publishing, 1963, pp. 368-381.

(12) Venn, Grant. Criteria for Technician Education. Washington, D. C.: Government Printing Office, 1968, pp. 46-47, OE 800-56.

(13) Cosmopolitan World Atlas. New York: Rand McNally and Company, 1972.

(14) "DPMA Assists Dearborn Schools Evaluate High School and Community College Curricula." Data Management, Vol. 10 (May, 1972), pp. 31-32.

(15) Education Directory of State Governments, 1969-1970. Washington, D. C.: U. S. Office of Education, 1969, OE 10001-70.

(16) Electronic Data Processing in Engineering, Science, and Business. Washington, D. C.: U. S. Office of Education, 1964, OE 800-30.

(17) Occupational Outlook Handbook, 1972-1973 Edition. Bulletin 1700, Washington, D. C.: U. S. Bureau of Labor Statistics, 1972.

APPENDIX A

LETTER OF INQUIRY

Marvin Wier
6134 E. 20th St.
Tulsa, Oklahoma 74112

December 27, 1973

State Supervisor
Department of Technical Education

Dear Sir:

Throughout the junior/community colleges in the United States, a variety of Business Data Processing curriculums are being offered to students. As a graduate student at Oklahoma State University, I have decided to provide a comparison of these curriculums through my Masters Thesis.

In order to adequately compare these curriculums for future reference by others in program development, I am asking for your professional assistance. The information given by you will be handled as research data, and will be strictly confidential.

Your assistance is needed to provide the names and addresses of two junior/community colleges that have the most successful Business Data Processing curriculums in your state. Please send the above information to Marvin Wier, 6134 East 20th Street, Tulsa Oklahoma, using the enclosed address label, if so desired. Upon completion of this survey, the letter of information will be destroyed. (If you desire a copy of the results of this comparison, which may be a benefitial reference for you, please indicate so in your letter.)

Your time and cooperation in providing this valuable information for me will be greatly appreciated.

Sincerely,

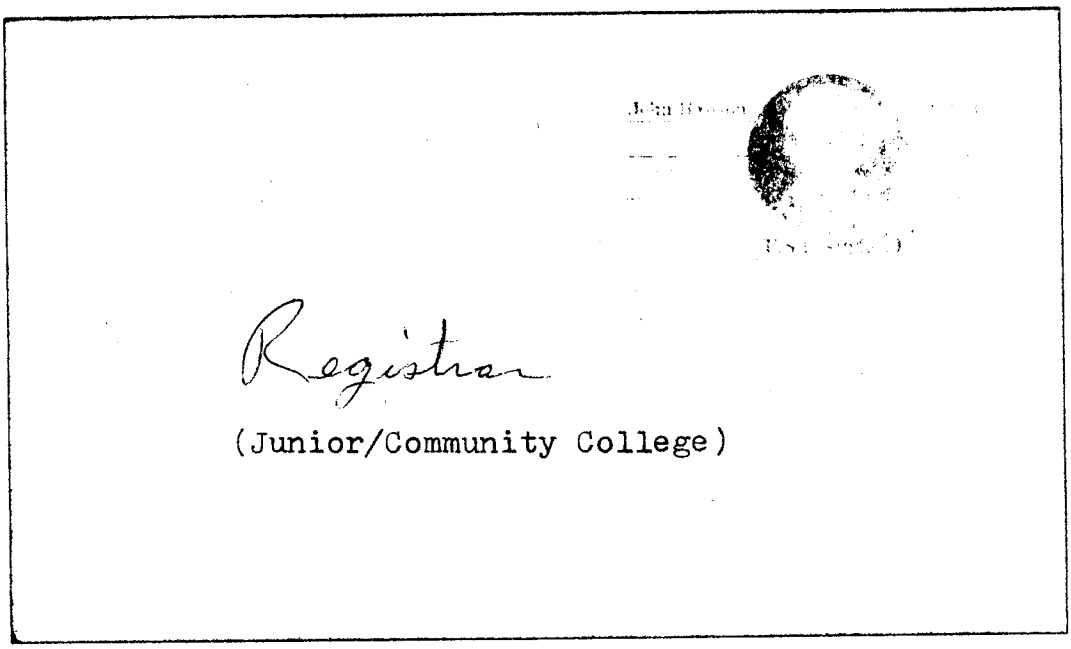
Marvin Wier
Technical Education
Graduate

Enclosure
MDW:tmw

APPENDIX B

POSTCARD REQUESTING JUNIOR COLLEGE CATALOG

POSTCARD REQUESTING JUNIOR COLLEGE CATALOG



Registrar

(Junior/Community College)

Dear Sir,

Will you please send a copy of your college catalog to me? I am particularly interested in your Data Processing program.

Thank you,

Marvin Wier
6134 E 20th Street
Tulsa, Okla. 74112

APPENDIX C

FOLLOW-UP LETTER OF INQUIRY

Marvin Wier
6134 E. 20th St.
Tulsa, Oklahoma 74112

February 22, 1974

(Name of State Supervisor
of Technical Education)

Dear Sir:

A few weeks ago, I sent a letter to you requesting the names and addresses of two junior/community colleges which, in your opinion, have the more outstanding Business Data Processing curriculums in your state. I will use these two curriculums in a comparison of other similar curriculums in the junior/community colleges in the United States.

If you have not already done so, please take a few moments to jot down those names and addresses and mail them to Marvin Wier, 6134 E. 20th St., Tulsa, Oklahoma 74112, (otherwise please ignore this letter.)

As a reminder, this information given by you will be handled as research data, and be strictly confidential. Upon completion of this study, the letter of information will be properly destroyed. (If you desire a copy of the results of this comparison, which may be a benefitial reference to you, please indicate so in your letter.)

Your time and cooperation in providing this valuable information for me will be greatly appreciated.

Sincerely,

Marvin Wier
Technical Education
Graduate

APPENDIX D

SEMESTER CREDIT HOURS IN CURRICULUMS (TABLE IX)

TABLE IX

SEMESTER CREDIT HOURS IN CURRICULUMS

College	Total	Technical (Mean=31)			Technical-Related (Mean=16)			Mathematics (Mean=7)			General Education (Mean=15)		
		Hrs.	Dev. from Mean	% of Tot.	Hrs.	Dev. from Mean	% of Tot.	Hrs.	Dev. from Mean	% of Tot.	Hrs.	Dev. from Mean	% of Tot.
1	67	33	+2	49.3	12	-4	17.9	9	+2	13.3	13	-2	19.4
2	67	32	+1	47.8	14	-2	20.9	6	+1	9.0	15	0	22.4
3	70	31	0	44.3	11	-5	15.7	6	+1	8.6	22	+7	31.4
4	61	33	+2	54.1	12	-4	19.7	6	-1	9.8	10	-5	16.4
5	63	30	-1	47.6	15	-1	23.8	6	-1	9.5	12	-3	19.0
6*	62	13	-18	21.0	30	+14	48.4	9	+2	14.5	10	-5	16.1
7	66	28	-3	42.4	9	-7	13.6	9	+2	13.6	20	+5	30.3
8	72	30	-1	41.7	28	+12	38.9	6	-1	8.3	8	-7	11.1
9	62	27	-4	43.5	18	+2	29.0	6	-1	9.7	11	-4	17.7
10	62	27	-4	43.5	15	-1	24.2	6	-1	9.7	14	-1	22.6
11	63	33	+2	52.4	9	-7	14.3	6	-1	9.5	15	0	23.8
12	65	27	-4	41.5	15	-1	23.1	6	-1	9.2	17	+2	26.2
13	66	31	0	47.0	14	-2	21.2	9	+2	13.6	12	-3	18.2
14	64	22	-9	34.4	18	+2	28.1	9	+2	14.0	15	0	23.3
15	64	34	+3	53.1	12	-4	18.8	7	0	10.9	11	-4	17.2
16	65	28	-3	43.1	11	-5	16.9	3	-4	4.6	23	+8	35.4
17	68	34	+3	50.0	16	0	23.5	3	-4	4.4	15	0	22.0
18	68	31	0	45.6	16	0	23.5	3	-4	4.4	18	+3	26.5
19	60	29	-2	48.3	21	+5	35.0	4	-3	6.7	6	-9	10.0
20	64	29	-2	45.3	9	-7	14.1	6	-1	9.4	20	+5	31.3
21	61	22	-9	36.1	12	-4	19.7	6	-1	9.8	21	+6	34.4
22	93	33	+2	35.5	22	+6	23.7	12	+5	12.9	26	+11	28.0
23	90	38	+7	42.2	17	+1	18.9	12	+5	13.3	23	+8	25.6

TABLE IX (continued)

24	94	55	+24	58.5	11	-5	11.7	13	+6	13.8	15	0	16.0
25	68	36	+5	52.4	11	-5	16.5	10	+3	14.6	11	-4	16.5
26	66	30	-1	45.5	18	+3	27.3	6	-1	9.1	12	-3	18.2
27	69	28	-3	40.6	20	+4	29.0	7	0	10.2	14	-1	20.3
28	66	25	-6	37.9	22	+6	33.4	6	-1	9.1	13	-2	19.7
29	82	35	+4	42.6	27	+11	33.0	10	+3	12.2	10	-5	12.2
30	74	33	+2	44.6	21	+5	28.4	7	0	9.5	13	-2	17.6
31	72	32	+1	44.5	16	0	22.2	10	+3	13.9	14	-1	19.5
32	72	41	+10	56.9	11	-5	15.3	13	+6	18.1	7	-8	9.7
33	68	31	0	45.6	18	+2	26.5	4	-3	5.9	15	0	22.1
34	73	32	+1	14.6	17	+1	23.3	8	+1	10.9	16	+1	21.9
35	84	40	+9	47.6	24	+8	28.6	10	+3	11.9	10	-5	11.9
36	63	26	-5	41.2	13	-3	20.6	7	0	11.2	17	+2	27.0

* Associate Degree in Business

APPENDIX E

SUGGESTED DATA PROCESSING CURRICULUM - U. S. OFFICE OF EDUCATION

SUGGESTED DATA PROCESSING CURRICULUM

U. S. OFFICE OF EDUCATION

Washington, D. C.*

First Semester	Credit Hours
Data Processing Mathematics I	4
Introduction to Data Processing	2
Unit Record Equipment	3
Accounting I	4
Communication Skills	2
	15
Second Semester	
Data Processing Mathematics II	4
Programming Fundamentals	3
Office Procedures	2
Accounting II	4
Communication Skills II	3
	16
Third Semester	
Advanced Programming	4
Statistics	4
Data Processing Systems	3
Social Science	3
	14
Fourth Semester	
Business Organization and Management	4
Systems Design and Development	3
Advanced Mathematics	5
Data Processing Field Project	0
Social Science	3
	15

*Source: Electronic Data Processing in Engineering, Science and Business. Washington D. C.: U. S. Office of Education, 1964. OE-80030

APPENDIX F

SUGGESTED DATA PROCESSING CURRICULUM - BANGS AND HILLESTAD STUDY

SUGGESTED DATA PROCESSING CURRICULUM

CURRICULUM IMPLICATIONS OF AUTOMATED DATA PROCESSING FOR EDUCATION

By F. K. Bangs and M. C. Hillestad*

First Semester	Credit Hours
College Algebra	4
Written Communications	3
Accounting Principles I	3
Introduction to Data Processing	4
Principles of Economics	3
	17
Second Semester	
Data Processing Mathematics	3
Oral Communications	3
Accounting Principles II	3
Business Conditions	3
Programming Languages	5
	17
Third Semester	
Statistics	4
Psychology	3
Advanced Accounting	3
Programming Languages	3
Data Processing Systems	3
	16
Fourth Semester	
Principles of Management	3
Human Relations	3
Data Processing Applications	5
Advanced Programming	3
	14

*Source: Bangs, F. K., and M. C. Hillestad. Curricular Implications of Automated Data Processing for Educational Institutions. Detroit: Management Information Services, 1968.

VITA

Marvin Dean Wier

Candidate for the Degree of

Master of Science

Thesis: A COMPARATIVE STUDY OF BUSINESS DATA PROCESSING CURRICULUMS AMONG SELECTED JUNIOR COLLEGES WITHIN THE UNITED STATES

Major Field: Technical Education

Biographical:

Personal Data: Born in Tulsa, Oklahoma, June 14, 1950, the son of Mr. and Mrs. E. R. Wier.

Education: Graduated from Memorial High School, Tulsa Oklahoma, in May, 1968; received Associate in Arts degree in Computer Science from Northeastern A. & M. Junior College in 1970; received Bachelor of Science degree in Technical Education from Oklahoma State University in 1972; completed requirements for the Master of Science degree at Oklahoma State University in May, 1974.

Professional Organizations: Phi Delta Kappa