ENVIRONMENTAL AND EDUCATIONAL CHARACTERISTICS OF SECONDARY BUSINESS DATA PROCESSING TEACHERS IN THE UNITED STATES

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TABLE OF CONTENTS

LIST OF TABLES

Table | Page

Table Page

CHAPTER I

INTRODUCTION

Education is the primary vehicle for the adjustment of discrepancies between the manpower demand and manpower supply in our country. The entire realm of our employment system is dependent upon the skills and knowledges of individuals within society who are available for employment.

Manpower shortages exist in many areas of employment related to automated data processing. These shortages began with the advent of the computer for commercial use in 1951. With the rapid expansion of the American business system following World War II, businessmen have been faced with an ever increasing volume of paper work. The central problem of the businessman, as reported by Wield (1), was to receive the data in time for it to be used effectively. In order for data to have prognostic value, it must reach the businessman as quickly as possible for utilization in planning and decision making. Even substantial increases in the number of workers did not enable business to process the data as rapidly as was needed nor to facilitate utilization of the data once it was processed. New methods, therefore, had to be devised to meet the ever-pressing needs of handling the data more rapidly and getting the data into a useable form for decision making.

Changes have rapidly taken place in the personnel requirements of companies which have installed computers to aid in the processing of

data created by business operations. Automated equipment has created additional jobs in which people prepare data for the machines, service the machines, and interpret the new data turned out by the machines.(2). At first, people feared that automation would replace workers; but, according to various United States Labor Department reports, very little happens to the total number of workers in an office when a computer is installed. The Occupational Outlook Handbook (3) reports that more office jobs have been created than have been eliminated by automation. Job specifications which existed in the 1950's have been so radically altered that additional skills and procedures have become prerequisite to handling the data efficiently.

E. Dana Gibson, San Diego State College, San Diego, California, predicted in a speech given at Oklahoma State University, June, 1969, that by 1980 the data processing industry would be second only to education in size in the United States. He further stated that instruction in data processing which started at the doctoral level has dropped to the masters level and is now dropping into the undergraduate level. He predicted that within ten years all vocational data processing would be offered at the high school level.

In a study conducted by S. J. Wanous (4) to determine those schools which offered instruction in data processing, respondents indicated that only 5.6 per cent of the secondary schools in the study offered instruction in data processing in 1962, compared with 53 per cent of those schools in the 1967 study. The above studies indicate that there has been increased emphasis placed on the teaching of data processing at the secondary level.

This increase, however, has not been enough to meet the

recommendations made by Goodlad (5) who states that "No student ought to leave school without some understanding of automation and information processing, considering the important changes these are bringing to the adult world." Since roughly one out of every three high school students does not graduate from high school and another one third do not continue their education program beyond a high school diploma, computer training in higher education is not enough to reach all students. In order to fill this gap and to prepare other students for technical training or college courses in which the computer is used, secondary schools must include computer instruction in their curriculums.

According to Greiner (6) the secondary school graduate who can demonstrate even basic understanding of data processing is more likely to be employed or offered the opportunity for further training or advancement within a short time than one who has no understanding of data processing. MacDonald (7) reports that secondary schools should be educating students to compete in the labor market through increased emphasis on mechanical and electronic methods of processing data. Secondary schools should change their emphasis from manual methods of processing information to the new techniques.

Bangs (8) states that educational institutions are not preparing enough persons who are qualified for automated data processing positions to meet the demands of business. He recommends that school boards, school administrators, teachers, and state supervisors exert additional effort to inaugurate curriculums in data processing and to update the programs currently in existence. Further recommendations are made that the cost of such training programs should be subsidized by federal and/or private business funds.

Many administrators who have attempted to follow the recommendations made by the Bangs' study have been confronted with many barriers. MacDonald (7) in a study conducted in 1964, listed three barriers to the teaching of the principles of data processing in the secondary schools:

1. Shortage of teachers with adequate training in the subject.
2. Lack of equipment for instructional purposes.
3. Availability of materials suitable for secondary schools.

To overcome these barriers, two basic recommendations have been made regarding teacher training in the area of data processing: an orientation course on the college and university level and in-service training for high school teachers provided by the state departments of vocational education (9).

Some universities are attempting to meet the challenges that have been previously enumerated through new programs in data processing geared to educators. In the summer of 1970, through the joint effort of Illinois State University, IBM Corporation, and the Division of Vocational and Technical Education, a two-week workshop was conducted covering the basic data processing concepts and their implementation into the secondary curriculum. The result of this workshop was an educational guide, Basic Data Processing, which covered the following areas: keypunch, sorter, reproducer, collator, and accounting machine.

In the summer of 1971, a similar workshop on computer concepts was conducted at Illinois State University using RPG as the programming language. An educational guide was one of the results of the workshop. (This guide is available on a limited basis through the State Department of Vocational and Technical Education, Springfield, Illinois.

Plans are in progress for having the manual printed for nation-wide distribution at a nominal fee when individual requests are received.) The Massachusetts State Director of Vocational Education conducted institutes on data processing for business education teachers to develop skills essential for teaching specialized courses for a two-year preparatory curriculum in business electronic data processing (10).

According to Brooks (11), "possibly the greatest deterrent to the incorporation of data processing into the high school curriculum is the shortage of faculty capable of teaching the material." Even though extensive efforts have been made by colleges and universities to develop programs suitable for the training of secondary teachers for the teaching of data processing, an insufficient number is taking advantage of the programs thus offered.

Statement of the Problem

To meet the challenge of training data processing teachers for the secondary schools, teacher-training institutions must accept the responsibility of providing the types of programs necessary to encourage and to prepare educators to teach the methods and skills associated with the automatic processing of data. These programs should be geared to the backgrounds of teachers to provide a basis for instruction in data processing concepts and applications.

The purpose of this study is to compare the environmental and educational characteristics of a selected group of business educators who teach no data processing to characteristics of three groups of secondary business educators who teach data processing. Those three groups are as

follows:

1. Those who teach a unit on data processing in a course existing in the regular business curriculum such as General Business, Bookkeeping, etc.
2. Those who teach a separate course in data processing but do not have equipment available for demonstration and "hands-on" experience.
3. Those who teach a separate course in data processing with equipment available for teacher and student use.

Hypotheses

Presented below are the null hypotheses tested in this research:

1. There is no significant difference at the .05 level of confidence between the environmental characteristics of the group of business educators who teach no data processing and the three groups of business educators who teach a unit in data processing, a separate course in data processing with no equipment, and a separate course in data processing with equipment.

2. There is no significant difference at the .05 level of confidence between the educational characteristics of the group of business educators who teach no data processing and the groups of business educators who teach a unit in data processing, a separate course in data processing with no equipment, and a separate course in data processing with equipment.

3. There is no significant difference at the .05 level of confidence between the environmental and educational characteristics of the group of business educators who teach a separate course in data

processing with equipment and the groups who teach a unit in data processing and a separate course in data processing with no equipment.

The statistical tests applied to the data collected on the environmental and educational characteristics are requisite to delineating the differences and similarities that exist among the groups.

Delimitations

This study will attempt only to ascertain the differences in educational backgrounds and environmental characteristics of business educators in four categories which are based on teaching assignments: those who teach no data processing concepts, those who teach a unit in data processing in an existing course within the business curriculum, those who teach a separate course in data processing with no equipment, and those who teach a separate course in data processing with equipment.

Category one consists of teachers who teach no data processing concepts in the business courses they are currently teaching. Category two, those who teach a unit in data processing, consists of business educators who are including units of instruction on the automatic handling of data in courses which are typically included in the business education curriculum.

Category three includes those who are teaching an Introduction to Data Processing course or a course on some specific phase of automated data processing. They do not, however, have equipment available for "hands-on" experience by the students.

Category four includes those who teach a course in Introduction to Data Processing or a course on some specific phase of automated data processing. Equipment, however, is available for demonstration

purposes and student use.

Sources of Data

The data for this study was obtained from the following: (1) published and unpublished materials relating to the history of the computer and the development of curriculum in data processing, the applications of the computer, and the job requirements for data processing personnel; (2) published and unpublished research projects dealing with the training requirements for individuals for data processing positions and curricular implications of automation and the secondary curriculum; and (3) questionnaires sent to business educators in selected schools in the United States.

Procedure

The following procedures were followed in conducting the study:

1. Researched literature relative to automated data processing to acquire necessary background knowledge for this study.
2. Surveyed the related research concerning automated data processing to determine the need for this study.
3. Designed a questionnaire to determine the characteristics of business educators who were and were not teaching concepts of business data processing.
4. Compiled a list of secondary schools by random sampling using educational directories from each of the fifty states.
5. Conducted a pilot study by sending the questionnaire to a random sample from the state of Kansas to test the usefulness of the questionnaire.

6. Revised the questionnaire to restate questions which tended to be ambiguous and rendered varied results from respondents.
7. Mailed questionnaires to additional secondary schools selected in the random sample.
8. Sent a follow-up letter to those who had not responded to the first mailing.
9. Analyzed the data from the questionnaire.
10. Formulated conclusions and made recommendations.

Definition of Terms

Certain terms used in this study are peculiar to the field of data processing and require explicit definition (12).

Application: The system or problem to which a computer is applied.

Automatic Data Processing: Data processing performed by a system of electronic or electrical machines so interconnected and interacting as to reduce to a minimum the need for human intervention.

Batch Processing: A technique by which items to be processed are coded and collected into groups prior to processing.

Business Application: A closely related set of activities that are treated as a unit--for example, each of the following: customer accounting, inventory control, or order entry and sales may be treated as a unit for conversion to automatic processing and operation.

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: An abbreviation for COmmon Business Oriented Language. A standard business data processing language intended as a means for presenting a program to a suitable computer, and a means of communicating procedures among individuals.

Computer: A device capable of accepting information, applying prescribed processes to the information, and supplying the results of these processes. It usually consists of input and output devices, storage, arithmetic logic units, and a control unit.

Data: Any or all facts, numbers, letters, and symbols, or facts that refer to or describe an object, idea, condition, situation, or other factors. Data connotes basic elements of information which can be processed or produced by a computer.

Data Processing: Rearrangement and refinement of data into a form suitable for use; often involves file processing to update files for transactions that occur.

Digital Computer: A computer which performs arithmetic and logical operations, not only on data but on its own program.

EDP: An abbreviation for ELECTRONIC DATA PROCESSING.

Flow Chart: A graphic representation of the major steps of work in process. Symbols are used to represent documents, machines, or actions. The area of concentration is on where or who does what rather than on how it is to be done.

FORTRAN: An abbreviation for FORmula TRANslating system. A programming language designed for problems which can be expressed in algebraic notation.

Hardware: The physical equipment or devices in an automated data

processing system. Contrasted with SOFTWARE.

Input: 1. Information transferred, or to be transferred, from an external storage medium into the internal storage of the computer. 2. Routines which direct 1. 3. The devices used to bring data into the computer.

Input Device: The mechanical unit designed to bring data to be processed into a computer; e.g., a card reader, a tape reader, or a keyboard.

Machine Oriented Language: 1. A language designed for use by a machine without translation. 2. A system for expressing information which is intelligible to a specific computer. Related to OBJECT LANGUAGE and contrasted with SOURCE LANGUAGE.

Output: 1. The information transferred from the internal storage of a computer to external storage or to any device outside the computer. 2. The routines which direct 1. 3. The device or collective set of devices necessary for 1. 4. To transfer from internal storage to external media.

Significance of the Study

The results of the study may be clearly significant for decreasing the shortage of business educators qualified to teach business data processing in the secondary schools by serving as a basis for developing methods and materials to impress business education teachers with the importance of business data processing to our economic system. The findings will be used to make recommendations for curriculum development at the undergraduate and graduate level for teachers of business education, for development of guidance materials which may be used by

counselors in advising students of the career opportunities in teaching business data processing, and for development of state certification requirements for teachers of business data processing.

All available evidence indicates that there is a definite need for additional qualified teachers in the area of data processing if all students are to receive the educational experiences necessary to fully comprehend the social ramifications of automation, to prepare them for advanced study in the area of automation, and to provide them with the skills necessary for entry-level positions in the area of automated data processing. It is hoped that this study will help provide the impetus necessary to get business education teachers involved in the teaching of data processing.

Conclusion

In Chapter I the problem and the procedures used to research the problem have been discussed. Chapter II will cover the related literature which has been written about the processing of data from the initial stages of business activity to the present state of automation.

CHAPTER II

SUMMARY OF BACKGROUND LITERATURE

Historical Development of Record Keeping

Need for Records

During the Stone Age, the exchange of goods by force rather than by trade failed to create the need for a record of transactions. As families joined into tribes and nations, the need for record keeping grew. Scratches on rocks, notches on trees, and marks on mud walls were used to record the transactions of that period (13).

Development of Bookkeeping Systems

Prior to 1000 B.C., barter had been the only means of exchange. When barter began to be replaced by the use of coins, it became necessary to keep written records of business transactions (14).

The practice of bookkeeping or the systematic keeping of records was used by the Babylonians, Egyptians, Athenians, and Romans. In Egypt the pharoahs emphasized the use of bookkeeping by the governments; extensive records were kept (13).

Fifty years after the first bank in the modern world was set up in Venice (14), a Florentine banker devised the first complete bookkeeping system (13). The first double entry books date back to 1340 A.D. (15). Prior to this, there was a gradual acceptance of the Arabic numeral

system replacing the Roman numerals (13). Auditing of books to find unbiased facts, discover shortages, and prevent losses was begun by the Athenians. Regular inventories were taken and laws requiring the publication of statements were enacted. But the first inventory in France was not conducted until 1348 A.D. (16).

Mechanical Data Processing

Typewriter. The first mechanical means of recording data was initiated with the invention of the typewriter by John Mills in 1714; the first practical form of the typewriter was not introduced until 1868 by Christopher Latham Sholes. Five years later, E. Remington and Sons contracted to manufacture the first typewriter which was called the Remington No. 1 (13).

With the development of the shift key in 1878, Scott-Browne School of New York City began the first formal instruction in the use of the typewriter (13). To determine if two-finger typing with each hand was better than the all-finger approach, a contest between Louis Traub and Frank McGurrin was held. McGurrin, using the all-finger approach, won the contest with speeds of 96.5 actual words on straight copy compared with 63 actual words a minute by Traub (17). One year later, Bates Torrey published a "Manual of Practical Typewriting" which described the touch method of typewriting for the first time. Within ten years, twenty-seven new typewriting textbooks had been published (17).

Calculating Machines (13). The mechanical handling of data began with the development of a digital counter by Blaise Pascal in 1642. This invention was followed by the development of a calculating machine in 1671 by Gottfried Wilhelm von Leibnitz. Three years later, he added

a stepped (cogged) wheel to his calculator. It was 1850 before D. D. Parmalee obtained a United States patent for the first key-driven calculator. An advanced model involving four processes was not developed until 1857. In 1872, Frank Baldwin invented the first practical reversible four-process calculator in the United States. The designing of a new type of wheel for the four-process calculator made the first compact machine possible.

William Burroughs, a name common to business machines, invented a key-set adding-printing machine with a crank in 1884. Nine years later, Otto Steiger patented the "Millionaire" machine, a calculator. Elgi, six years after the invention of the calculator, marketed a version of the machine which required only one turn of the crank for multiplication and provided for automatic shift to the next position.

Calculators capable of multiplying were not introduced until 1930, but the first keyboard rotary machine to attain commercial success was introduced by Jay R. Monroe and Frank S. Baldwin in 1911. It was known as the Monroe Calculator. The ten key adding machine, which is so important in offices today, was invented in 1914 by Oscar and David Sundstrand. These developments led to the calculating machines which could be programmed for automatic handling of data. Even though bookkeeping records are still handled through manual processes today, many electromechanical and electronic methods of handling data have been developed.

Cash Register (13). In 1879, James Ritty of Dayton, Ohio, invented the cash register. Five years hence, John H. Patterson founded the National Cash Register Company and made the cash register commercially successful. Today, NCR is a leader in innovations dealing with machines

applicable to the sales area.

Bookkeeping Machines (13). In 1884, William S. Burroughs invented a key-set adding-printing machine with a crank and patented it in 1888. In 1891, the Burroughs bookkeeping machine was successfully marketed. A further development by Charles F. Kettering for NCR resulted in a machine whose tabulating carriage made it possible to sort data into a number of columns in addition to performing the functions of recording, calculating, and summarizing.

Unit Record Equipment

Textile Looms. Machines manufactured for the textile industry were leaders in the development of repeat operations for looms. The first use of an input medium to control a machine was in 1725 when Basuke Bouchon used perforated paper in the operation of his loom. Then in 1728, Falcon, a French engineer, developed a loom which was operated by perforated cards (18). The first successful textile loom to operate from punched cards is attributed to Joseph Marie Jacquard (13).

Difference Engine. Another leader in the field of automation was Charles Babbage who in 1812 designed the difference engine which was capable of printing mathematical tables. Upon completion of this machine, he began work on the analytical machine which consisted of a memory unit, a control unit, and an arithmetic unit. This machine, although it was never completed, was the forerunner of the modern day computer. The lack of completion of the analytical machine in the 1820's is attributed to the lack of technological knowledge necessary for its completion (19).

Punched Card Data Processing. In 1887, it became quite apparent

in the Bureau of Census that with the continued increase in population that it would be impossible to complete one census before it was time to take the next. To overcome this time problem, Dr. Herman Hollerith developed a punched card machine using the serial technique of punching, which was used to handle the census data for 1890. Census taking was subsequently reduced from seven years to two years (13). In 1896, Dr. Hollerith left the Census Bureau to organize the Tabulating Machine Company which later merged to form the International Business Machines Company in 1924 (19).

James Powers succeeded Dr. Hollerith at the United States Census Bureau. By 1907, Powers had begun to develop punched-card equipment using mechanical, rather than electrical, sensing devices (20). One year hence, Powers patented his first punch machine which used the simultaneous-punching principle involving the keying in of all the information to be punched in a card; then by depressing a certain key, the information is punched simultaneously (13). Horizontal sorters were introduced in 1912 which sorted 200 cards a minute. Vertical sorters preceded the horizontal sorters but were unsatisfactory for human comfort in operation due to the constant stooping required to lift the cards from the lower pockets. One year later, printing tabulators which printed only numbers were available for use (21). By 1920, electromechanical machines came into general use (13).

Advances in punched card equipment in the late 1920's and early 1930's resulted in their expanded use in conjunction with machines which could handle alphabetic data. Punched cards with 80 and 90 columns were introduced during this time (13).

In 1932, Thomas J. Watson, Sr., IBM's past president, opened the

first office offering punched card equipment to any individual or firm on an hourly or job-rental basis (22). Today, service bureaus are located throughout the United States to handle daily work loads of individual firms or assist firms during peak loads when they cannot handle the volume of work using their equipment (23).

The components of the punched card machines were used by H. H. Aiken of Harvard University to build an automatic calculator. This resulted in the Automatic Sequence Controlled Calculator now known as Mark I which produced math tables on a twenty-four hour a day schedule from 1943 until 1948. Instructions were given on perforated tape rather than on cards (20).

Electronic Data Processing

Electronic computers were first used in the 1940's in several research laboratories (24). The end of the pioneering period was marked by the following events: in 1943, the journal, Mathematical Tables and Other Aids to Computation, began its publication; in 1946, the Moore School of Electrical Engineering in Philadelphia offered the first course of lectures on computer theory and techniques; and in 1947, the Association for Computing Machinery, the first society of practitioners and users of computing and data processing, was founded (20).

The first machine to use electronic tubes for calculating was ENIAC, Electronic Numerical Integrator and Calculator. It was developed between 1942 and 1946 at the University of Pennsylvania by Dr. John W. Mauchly and J. Presper Echert and their associates (13). The ENIAC had 40 panels with approximately 1500 electromechanical relays and 18,000 vacuum tubes. Other names associated with its creation are von Neumann

and Goldstine (25). John von Neumann, who was a mathematician at the Institute for Advanced Study in Princeton, New Jersey, did original work in developing computers as well as laying out fundamental designs for modern computers. Other experimental computers developed shortly after 1946 were the IBM Selective Sequence Electronic Calculator, the Harvard Mark III, the Electronic Discrete Variable Automatic Computer (EDVAC), the Bureau of Standards Eastern Automatic Computer (SEAC), and the Eckert-Mauchly Corporation's BINAC (25).

By 1948, F. C. William and T. Kilburn of the University of Manchester, England, had developed the first computer to hold both program and data in the same storage unit (20). The first stored program type digital computer was the EDSAC (Electronic Delayed Storage Automatic Computer) which came from Cambridge University, England. UNIVAC I was the first of a line of computers built by Remington Rand which, in 1949, acquired the Eckert-Mauchly Computer Corporation, originally formed as a partnership in 1946. The Remington Rand Corporation later became the UNIVAC Division of Sperry Rand Corporation (13).

Generations of Computers

Based on the innovations in computer production, computers are characterized as being first, second, third, and fourth generation machines.

Computers of the 1950's. The first generation machines (1946-1959) were bulky in size, used vacuum tubes to control the circuitry, were somewhat inflexible, and demanded strict observance of air-conditioning requirements. They were capable of performing thousands of calculations per second operating in terms of milliseconds (26). Machines typical of

this period used cathode ray tubes for internal storage. In order to enlarge the memory capacity of computers, the magnetic drum was used in the construction process. The first fully electronic computer constructed with magnetic drum storage was developed at the Electronic Computation Laboratory of Birbick College, University of London. These were the first practical systems to allow internal-type programming providing for comparisons and "logical decisions" ability during calculations of data (13).

In 1951, UNIVAC I was developed by Eckert and Mauchly and delivered to the Bureau of Census. The UNIVAC used magnetic tape as an input-output medium; raised tabulating speeds to 30,000 items a minute; and handled both numeric and alphabetic data (27). The first electronic computers designed primarily for commercial use were the UNIVAC and LEO. UNIVAC was also one of the first general-purpose computers put on sale (20). By 1963, UNIVAC I was judged to be of sufficient historical interest to be placed on exhibition at the Smithsonian Institute. It had been in use more than 73,000 hours and was replaced at the Bureau of the Census by new computers (27).

In 1951, Dr. Jay W. Forrester at MIT directed the production of Whirlwind I which was the first large machine to use magnetic cores for main storage. This development influenced the design of the UNIVAC File and the UNIVAC Scientific Computers (ERA) (19).

A UNIVAC, the first computer designed for business data processing, was delivered to General Electric in Louisville in 1954 (28). Also in that same year, the United States Steel Corporation pioneered the first large-scale application of integrated data processing using the five channel punched paper tape as the code. It was first demonstrated at a

special conference for the American Management Association (13).

During the mid 1950's magnetic core storage displaced earlier devices resulting in internal speeds hundreds of times faster than that of earlier computers. Due to technological advancements in electronics and solid-state physics, the second-generation computers became a reality (20).

Second-Generation Computers. The second-generation computers (1959-1965) had the following characteristics: transistorized, large memories, micro-second access time, shrinking physical size, increased speed, built-in error detection and correction devices, less strict air-conditioning requirements, improved peripheral equipment, and more sophisticated software and programming techniques. IBM, Minneapolis-Honeywell, Burroughs, National Cash Register, RCA, Philco, Univac, and Control Data Corporation introduced the business-oriented, second-generation computers (29).

Third-Generation Computers. Most of the computers placed on the market after 1965 are classified as third-generation computers which make up the bulk of computers in operation today. By 1964, third-generation computers, including IBM's System/360, were available and were characterized by monolithic integrated circuits, multiprogramming capability, multiprocessing capability, time-sharing terminals, greater miniaturization of hardware, and increased memory sizes which paved the way for real-time processing (29).

Fourth-Generation Computers. The fourth-generation computers as identified by Awad (29) began with the computers produced in 1971. Other authors indicate that they are in the experimental stage and not available for general use. From a design viewpoint, they offer users

increased input/output capabilities by separating the input and output functions from processing, longer component life, and greater reliability. From a functional viewpoint, they are capable of handling more powerful languages which will broaden the use of multiprogramming and multiprocessing resulting in a major shift from batch to on-line, remote, interactive processing. The amount of on-line processing is expected to reach 50 per cent by the mid 1970's. Other characteristics include increased use of multiprogramming, increased availability of the computer system, shared memory storage, operation of the central processing unit of the computer in more than one mode, and use of newly developed software.

It is estimated that the fourth-generation computers will operate in nanoseconds, one-billionth of a second. ILLIAC IV which was designed and developed at the University of Illinois is nearing completion. It is an experimental machine built in cooperation with the Burroughs Corporation in Peola, Pennsylvania. It is designed to perform as many as 64 computations simultaneously. To exemplify the speed at which this computer operates, a linear-programming problem in our present-generation computers which would take six to eight hours to solve should be solvable by ILLIAC IV in less than two minutes. New techniques of memory storage, utilizing the laser beam, make it capable of storing one trillion "bits" of information in a much smaller space than previously required in other memory systems (30).

It is predicted that the fourth-generation computers will result in many leasing firms encountering difficulties in allocating new customers to take over third-generation systems which are released by users moving into fourth-generation hardware (31). Also, that greater competition

will exist among computer manufacturers, especially with IBM, for a share of the new-generation market. Since the upper managerial echelons of most corporations better understand the electronic data-processing field, organizations will upgrade, replace, or retain an existing computer system based on professional, technical knowledge of hardware rather than the former impulsive commitment to any given computer system.

Number of Installations

The number of computer installations has increased from ten systems in 1951 to 85,000 installations in 1971. It is estimated that by 1975, 150,000 computers will be installed. The United States in 1966 had 63 per cent of the 144,000 electronic computers installed throughout the world. IBM has manufactured 70 per cent of the world's estimated 144,000 computers and has rented more than half of its production (31).

Size Classification

Digital computer installations are usually classified in terms of super-sized, large-scale, medium-scale, small-scale, and minicomputer (29).

Cost of Computers

The increase in the number of computers has been accompanied by a decrease in the average price of a computer. The average price was $3,000,000 in 1951 down to $374,000 in 1971. It is estimated that the price in 1975 will represent ten per cent of the price of the 1951 computer, $300,000.

Due to the steady increase in processing speeds and the decrease in price of computers, the cost per one million calculations had decreased from $250 in 1951 to $.10 in 1971 with a further decrease to $.08 predicted by 1975.

Even though the average cost of computation has decreased, the total cost of writing one computer instruction has steadily increased from $400 in 1953 to $730 in 1971. This increase in the cost of writing one computer instruction can be attributed to the rising cost of skilled labor and the excess of demand over supply of qualified designers and programmers. The cost per instruction is estimated to reach $800 by 1975. This increase will continue unless improved technology or more sophisticated system analysis methods are developed.

Computer Manufacturers

Prior to 1971, the major computer manufacturers were "The Big Eight," IBM, UNIVAC, Honeywell, Control Data, RCA, General Electric, Burroughs, and NCR. Today only six of these companies remain in competition with IBM controlling approximately seventy per cent of the market. General Electric sold out to Honeywell; and as of February, 1972, no definite decision had been made by RCA as to whom they would sell (32). Newsweek indicates that Honeywell is second, resulting from the consolidation through the acquisition of General Electric's computer operations.

Application of the Computer

Some of the main business applications where computers are used can be classified as basic, advanced, and real-time applications (33).

Basic applications include such functions as record keeping, payroll, production scheduling, order writing, customer billing, and financial accounting. Inventory control, linear programming, critical path analysis, simulation, and information retrieval are examples of advanced applications. Real-time as compared with batch processing of various applications produces given results almost instantaneously which allows for immediate control over the project under study. Areas include medical monitoring of patients, airline and motel reservation systems, and stock market quotations.

Computer utilization is not limited to business but also includes use by government and education. Government applications are wide and varied including the checking of income tax returns by the Internal Revenue Service, speeding of mail by the United States Postal Service, record keeping in the Social Security office, and monitoring of space flights. Educational institutions make use of the computer in such areas as payroll, student report cards, personnel records, test scoring, grouping techniques, scheduling, computer-assisted instruction, accounting applications, budget projections, permanent student record information, curriculum research and evaluation, and reports for federally funded projects (34).

Future for Computers

Learson, president of IBM, says that growth in the computer industry can only come through expansion into the operational areas of businesses and industrial plants. The difficulty of computerizing all operations is mountainous compared with computerizing one phase of operations such as payroll. This can only be accomplished by increased

memory capacity through semiconductor memories which are included on two models of the IBM 370 series (31).

Awad (29) refers to this decade as the Seething Seventies due to the introduction of the fourth-generation series of computers, the minicomputer, and other expected developments. He lists the developments as follows:

1. Data transmission via satellite, through which organizations can exchange operating data with affiliating organizations and provide government agencies pertinent reports.

2. Cyrogenics - that which reduces the sensitivity of computers by controlling their temperature close to absolute zero.

3. Fluidic computers, using fluids instead of electronic circuits, which are expected to be cheaper and easier to maintain.

4. Various types of terminals, which would allow virtually every user to have direct access to a computer.

5. A laser computer, capable of processing data at ten trillion bits per second.

6. Electro-optical memories which are to be made from a layer of thin rare-earth ferroelectrical crystalline material capable of erasing data and changing their condition at the speed of light.

7. Other developments include computer-aided design for city planning and animation, procurement applications related to purchase order selection of vendors, and material flow control.

Curriculum Development in Business Data Processing

Not only does the literature cover the historical development of methods of handling data but also covers the development of an educational philosophy to provide the impetus necessary to provide the

educational training necessary for people entering the job market. Various guidelines have been proposed through the years relating to curriculum planning. With the advent of the computer, business educators became faced with the challenge of developing curriculum in the area of automated business data processing. In the December, 1964, issue of Business Education Forum, guidelines for curriculum planning in business education for the secondary school were published. These guidelines were drafted by the Policies Commission for Business and Economic Education and listed the following as determinants of what business education in the school should provide:

1. Assessment of prior experiences of students.
2. Range of offerings determined by the basic abilities of students.
3. Consideration of the demands of the business community in planning areas of specialization.
4. Obligations of the school based on the values and ethical standards of the community.
5. Consideration of offerings of other levels of schools available within the community before programs are developed. (35).

According to the article (35), for the business education curriculum to be considered a well formulated one, it must meet three criteria:

1. The philosophy of the business education program is consistent with the philosophy of the total school program.
2. The vocational preparation provided for students will provide for specific occupational opportunities and for long-term career possibilities.
3. The business program must provide for the general education needs of all students in the areas of business and economic understandings.

The Policies Commission (35) stipulates that the implementation of

the curriculum developed should assure the following:

1. Competency of the teacher in both content and methodology.

2. Availability of appropriate facilities for the curriculum.

3. Continuous evaluation of the total curriculum.

In implementing curricular changes, especially in the field of automated data processing, the above factors are quite relevant. One must determine the needs of students and the community if the curriculum is to achieve the objectives as set forth by the Policies Commission (36). A haphazard approach to instituting curricular changes could result in an inadequate program which would culminate in eventual failure. Many companies have gone bankrupt because they entered the computer field unprepared to cope with the problems involved. Some schools have followed a similar procedure which led to disasterous effects on both the students and the community. In order to avoid beginning a data processing program which is not needed in a community, Merle W. Wood (37) suggests the following procedures for establishing a data processing program:

Local Needs. The first step is to study the local needs which serves essentially two purposes: to supply the school with important information and to let the business community know about a new program which is being considered. Not only can information be obtained through a survey of local businesses but also through the State Employment Securities Commission and Manufacturer representatives. Once the need has been established through job availability, the next step is curriculum development.

Advisory Committee. Since few educators have a background of data

processing experiences, an advisory committee should be established early in the planning stages. This committee should continue to function after the courses are established and operating in order to keep the instructional programs up-to-date.

State Departments of Public Instruction. In addition, the services of the State Department of Public Instruction should be, in most instances, incorporated into the over-all plans. With the passing of the Vocational Acts of 1963, 1968, 1969, and 1970, monies are available for vocational programs and the money is dispersed through the State Departments of Vocational Education which are under the administration of the Superintendent of Public Instruction. Wood (37) recommends that the state or regional official who will be responsible for supervision of the program should be on the initial advisory committee to provide a better foundation on which an acceptable program can be developed.

Dissemination of Information. Once the program has been developed and equipment has been purchased, the program should be promoted through various media such as the local newspaper, local radio and TV stations, speakers for professional group meetings, school newspaper, and faculty dissemination.

Student Selection and Standards. Wood (37) recommends that student selection and standards be established prior to program implementation. Entrance standards have been based on prior school grades, anecdotal notes of teachers and counselors, and data processing aptitude tests, the latter of which is considered to be very unreliable by some individuals involved in the programs. The Introduction to Data Processing course is fundamental and considered non-vocational; therefore, there are no entrance requirements in most schools for this particular course.

It is recommended by some schools that a person taking a key-punch operator course should have a typing rate of 40 NWPM while others indicate that 30 NWPM is adequate. Unit record equipment operators should have average grades plus some knowledge of bookkeeping and bookkeeping procedures. The prerequisites for a computer programmer include one year of algebra plus an average grade of "B" or higher.

Adult entry is based on an individual conference, aptitude testing, and apparent interest for placement. Edwards (38) states that personal traits required by employers of jobs in automated-accounting data-processing units include intelligence, enthusiasm, optimism, and the ability to analyze, think logically, reason abstractly, perform routine work accurately, and understand spatial relationships. In a study conducted in forty-two machine-accounting units in Oklahoma City (38), the abilities and aptitudes required of workers in machine-accounting units were very similar to those required in other occupations. The abilities to get along with other people, think logically, and to adapt to new situations were discovered to be important traits which individuals should possess.

In addition to entry level requirements, course completion standards must also be set. One approach to evaluation is to set minimum requirements. Once the requirements are achieved, a certificate is issued to the student. If the students do not meet the minimum requirements but complete the course, they are given attendance certificates which indicate they have had the course but provide no documentary evidence recommending them for employment. Standards must be high enough to produce competent workers in every job level; otherwise, employers will lose faith in the adequacy of the program and course graduates would

find it difficult to secure employment.

Follow-up Evaluation. Once students have completed the course sequence and have been placed in jobs, they should be evaluated in terms of success or lack of success. This evaluation then provides a basis for changes and adjustments in the existing curriculum to better meet the needs of the work community. Results of the study should be disseminated to the cooperating organizations and agencies which provide information to other schools anticipating the institution of business data processing programs.

Selection of Material for Curriculum

Two basic goals of a data processing curriculum should be to develop vocational skills and to develop a general education background relating to data processing and automation (39).

> What is now becoming clear is that automation is not just another course, but a technology that can be applied in all fields. What began almost as the exclusive province of the business educator, and in some cases, of the science and mathematics teacher, is now recognized as belonging also to teachers of everything from art to zoology. (40)

Material for a curriculum in data processing must be carefully selected if students are to be provided with the background necessary to meet the challenges of change in the world of work.

Since the demands made on office workers in an automated system differ from the demands made on office workers processing data manually or mechanically, Gibson (41) states that teachers of business education should strive to provide training in the following areas to meet these changing demands:

1. Develop logical thinking through problem solving.

2. Develop math relationships.

3. Stress greater accuracy, better proofreading, and higher speeds in using electric typewriters.

4. Develop machine transcription ability.

5. Explain use of edge-punched cards, tapes, and tags in retailing inventory and sales.

Basic Approaches to the Teaching of Data Processing

Miller (36) lists three basic approaches to the teaching of data processing to achieve the two basic goals of a data processing curriculum:

1. Integration - Unit of Instruction

2. Introductory, nonspecialized course

3. Vocational courses to develop skills.

Integration of data processing concepts into courses such as shorthand, typewriting, general business, office practice, economics, distributive education, and accounting can provide an excellent opportunity to develop general understandings, especially when the school is of such size that it does not warrant a separate course (37).

When the teachers of business subjects have a background in data processing, a unit on data processing designed to provide depth to an understanding of its applications in a particular course can be developed to better prepare students for the world of work (42).

An introduction to data processing course provides an overview plus some in-depth student applications of every area of data processing including the manual, mechanical, electromechanical or unit-record, and electronic phase of data processing. This course should serve in

achieving both the pre-vocational and general educational objectives necessary for objective fulfillment (36).

Wood (37) recommended the following courses for a vocational program: one semester Key Punch Operator program; Tabulating Equipment Operator program; and Computer Programmer program which should consist of the following courses: one semester each of Bookkeeping I and II, Electromechanical Machines, Basic Computing Machines, Business Organization, Accounting, Systems Development and Design, Management Accounting, Advanced Computer and Programming Systems and Business Simulation; one-half semester each of Typewriting and Human Relations; and three semesters of programming.

Content of Courses. Rasche (42) suggests that the following might be included in an introduction to data processing course to provide instruction in the fundamentals of electronic data processing:

The flow of data within the business structure and the data processing cycle.

Basic concepts and the vocabulary of data processing.

Exercises in logic and decision making.

Uses of EDP, commercial, scientific, and other.

Computing equipment in the EDP system and its function.

Preparation of input data, data representation.

Software and programming.

Programming applications.

Documentation.

Interpretation and further uses of output data.

Importance of accuracy in preparation of data.

Job opportunities available in EDP.

Respect for, and care of equipment.

Rasche (42) further states that where unit record equipment and/or an electronic computer is available the typical curriculum includes the following courses:

Keypunch. Drills and practice problems to develop a high degree of skill in converting source documents to computer input. Prerequisite: Typewriting.

Introduction to Unit Record Equipment. A survey course.

Tabulating Equipment. Operation of the keypunch, sorter, verifier, interpreter, collator, and in some cases, tabulator or calculator.

Introduction to Computers. A survey course.

Computer Operations. Actual operations, such as mounting tapes, discs, using utility programs, running jobs, etc.

Computer Programming. Actual writing of programs is undertaken, with any of the languages being used.

Berryman (43) states that what the student learns in the classroom must be applicable to the hardware available, and these endeavors can be justified only if they are typical of the kinds of activities that are being performed in today's modern data processing installations. When contemplating an effective data processing program, Berryman (43) suggests that the following items should be given consideration:

1. Unit record programs as complete and terminal programs are outdated. He justified this statement by saying there is little demand for highly trained technicians in this area.

2. Emphasis on COBOL, assembler, RPG, FORTRAN is needed. These languages will provide high transfer ability to other languages the valuable skills necessary to obtain gainful employment.

3. Instruction in magnetic disk and/or magnetic tape systems is necessary. A computer system that is of any size will require basic knowledge in one or both of

these areas.

4. Emphasis should also be placed on common data processing systems such as accounts receivable, inventory, billing, and so on. An overview and a fairly good understanding of systems design will help the data processor at the entry level to further understand as he proceeds up the ladder.

The writings of Rasche (42) and Berryman (43) are representative of the variety of opinions that exist in the area of curriculum development in the secondary schools. Rasche (42) emphasizes that course content will vary from school to school as well as the approaches that are used to achieve learning if an instructor begins with the premise that one must know the input available and the output desired before beginning. Not only the school, administration, staff, equipment, and students, but also the business community, the job opportunities, and the training, aptitudes, and the abilities needed to fill these jobs will determine the type of data processing program that is developed.

Conclusion

Since the computer is paramount in the operation of our large business enterprises which account for three-fourths of the business activity, it seems imperative that business educators provide the background and training necessary for students to survive in this world of automation.

CHAPTER III

METHODS AND PROCEDURES OF THE INVESTIGATION

The primary purpose of this study was to determine the differences in the environmental and educational characteristics of a group of secondary business educators who teach no data processing and three groups of secondary business educators who teach a unit in data processing, a separate course in data processing with no equipment, and a separate course in data processing with equipment. The second purpose of this study was to use the findings to make recommendations for curriculum development in the area of data processing at the undergraduate and graduate levels, for the development of guidance materials to be used by counselors in advising students for preparation in the teaching of data processing, and for the development of recommendations for state certification requirements for teachers of data processing.

The hypotheses are (1) that there is no significant difference at the .05 level of confidence between the environmental characteristics of the group of business educators who teach no data processing and the groups of business educators who teach a unit in data processing, a separate course in data processing with no equipment, and a separate course in data processing with equipment, (2) there is no significant difference at the .05 level of confidence between the educational characteristics of the group of business educators who teach no data processing and the groups of business educators who teach a unit in data

processing, a separate course in data processing with no equipment, and a separate course in data processing with equipment, and (3) there is no significant difference at the .05 level of confidence between the environmental and educational characteristics of the group of business educators who teach a course in data processing with equipment and the groups of business educators who teach a unit in data processing and a separate course in data processing with no equipment.

The total population for the study consisted of the business education teachers in all high schools in the fifty states of the United States. The participants were selected at random through the use of a table of random numbers and pre-numbered educational directories from each of the fifty states to participate in the study. Because of the size of the sample and the number and length of the questions used to obtain the desired information, the questionnaire was selected as the best instrument for collecting the data.

Development of the Questionnaire

The questionnaire which served as the vehicle for collecting the information relative to solving the problem, provided a means whereby standardized data could be collected from each individual within the sample population. The information requested on the questionnaire was categorized for ease of tabulation.

Primary considerations in developing the questionnaire were the ease of understanding what information was desired and the time required to complete it.

The first part of the questionnaire concerns information relative to the environmental characteristics in terms of sex, age, years of

experience, type of school, annual salary, professional and trade journals read, courses taught, how employment occurred, why they began teaching data processing, work experience related to data processing, how they kept updated in data processing, and organizational membership. The investigator further sought to ascertain the extent and source of their training in various areas of data processing. These topics were selected because of their relevance to the counseling of students regarding the teaching of business data processing.

The second part of the questionnaire concerns the educational characteristics of each individual. Data regarding the highest level of education achieved, highest degree held, when degree was obtained, major and minor in graduate and undergraduate programs, and source of the degree were obtained. Included in this section was information regarding methods taken in the teaching of data processing, amount of credit received for the methods course, languages the participants were qualified to teach, the benefits of various business and general education subjects taken in high school to the teaching of data processing, and the courses which they had taken in college and considered to be the two most and the two least helpful in preparing them for teaching data processing.

Part three concerns environmental characteristics and deals with attitudes toward various activities related to the teaching of data processing. Such things as reactions to "puzzle-type" activities, attitude toward involvement in the field of data processing, when and where data processing should be introduced, and attitude toward the actual teaching of data processing were requested. Because many business educators are reluctant to become involved in the teaching of data

processing, an attempt was made by the researcher to determine what the respondents' reactions were to student motivation, relevancy of subject matter, financial resources, creativity, autonomy of position, and accessibility of machines. Participants responded to whether they felt the formal education they had received prior to teaching data processing had adequately prepared them for the position.

Questions were constructed to permit selection of answers from a multiple choice of responses. Only six opportunities were provided for written responses.

The questionnaire was pre-tested with a random sample of teachers in the state of Kansas to clarify any points concerning structure, wording, and the type of response which was sought. Additionally, the responses from the pre-test group allowed the early development and testing of the necessary statistics and computer programs.

Selection of Sample

The fifty states of the United States served as the geographic area from which the sample was selected. The number of schools contacted in each state was based on the relationship between the total number of computers in the United States to the number of computers installed in each state as listed in Moody's Computer Industry Survey (see Appendix D). As an example, the state of Alabama had 373 computers compared with Delaware which had 124. Questionnaires were sent to twelve schools in Alabama and to four schools in Delaware.

Educational directories listing the secondary schools and administrative personnel were obtained from each of the fifty states. Once the secondary school listings were numbered by the researcher, the

number of questionnaires to be sent to each state (see Appendix D) was determined. Numbers were then selected for each of the states from a table of random numbers. A match was then made between the random numbers selected and the corresponding number of the schools listed in the directories.

A cover letter (Appendix A) was sent with each questionnaire indicating the classification of the teacher to whom the principal of the selected school was to give the questionnaire for completion. If there was no one on the staff who met the requirements as stipulated, the questionnaire was to be returned in the stamped, self-addressed envelope which was enclosed with the questionnaire and cover letter.

A total of 1,428 questionnaires were mailed. At the end of the fourth week from the original mailing, a reminder was sent to each of the principals of those schools which had not returned the questionnaire. A total of 936 questionnaires, or approximately sixty-seven per cent, were returned to the researcher. Of the 936 returned questionnaires, 538 indicated that no one was on the staff who met the requirements as stipulated in the cover letter. Approximately forty-three per cent, or 398, of the 936 returned, were completed. Because the researcher was unable to obtain a list of business educators from the State Departments of Education and had to rely on the principals of the various schools to distribute the questionnaire for completion, a small response for each of the categories was expected.

An additional 40 schools, 10 for each of the four categories, were selected at random and mailed a questionnaire in an effort to determine if the additional data would change the results obtained from the original sampling. No differences were found; therefore, it was assumed that

the sample was representative of the total population which it represented.

Procedure for Analysis of Data

Business education teachers were classified into four categories: those who teach no data processing, those who teach a unit in data processing, those who teach a separate course in data processing with no equipment, and those who teach a separate course in data processing with equipment. Those who teach no data processing were chosen as the control group and comparisons were made with each of the three groups who teach data processing to determine if actual differences occurred by mere chance.

A chi-square test of independence was used to determine whether the observed sample differences signified differences among the populations or whether they were merely the chance variations to be expected among random samples from the same population. The null hypothesis is that the observed frequencies or proportions for the samples have come from the same or identical populations. The probability associated with the occurrence of values of an observed chi square was compared with a critical value of chi square for a particular level of significance and for the degrees of freedom (df = (k-1) (r-1)). If an observed value of chi square was equal to or larger than the critical value of chi square, the null hypothesis was rejected at that level of significance. When the null hypothesis was rejected, it indicated that there was a difference in the educational and environmental characteristics of the groups of business educators.

The null hypothesis: the observed frequencies or proportions are

the same for all teaching categories. The alternate hypothesis: the observed frequencies or proportions differ from teaching category to teaching category.

The significance level is the probability that a statistical test will yield a value under which the null hypothesis will be rejected when, in fact, it is true. The most common values are .05 and .01 (44). Siegel (44) states that the level of significance is set by the researcher based on his estimate of the importance or possible practical significance of his findings; therefore, the researcher chose the .05 level of significance for acceptance or rejection of the null hypothesis.

Procedure for Reporting Analysis of Data

Answers to two broad classifications of questions were sought to help effect solutions to both phases of the problem of this study. These questions are as follows: (1) What are the environmental characteristics of individuals in each of the four categories? (2) What are the educational characteristics of individuals in each of the four categories?

The researcher chose to analyze the data gathered by the use of the questionnaire through separate chapters based around each of the two question areas. The next two chapters will, therefore, present an analysis of data relative to the factors which might influence certification requirements and provide guidance information for the future teachers of data processing based on the environmental and educational factors.

CHAPTER IV

ANALYSIS OF DATA REGARDING THE ENVIRONMENTAL CHARACTERISTICS OF SECONDARY BUSINESS DATA PROCESSING TEACHERS IN THE UNITED STATES

An attempt was made to determine differences in the environmental characteristics of business educators in the United States. Business education teachers were divided into four categories: (1) those teaching no data processing concepts, (2) those teaching a unit on data processing in a traditional business class, (3) those teaching a course in data processing with no equipment, and (4) those teaching a course in data processing with equipment. A detailed explanation of each of these categories was presented in Chapter I. Chapter IV will illustrate the similarities as well as the differences in specific environmental characteristics which existed between the group teaching no data processing and those groups teaching data processing.

Rather than present a separate table for each of the topics requiring a response, a table of combined topics with chi-square values and percentages of response is presented where feasible. In other instances, only the chi-square values are presented with the percentages of response being presented in a separate table when the chi-square value was significant.

The number of responses per question differed throughout the study because individual respondents failed to answer all questions completely

or responded with more than one answer where opportunity was given for multiple responses.

For a valid chi square to be calculated, the data had to meet certain statistical requirements: (1) answers required independence, (2) twenty per cent of the cell frequencies could not be five or below. Where the data failed to meet the statistical requirements, no chi square was calculated. Only frequencies or proportions are reported.

Sex of Respondents

The chi-square value as appears in Table I for the sex of the respondents was not significant; therefore, the null hypothesis $(H_o)_1$ was retained. Even though the percentage response of males for all teaching categories was found to be equal and the percentage of response of females for all teaching categories was found to be equal, the percentage of males was not equal to the percentage of females in all teaching categories.

The percentage response of females (61.2) teaching no data processing was greater than the percentage response of males (38.8) teaching no data processing. The percentage of males in each of the groups teaching data processing was greater than the percentage of males teaching no data processing.

Males and females have equal opportunity for teaching in the area of business education and business data processing. It would seem from the findings presented that males (55.1) tend to teach courses in data processing with equipment more often than females (44.9). The category of teaching a separate course in data processing with equipment was the only group where the males outnumbered the females.

TABLE I

PERCENTAGE RESPONSE OF MALE AND FEMALE IN EACH TEACHING CATEGORY

Categories of Teaching	Number of Respondents	Per Cent of Males	Per Cent of Females
No Data Processing Unit	165	38.8	61.2
Course No Equipment	82	39.0	61.0
Course Equipment	71	43.7	56.3
	78	55.1	44.9

$N = 396$; $x^2_{(3)} = 6.419$ NS; $C = 0.126$

This table should be read: 38.8 per cent of all business teachers who responded and who were teaching no data processing concepts were males and 61.2 per cent were females.

Age of Respondents

The null hypothesis $(H_o)_1$ was retained for the various age categories of the respondents. However, the chi-square value as shown in Table II was significant at .10 level. At this level of significance, it would appear that of the respondents who were thirty years of age and under, fewer were teaching a unit in data processing (30.1) and a separate course in data processing with no equipment (21.4) than were those who were teaching no data processing (33.7); however, a higher percentage were teaching a course in data processing with equipment (38.0). If individuals in this age category are to become involved in the teaching of data processing, they are more likely to be teaching a course with equipment than a unit in data processing or a course in data processing with no equipment.

Of those teaching no data processing, 47.9 per cent were in the age category of thirty-one to fifty. Two groups, those teaching a unit in data processing (51.8) and those teaching a separate course in data processing with no equipment (68.6), had a larger percentage of responses in this age category than did those teaching no data processing (47.9); whereas, there was a smaller percentage of responses from those teaching a course in data processing with equipment (46.8). Of the individuals in the age category of thirty-one to fifty who have become involved in the teaching of data processing, they have done so more frequently by teaching a separate course in data processing with no equipment.

Of teachers fifty-one years of age or over, the differences were not significant between those teaching no data processing (18.4) and

TABLE II

PERCENTAGE RESPONSE OF AGE GROUPS IN EACH TEACHING CATEGORY

Categories of Teaching	Number of Respondents	Per Cent Response for Ages		
		18-30	31-50	51-
No Data Processing	163	33.7	47.9	18.4
Unit in Data Processing	83	30.1	51.8	18.1
Course No Equipment	70	21.4	68.6	10.1
Course Equipment	79	38.0	46.8	15.2

$N = 395$; $x^2_{(6)} = 10.602$ NS; $C = 0.162$

This table should be read: Of the 163 responding who were teaching no data processing, 33.7 per cent were thirty years of age or under, 47.9 per cent were 31 to 50 years of age, and 18.4 per cent were fifty-one years of age or older.

those teaching a unit in data processing (18.1). The greatest differences occurred between those teaching no data processing (18.4) and those teaching a separate course in data processing with no equipment (10.0). Fifteen and two-tenths per cent of those who were fifty-one years of age and over were teaching a separate course in data processing with equipment (15.2). At the age of fifty-one and over, business educators were more reluctant to teach a separate course in data processing with no equipment than with equipment. The findings indicate that all are ready to face the challenge of integrating a unit on data processing into a course which they are teaching in the regular business curriculum.

A further breakdown of ages indicated that of those teaching no data processing, 61.3 per cent were between the ages of twenty-two and forty. Only .6 per cent were below twenty-one. Of those teaching a unit in data processing, 81.9 per cent were between twenty-two and fifty. No individual teaching a unit in data processing responded who was below twenty-one years of age.

Years of Experience

In Table III, chi-square tests of independence were used to determine if the percentages of response for years of experience in three areas were equal for all teaching categories. The chi-square values were significant; therefore, the null hypothesis $(H_o)_1$ for each of the categories was rejected.

Secondary Schools

A higher percentage of those teaching no data processing (58.8)

TABLE III

CHI-SQUARE VALUES FOR THE YEARS OF EXPERIENCE IN SECONDARY SCHOOLS, BUSINESS EDUCATION, AND DATA PROCESSING FOR ALL TEACHING CATEGORIES

Selected Areas	Number of Responses	Chi Square $x^2_{(9)} = 16.92$	Results
Secondary Schools	376	25.16	S
Business Education	359	18.62	S
Data Processing	232	56.90	S

and those teaching a separate course in data processing with equipment (60.3) had less than ten years experience in the secondary schools compared with those teaching a unit in data processing (43.4) and those teaching a separate course in data processing with no equipment (44.8). Those having ten years or more of teaching experience in the secondary schools are more likely to be teaching a unit in data processing or a separate course in data processing with no equipment than they are to be teaching a separate course in data processing with equipment.

Business education teachers with less than two years experience in the secondary schools tend to teach a separate course in data processing with equipment more frequently than to teach a unit in data processing or a course in data processing with no equipment. Of those teaching no data processing, 15.6 per cent had less than two years of experience compared with 2.6 per cent of those teaching a unit in data processing, 6 per cent of those teaching a separate course in data processing with no equipment, and 21.9 per cent of those teaching a separate course in data processing with equipment.

Business Education

In Table V, the findings for years of teaching experience in business education are positively correlated with the years of experience in the secondary schools. Approximately equal percentages of response were recorded for each of the teaching categories for less than ten years of experience and ten years or more experience in secondary schools and business education.

A higher percentage of those teaching a unit in data processing (55.1) and a separate course in data processing with no equipment (50.8)

TABLE IV

PERCENTAGE RESPONSE FOR YEARS OF EXPERIENCE IN THE SECONDARY SCHOOL AND TEACHING CATEGORY

Categories of Teaching	Number of Respondents	Years of Teaching Experience			
		0-2	2-5	5-10	10-
No Data Processing	160	15.6	16.3	26.9	41.2
Unit on Data Processing	76	2.6	23.7	17.1	56.6
Course No Equipment	67	6.0	11.9	26.9	55.2
Course Equipment	73	21.9	19.2	19.2	39.7

$N = 376$; $x^2_{(9)} = 25.16$ S; $C = 0.2505$

This table should be read: Of the 160 respondents who were teaching data processing, 15.6 per cent had less than two years of experience in the secondary schools.

TABLE V

PERCENTAGE RESPONSE FOR YEARS OF EXPERIENCE IN BUSINESS EDUCATION AND TEACHING CATEGORIES

Categories of Teaching	Number of Respondents	Years of Teaching Experience			
		0-2	2-5	5-10	10-
No Data Processing	152	14.5	20.4	25.0	40.1
Unit in Data Processing	78	5.1	23.1	16.7	55.1
Course No Equipment	63	7.9	11.1	30.2	50.8
Course Equipment	66	21.2	19.7	21.2	37.9

$N = 359$; $x^2_{(9)} = 18.62$ S; C = 0.2220

This table should be read: Of the 152 responding who were teaching no data processing, 14.5 per cent had less than two years experience in business education.

had ten years of experience or more compared with those teaching no data processing (40.1) and those teaching a separate course in data processing with equipment (37.9). The significant difference between the group teaching no data processing and the three groups teaching data processing seemed to be in the categories of those teaching a unit in data processing and a course in data processing with no equipment. The differences between those teaching no data processing and those teaching a separate course in data processing with equipment was very minimal except for those with less than two years of experience in business education. A smaller percentage of those teaching a unit in data processing (5.1) and those teaching a separate course in data processing with no equipment (7.9) had less than two years experience than did those teaching no data processing (14.5); however, there was a higher percentage of those teaching a separate course in data processing with equipment (21.2).

Of those teaching no data processing, 20.4 per cent were in the category of two to five years of experience in teaching business education compared with 23.1 per cent of those teaching a unit in data processing, 11.1 per cent of those teaching a separate course in data processing with no equipment, and 19.7 per cent of those teaching a separate course in data processing with equipment. The major difference occurred between those teaching no data processing and those teaching a course in data processing with no equipment. This might indicate that the individuals with two to five years of experience in business education are more likely to teach a unit in data processing or a separate course in data processing with equipment than they are to teach a separate course in data processing with no equipment.

Twenty-five per cent of those teaching no data processing had five to ten years of experience. In this category, the individuals would be more likely to teach a course in data processing with no equipment (30.2) than to teach a unit in data processing (16.7) or a separate course in data processing with equipment (21.2).

Data Processing

In Table VI, 92.9 per cent of those teaching no data processing had less than two years of experience in data processing. Possibly for the majority of the respondents this would mean a total absence of experience in the teaching of data processing compared with 34.5 per cent of those teaching a unit in data processing, 38.2 per cent of those teaching a course in data processing with no equipment, and 47.6 per cent of those teaching a course in data processing with equipment.

Of those teaching no data processing, 96.45 per cent had less than five years of experience in the teaching of data processing compared with 74.1, 85.5, and 92 per cent of those teaching data processing in each of the three teaching categories respectively. A higher percentage of those teaching a unit in data processing had more than five years of experience than in any of the other categories. This may indicate that the teaching of a unit in data processing had been occurring in the secondary school before separate courses in data processing were offered at the secondary level.

Since the percentage of responses from those teaching a course in data processing with no equipment was greater than the percentage of responses from those teaching a course in data processing with equipment

TABLE VI

PERCENTAGE RESPONSE FOR YEARS OF TEACHING EXPERIENCE IN DATA PROCESSING AND TEACHING CATEGORIES

Categories of Teaching	Number of Respondents	Years of Teaching Experience			
		0-2	2-5	5-10	10-
No Data Processing	56	92.9	3.55	3.55	0.0
Unit in Data Processing	58	34.5	39.6	20.7	5.2
Course No Equipment	55	38.2	47.3	12.7	1.8
Course Equipment	63	47.6	44.4	6.4	1.6

$N = 232$; $x^2_{(9)} = 56.90$ S; C = 0.4438

This table should be read: Of the 56 who were teaching no data processing, 92.9 per cent indicated they had taught data processing for less than two years. This might indicate that they had never taught it or they had taught it in the past.

in the category of five years or more experience in the teaching of data processing, the data corresponds to the findings of MacDonald (7) that many schools cannot afford the cost of implementing a curriculum in data processing if equipment is a prerequisite for the course. Many schools, therefore, introduced data processing into the curriculum by integrating it into courses which already existed within the curriculum. The next step was an introductory course in data processing as part of the general education of the students. But, with the decrease in the cost of equipment (31), some school administrators have been able to acquire some equipment which is available for administrative purposes as well as educational purposes.

School Environment

Types of Students

Because the expected frequencies were below five in four cells of the tables dealing with high school day students and "other" students, a valid chi-square value could not be calculated for the observed frequencies. A chi square was calculated for adult evening students but was not found to be significant. Table VII gives the chi-square values for incidence of response for types of students taught for the four teaching categories.

The percentages of response as shown in Table VII indicate that very minute differences existed among the teaching categories as they relate to the type of students being taught. Over ninety-six per cent in all teaching categories were teaching high school day students. Less than twenty-five per cent were teaching in adult evening programs and

TABLE VII

PERCENTAGES OF RESPONSE AND CHI-SQUARE VALUES FOR TYPES OF STUDENTS TAUGHT FOR ALL TEACHING CATEGORIES

Types of Students	Per Cent Response per Teaching Category				Chi Square $x^2_{(3)} = 7.82$	Results
	None	Unit	Course No Equipment	Course Equipment		
High School Day	98.8	98.8	98.6	96.2	None	
Adult Evening	18.1	24.1	15.5	25.3	2.53	NS
"Other"	3.6	2.4	4.4	1.3	None	
Total	100.0	100.0	100.0	100.0		

less than five per cent in all categories were teaching "other" types of students. Even though a valid chi square could not be calculated for two of the student categories, conclusions from the data presented could be made that the percentages of response for types of students being taught were equal regardless of the group of teachers being considered.

Of the 165 respondents who were teaching no data processing, 163 were teaching high school day students, 35 were teaching adult evening students, and 6 were involved in the teaching of "other" students. No attempt was made to identify where the multiple responses occurred.

Eighty-three respondents taught a unit in data processing. Eighty-two were teaching high school day students, twenty were teaching adult evening students and two were teaching students classified as "other."

Of those who were teaching a course in data processing with no equipment, seventy were teaching high school day students, eleven were teaching adult evening students, and three were teaching "other" types of students.

Of the seventy-nine respondents who were teaching a course in data processing with equipment, 71 were teaching high school day students, 20 were teaching adult evening students, and one was teaching "other" students.

The percentages presented clearly indicate that the majority of teachers in all teaching categories teach high school day students; whereas, a very small percentage teach adult evening students and "other" students.

Types of School

Percentages reported in Table VIII exceed 100 per cent for all

TABLE VIII

PERCENTAGE RESPONSE FOR TYPES OF SCHOOLS IN WHICH THE RESPONDENTS WERE TEACHING FOR ALL TEACHING CATEGORIES

Categories of Teaching	Number of Responses	Four-Year Secondary	Three-Year Secondary	Area Vocational	Other
None	165	69.1	24.8	2.4	6.1
Unit	83	67.5	27.7	3.6	4.8
Course No Equipment	71	63.4	26.8	2.8	8.5
Course Equipment	79	49.4	31.6	8.9	7.6

This table should be read: Of the 165 who were teaching no data processing, 69.1 per cent were teaching in a four-year secondary school, 24.8 per cent were teaching in a three-year secondary school, 2.4 per cent were teaching in an area vocational school, and 6.1 per cent were teaching in "other" types of schools.

categories except for those teaching a course in data processing with equipment. Because of the multiple responses received from those teaching in more than one type of school, the data did not meet the independence requirement for calculation of a valid chi square.

Those teaching no data processing, a unit in data processing, and a course in data processing with no equipment recorded approximately equal percentages of response to teaching in four- and three-year secondary schools. Those teaching a course in data processing with equipment tended to teach more often in three-year secondary and area vocational schools than did those in the other teaching categories.

In calculating the percentages of response for those teaching in an area vocational school in all teaching categories, over three times as many individuals who were teaching a course in data processing with equipment taught in an area vocational school as did those in the other three teaching categories combined.

Attitudes

In Table IX, chi-square values are listed for attitudes of the respondents which relate to various aspects of data processing.

Puzzle-Type Activities

The null hypothesis $(H_o)_1$ for puzzle-type activities was retained, over one-half, or 52.6 per cent, of those teaching a unit in data processing and, 56.9 per cent, of those teaching a course in data processing with equipment indicated that they enjoyed puzzle-type activities; whereas, only 42.2 per cent of those teaching a course with no equipment expressed the same sentiment. Forty-nine per cent of those

TABLE IX

CHI-SQUARE VALUES FOR ATTITUDES AND TEACHING CATEGORIES

Attitudes	Chi Square	Results
Puzzle-Type Activities $x^2_{(6)} = 12.59$	4.021	NS
Involvement in the Field of Data Processing $x^2_{(6)} = 12.59$	33.609	S
Teaching of Data Processing $x^2_{(2)} = 5.99$	7.26	S
Factors in the Teaching of Data Processing $x^2_{(4)} = 9.49$		
Student Motivation	2.86	NS
Relevancy of Subject Matter	3.74	NS
Financial Resources	4.82	NS
Creativity	1.74	NS
Autonomy of Position	6.47	NS
Accessibility of Machines	16.96	S
Benefits of Formal Education Received Before Beginning to Teach Data Processing $x^2_{(4)} = 9.49$	8.311	NS

teaching no data processing expressed a favorable attitude toward puzzle-type activities.

The percentage response to puzzle-type activities being "okay" ranged from 46.9 per cent for those teaching a course in data processing with no equipment to 34.7 per cent for those teaching a course in data processing with equipment. Only among those teaching a course in data processing with equipment (34.7) was the percentage response for puzzle-type activities being "okay" less than the percentage response for the control group, those teaching no data processing (40.5). Those teaching a unit in data processing (41.0) and those teaching a separate course in data processing with no equipment (46.9) exceeded the percentage response for the control group.

Puzzle-type activities are indicative of two factors, analysis of problems and logical thinking, which, according to Hurst (45), are necessary for success in data processing careers. According to the responses, there was no difference in the attitudes of those not teaching data processing and those teaching data processing regardless of the category.

Involvement in the Field of Data Processing

For attitudes expressed toward involvement in the field of data processing, Table X, the chi-square value was significant; therefore, the null hypothesis $(H_o)_1$ was rejected indicating that there were differences of opinion among the four categories. The highest percentage response for "no desire to become involved" in the area of data processing came from those teaching no data processing. Current writings in

TABLE X

PERCENTAGE RESPONSE FOR ATTITUDE TOWARD INVOLVEMENT IN THE FIELD OF DATA PROCESSING AND TEACHING CATEGORIES

Categories of Teaching	Number of Respondents	Interest Independent Study	No Desire To Become Involved	Interested Have Taken Formal Courses
None	147	42.2	34.0	23.8
Unit Course	78	52.6	16.7	30.8
No Equipment Course	66	51.5	12.1	36.4
Equipment	73	41.1	8.2	50.7

$N = 364$; $x^2_{(6)} = 33.609$; $C = 0.291$

This table should be read: 34 per cent of those who were teaching no data processing had no desire to become involved in the teaching of the subject.

the area of data processing emphasize that even though many universities and colleges are offering courses in data processing, few business educators are taking advantage of the opportunities which are available to them. This would lead the researcher to believe that a new approach to creating interest in the field of data processing is necessary if the secondary schools are ever to meet the challenge as stated by Greiner (6) of providing a general education background in data processing for all secondary students.

The group with the lowest percentage response which expressed an interest and had taken formal courses in data processing was those teaching no data processing. In comparison, those teaching a course in data processing with equipment had the highest percentage response for interest and formal education.

Teaching in Data Processing

The chi-square value for attitude toward the teaching of data processing was significant at the .02 level of confidence; therefore, the null hypothesis $(H_o)_3$ was rejected. Table XI shows that only three categories were asked to respond to this particular question since it related directly to the teaching experiences in data processing. For those questions where only three categories were asked to respond, the group teaching a separate course in data processing with equipment was used as the control group.

Over ninety per cent, 91.4, of those teaching a separate course in data processing with equipment compared with 66.7 per cent of those teaching a unit in data processing and 86.8 per cent of those teaching a separate course in data processing with no equipment enjoyed the

TABLE XI

PERCENTAGE RESPONSE TOWARD ATTITUDE IN THE TEACHING OF DATA PROCESSING AND TEACHING CATEGORIES

Categories of Teaching	Number of Respondents	Enjoy Plan to Continue	Enjoy Prefer Another Field
Unit	27	66.7	33.3
Course No Equipment	38	86.8	13.2
Course Equipment	35	91.4	8.6

$N = 100$; $x^2_{(2)} = 7.26$; $C = 0.2602$

This table should be read: 91.4 per cent of those responding who were teaching a course in data processing with equipment enjoyed their teaching and planned to continue.

teaching of data processing and planned to continue. A greater satisfaction evidently occurs when equipment is available for demonstrations and student use.

Only 8.6 per cent of the control group responded that they enjoyed the teaching of data processing but actually preferred teaching in another field; whereas, 33.3 per cent of those teaching a unit in data processing and 13.2 per cent of those teaching a separate course in data processing with no equipment expressed the same opinion.

The third and fourth categories regarding attitude were also included on the questionnaire, but the number of responses was so small that to include them in the table would have prevented calculating a valid chi square. There were three responses to "I do not enjoy teaching data processing but plan to continue." There were no responses to the fourth category, "I do not enjoy teaching data processing and plan to teach in another area."

Factors in the Teaching of Data Processing

Table IX, page 61, presents the chi-square values for attitudes expressed for various factors in the teaching of data processing. The null hypothesis $(H_o)_3$ was rejected for student motivation, relevancy of subject matter, financial resources, creativity, and autonomy of position. It was retained for accessibility to machines.

Student Motivation. The highest percentage response for student motivation being extremely favorable in the teaching of data processing was from those teaching a separate course in data processing with equipment (44.6). Only 33.9 per cent of those teaching a unit in data

processing and 38.5 per cent of those teaching a separate course in data processing with no equipment expressed an extremely favorable opinion.

A very small percentage, only 3.6 per cent, of those teaching a course in data processing with equipment had found student motivation an unfavorable factor in the teaching of data processing compared with 10.7 per cent of those teaching a unit in data processing and 7.7 per cent of those teaching a separate course in data processing with no equipment.

Relevancy of Subject Matter. A favorable reaction toward the relevancy of subject matter in the teaching of data processing was expressed by 96.3 per cent of those teaching a course in data processing with equipment; 96.1 per cent of those teaching a course in data processing with no equipment; and 97 per cent of those teaching a unit in data processing.

Financial Resources. A favorable attitude toward the availability of financial resources in the teaching of data processing was expressed by 59.2 per cent of those teaching a course in data processing with equipment, 48.1 per cent of those teaching a unit in data processing, and 49.2 per cent of those teaching a course in data processing with no equipment.

Those teaching a unit in data processing had the highest percentage response (51.9) for financial resources being an unfavorable factor; 42.3 per cent and 40.8 per cent were the percentages of response for the other categories of teachers for an unfavorable attitude toward financial resources in the teaching of data processing. These findings seem to imply that where equipment is available, financial resources are available to adequately implement the data processing program.

Creativity. Eighty per cent of those teaching a unit in data processing, 84.6 per cent of those teaching a course in data processing with no equipment and 84 per cent of those teaching a course in data processing with equipment reacted favorably to the opportunity for creativity in the teaching of data processing.

Less than twenty per cent in each teaching category had an unfavorable attitude toward creativity in the teaching of data processing. There appears to be less opportunity for creativity in the teaching of data processing when data processing equipment is not available for "hands-on" experience for the students.

Autonomy of Position. Only 12.5 per cent of those teaching a course in data processing with equipment indicated that their data processing positions lacked the autonomy which they would have preferred. The other 87.5 per cent felt that their positions held a certain degree of independence which perhaps did not exist in other teaching assignments.

Almost eighty per cent of those teaching a unit in data processing expressed a favorable attitude toward the autonomy that a teaching position in data processing possesses. Of the eighty per cent, 14.9 per cent had extremely favorable attitudes toward the autonomy of their teaching positions. Of those teaching a course in data processing with no equipment, 89.6 per cent indicated a favorable attitude toward autonomy of position. An additional 35.4 per cent expressed an extremely favorable attitude.

A higher percentage of those teaching a course with no equipment (89.6) found their positions to be autonomous than did those teaching a course in data processing with equipment (87.5). Approximately eighty

per cent of those teaching a unit in data processing experienced opportunities for independent action in the teaching process.

The researcher interpreted this to mean that a majority in all teaching categories did not have additional administrative duties in data processing attached to the teaching assignment in data processing.

Accessibility to Machines. The chi-square test of independence calculated in Table XII for accessibility to machines and teaching categories was significant; therefore, the null hypothesis $(H_o)_3$ was rejected. There is definitely a difference among the teaching categories regarding the availability of data processing machines for educational purposes.

Sufficient access to machines to achieve the objectives of the course was indicated by 65.5 per cent of those teaching a course with equipment compared with 28.8 per cent of those teaching a unit in data processing and 35.3 per cent of those teaching a course in data processing with no equipment. The majority of those teaching a unit in data processing (71.2) or a course in data processing with no equipment (64.7) found the situation relating to availability of machines for student use to be unfavorable.

The data would seem to indicate that a very small percentage of those teaching a unit in data processing had access to machines. A very slight increase in percentage was recorded for the availability of machines for those teaching a course in data processing with no equipment. Even those teaching a course which provided an opportunity for "hands-on" experience may not have been able to use the exact pieces of equipment when and where they could have been more advantageously used from an instructional viewpoint.

TABLE XII

PERCENTAGE RESPONSE FOR ATTITUDE TOWARD ACCESSIBILITY OF MACHINES AND TEACHING CATEGORIES

Categories of Teaching	Number of Respondents	Extremely Favorable	Favorable	Unfavorable
Unit Course	52	11.5	17.3	71.2
No Equipment Course	51	17.65	17.65	64.7
Equipment	55	29.1	36.4	34.5

$N = 158$; $x^2_{(4)} = 16.96$ S; C = 0.3114

This table should be read: 29.1 per cent of those who were teaching a course in data processing with equipment had an extremely favorable attitude toward the accessibility of machines.

Benefits of Formal Education

The chi-square value for benefits of formal education received before beginning to teach in the field of data processing was not significant; therefore, the null hypothesis $(H_o)_3$ was retained. The chi-square value was, however, significant beyond the .10 level. In case the hypothesis has been retained when in reality it should have been rejected, the researcher will point out where the differences lie at this level of significance.

Of those teaching a course in data processing with equipment, 61.8 per cent indicated that their formal education had prepared them adequately for teaching in the area of data processing; 7.3 per cent indicated that they had been well prepared for their teaching position; and 38.2 per cent indicated that their formal education had failed to prepare them adequately for the teaching experiences in which they were involved.

Over fifty per cent of those teaching a course in data processing with no equipment felt they had been adequately prepared for the teaching of data processing; 3.9 per cent were well prepared to teach data processing; and 47.1 per cent had not been adequately prepared to accept the responsibility they encountered in the teaching of data processing.

A negative attitude toward the benefits of formal education for preparation in the teaching of data processing was expressed by 61.1 per cent of those teaching a unit in data processing; 5.6 per cent felt they had been well prepared; and 33.3 per cent felt they had been adequately prepared.

TABLE XIII

PERCENTAGE RESPONSE TO THE BENEFITS OF FORMAL EDUCATION RECEIVED BEFORE BEGINNING TO TEACH IN THE FIELD OF DATA PROCESSING AND TEACHING CATEGORIES

Categories of Teaching	Number of Respondents	Well Prepared	Adequately Prepared	Failed to Prepare Adequately
Unit	54	5.6	33.3	61.1
Course No Equipment	51	3.9	49.0	47.1
Course Equipment	55	7.3	54.5	38.2

$N = 160$; $x^2_{(4)} = 8.311$ NS; $C = 0.215$

This table should be read: Only 5.6 per cent of those who were teaching a unit in data processing felt that the formal education received before beginning to teach in the field of data processing had prepared them well for the teaching position.

Responses indicated that 61.8 per cent of those teaching a course in data processing with equipment had been well prepared to teach in the area of data processing; whereas, 38.9 per cent of those teaching a unit in data processing and 52.9 per cent of those teaching a separate course in data processing with no equipment indicated they had received training which had prepared them for their teaching experiences.

These findings seem to indicate that individuals who are planning to teach data processing with equipment tend to seek out educational processes which are meaningful when applying them to a teaching environment.

When and How Should Data Processing Be Introduced

A valid chi-square test of independence could not be calculated as several individuals responded twice rather than only once for each of the levels.

Integration of Data Processing. According to Table XIV, approximately forty per cent of all responses were for integration of data processing concepts to begin at the high school level: 46.4 per cent, 41.6 per cent, 45.5 per cent, and 39.4 per cent.

Only 18.5 per cent of those teaching no data processing indicated that the teaching of data processing should begin at the junior high level by integrating the subject matter into courses currently in the curriculum. A higher percentage of those teaching data processing, regardless of the method, responded that integration should begin at the junior high level. According to E. Dana Gibson in a speech given at Oklahoma State University in the summer of 1969, additional emphasis

TABLE XIV

PERCENTAGE RESPONSE FOR THE EDUCATIONAL LEVEL AT WHICH THE INTEGRATION OF DATA PROCESSING CONCEPTS SHOULD BEGIN AND TEACHING CATEGORIES

Categories of Teaching	Number of Respondents	Junior High	Senior High	Adult Education	College
None	151	18.5	46.4	13.9	21.2
Unit Course No Equipment	89	23.6	41.6	18.0	16.8
Course Equipment	66	24.2	45.5	12.1	18.2
	71	29.6	39.4	12.7	18.3

N = 377

This table should be read: Of the respondents who were teaching no data processing, 18.5 per cent indicated that the integration of data processing concepts into the curriculum should begin in the junior high school.

will gradually be placed on instruction in data processing at the junior high level. The percentage response for integration at the junior high level is higher for all groups teaching data processing than is integration at the adult level or at the college level.

Unit of Instruction. As shown in Table XV, fifty per cent or more in all teaching categories expressed the necessity of introducing the unit of instruction at the high school level. The highest percentage recorded for the unit of instruction to be placed first in the senior high curriculum was by those teaching a course in data processing with no equipment, 61.2 per cent. The percentage response for both the integration of concepts and the unit of instruction at the junior high level was less for those teaching no data processing and highest for those teaching a course in data processing with equipment. The importance of the subject matter being taught at the junior high level for guidance purposes or for the background necessary for the student to become an intelligent citizen regarding the sociological ramifications of automation was clearly recognized by those teaching data processing.

Separate Course. Over forty per cent of those teaching data processing, as indicated in Table XVI, responded that a separate course in data processing should first be introduced at the high school level. Only 34.9 per cent of those teaching no data processing expressed the same belief.

More than thirty per cent of those teaching no data processing, those teaching a unit in data processing, and those teaching a course in data processing with equipment felt that a separate course should not be included in the curriculum until the college level. Twenty-nine and one-tenth per cent of those teaching a course in data processing with no

TABLE XV

PERCENTAGE RESPONSE FOR THE EDUCATIONAL LEVEL AT WHICH A UNIT IN DATA PROCESSING SHOULD BECOME AN INTEGRAL PART OF AN EXISTING COURSE IN THE CURRICULUM AND TEACHING CATEGORIES

Categories of Teaching	Number of Responses	Junior High	Senior High	Adult Education	College
None	152	7.9	51.3	18.4	22.4
Unit	106	10.4	50.0	18.9	20.7
Course No Equipment	67	10.5	61.2	13.4	14.9
Course Equipment	89	18.0	51.7	16.8	13.5

N = 414

This table should be read: 50 per cent of the 106 responses from those teaching a unit in data processing indicated that a unit in data processing should be integrated into existing courses in the curriculum in high school.

TABLE XVI

PERCENTAGE RESPONSE FOR THE EDUCATIONAL LEVEL AT WHICH A SEPARATE COURSE IN DATA PROCESSING SHOULD BE OFFERED AND TEACHING CATEGORIES

Categories of Teaching	Number of Responses	Junior High	Senior High	Adult Education	College
None	181	1.7	34.9	24.3	33.8
Unit Course	109	1.8	40.4	26.6	31.2
No Equipment Course	86	0.0	41.2	26.7	29.1
Equipment	108	2.8	42.6	23.1	31.5

N = 484

This table should be read: No one teaching a course in data processing with no equipment thought a separate course in data processing should be offered at the junior high level.

equipment indicated that it should be left until the college level, however.

Very few responses were recorded for teaching a separate course in data processing at the junior high level: 1.7 per cent, 1.8 per cent, and 2.8 per cent. Over twenty per cent in each category, however, felt that a separate course was appropriate for adult education programs.

Salaries

Salary Schedule

The null hypothesis $(H_o)_1$ for annual salary and teaching categories was retained when the chi-square value as illustrated in Table XVII was found to be less than the critical value of chi square for three degrees of freedom.

The percentages of response for receiving a salary equal to the salary schedule ranged from 73.9 per cent to 86.0 per cent; whereas, those receiving a salary higher than the salary schedule ranged from 14 per cent to 26.1 per cent.

The highest percentage response for receiving a salary equal to the salary schedule was from those teaching no data processing (86.0). Comparable percentages were recorded for those teaching a unit in data processing (84.1) and for those teaching a course in data processing with equipment (84.2). The greatest difference in percentages of response occurred between those teaching no data processing and those teaching a course in data processing with equipment (73.9).

TABLE XVII

PERCENTAGE RESPONSE ON ANNUAL SALARY AND TEACHING CATEGORIES

Categories of Teaching	Number of Respondents	Per Cent Equal To Salary Schedule	Per Cent Higher Than Salary Schedule
None	164	86.0	14.0
Unit	82	84.1	15.9
Course No Equipment	69	73.9	26.1
Course Equipment	76	84.2	15.8

$N = 391$; $x^2_{(3)} = 5.248$; $C = 0.115$

This table should be read: Of those teaching a unit in data processing, 84.1 per cent received a salary equal to the salary schedule for their education and experience.

Reason for Receiving Higher Than

Salary Schedule

Two of the respondents (16.7 per cent) who were teaching a course in data processing with equipment and received a salary higher than the salary schedule did so because they were teaching data processing. The other 64 who received salaries higher than the salary schedule did so for reasons other than the teaching of data processing.

A larger percentage of those individuals who were teaching a course in data processing without equipment received a salary higher than the salary schedule but none did so because they taught data processing.

Teaching and Work Experience in Data Processing

How Employed for Teaching Position

In Table XVIII, the chi-square test of independence calculated for how employed for the data processing position and teaching categories was not significant; therefore, the null hypothesis $(H_o)_3$ was retained.

Approximately seventy to eighty per cent of all respondents who were teaching data processing were recruited from within the system to begin a career in the teaching of data processing. Less than thirty-two per cent in any category were initially employed for the position. The differences which did exist might indicate that teachers teaching data processing with equipment are more likely to be recruited for the position than are teachers for units in data processing or courses in data processing with no equipment.

TABLE XVIII

PERCENTAGE RESPONSE FOR POSITION AS TEACHER OF DATA PROCESSING AND TEACHING CATEGORIES

Categories of Teaching	Number of Respondents	Initially Employed	Recruited From Within
Unit	47	21.0	79.0
Course No Equipment	48	22.9	77.1
Course Equipment	61	31.1	68.9

$N = 156$; $x^2_{(2)} = 1.63$; $C = 0.1016$

This table should be read: 79 per cent of those teaching a unit in data processing were asked to incorporate data processing concepts into courses which they were teaching within the school system.

Hiring Patterns for Three- and Four-Year Secondary Schools

Table XIX reports the chi-square results for hiring patterns for three- and four-year secondary schools and teaching categories. The null hypothesis $(H_o)_3$ was retained. There is no difference in the hiring patterns of the three- and four-year secondary schools for data processing teachers. The majority of data processing teachers in each type of school were recruited from within the system.

Reason for Beginning to Teach Data Processing

Because the calculated chi square shown in Table XX was less than the critical value of chi square for eight degrees of freedom, the null hypothesis $(H_o)_3$ was retained.

The chi-square value was significant, however, at the .07 level of significance. Of those teaching a course in data processing with equipment, 34.6 per cent began teaching data processing because of a personal interest in the subject matter compared with 33.8 per cent of those teaching a unit in data processing and 23.7 per cent of those teaching a separate course in data processing with no equipment. The difference seemed to be in the category of teaching a separate course in data processing with no equipment. They had a higher percentage response for feeling obligated to begin teaching data processing and for education received in data processing than did those teaching a course in data processing with equipment. Those teaching a unit in data processing had a higher percentage response in one category, felt obligated, than did

TABLE XIX

CHI-SQUARE RESULTS FOR TEACHING CATEGORIES AND THE HIRING PATTERNS FOR THREE- AND FOUR-YEAR SECONDARY SCHOOLS

Categories of Teaching	Chi Square $x^2_{(1)} = 3.84$	Results
Unit	1.23	NS
Course No Equipment	1.36	NS
Course Equipment	.02	NS

TABLE XX

PERCENTAGE RESPONSE OF TEACHING CATEGORIES AND REASONS WHY THEY BEGAN TEACHING IN THE FIELD OF DATA PROCESSING

Reasons	Unit	Course No Equipment	Course Equipment
Interest in Data Processing	33.8	23.7	34.6
Asked by Administration	18.5	20.3	26.9
Felt Obligated	20.0	17.0	3.8
Work Experience	3.1	6.8	10.3
Education in Data Processing	24.6	32.2	24.4
	65	59	78

$N = 202$; $x^2_{(8)} = 14.61$; $C = 0.2597$

This table should be read: Of those teaching a course in data processing with equipment, 34.6 per cent began teaching in the area because of a personal interest in the subject.

those teaching a separate course with equipment.

Individual initiative was indicated by 69.3 per cent of those teaching a separate course in data processing with equipment as the basis for teaching data processing compared with 62.7 per cent of those teaching a separate course with no equipment and 61.5 per cent of those teaching a unit in data processing. The differences as a total were not significant. The greatest percentage difference existed between those who were asked by the administration and those who felt obligated to begin teaching data processing.

Work Experience in Data Processing

Types of Business. In Table XXI, chi-square tests of independence for no work experience, work experience in an accounting firm, and work experience in an educational facility and the teaching categories were not significant; therefore, the null hypothesis $(H_o)_3$ was retained.

Even though the differences within each response category were not significant, the differences between the responses should be observed. No work experience in data processing was recorded for 37.8 per cent of those teaching a course in data processing with equipment compared with 52.1 per cent of those teaching a course with no equipment and 39.8 percent of those teaching a unit in data processing. In contrast, 60.2 per cent of those teaching a unit in data processing, 47.9 per cent of those teaching a course in data processing with no equipment, and 62.2 per cent of those teaching a course in data processing with equipment had some type of work experience in data processing.

The differences which existed within the sample population show that a higher percentage of those teaching a course in data processing

TABLE XXI

CHI-SQUARE RESULTS FOR WORK EXPERIENCE AND TEACHING CATEGORIES

Type of Establishment	Chi Square $x^2_{(2)} = 5.99$	Results
No Work Experience	3.58	NS
Accounting Firm	2.68	NS
Consulting Firm	None	
Educational Facility	5.07	NS
Mining-Petroleum	None	
Government	None	
Distribution	None	
Insurance	None	
Manufacturing	None	
Public Utilities	None	
Finance	None	
Military	None	
Other	None	

with equipment tended to have work experience in an accounting firm than did those teaching a unit in data processing or a course in data processing with no equipment. Experience in an accounting firm was indicated by 20.3 per cent of those teaching a course in data processing with equipment, 13.3 per cent of those teaching a unit in data processing, and 11.3 per cent of those teaching a separate course in data processing with no equipment.

Since there were only two individuals who had had work experience in data processing in a consulting firm, no chi square could be calculated as the expected frequencies for half of the cells were below five. Those who responded were teaching a course in data processing with equipment.

The chi square for work experience in an educational facility was significant at the .08 level of significance. Work experience in an educational facility was indicated by 16.9 per cent of those teaching a course with no equipment and 18.1 per cent of those teaching a unit in data processing compared with 30.4 per cent of those teaching a course in data processing with equipment.

Data for the following areas of work experience in data processing were also collected: mining-petroleum, government, distribution, insurance, manufacturing, public utilities, finance, military, and others. The expected frequencies in all categories were too low to calculate a chi square; therefore, only the frequencies are reported in Table XXII.

Government, manufacturing, and military were the highest ranking for work experience among all teaching categories with a response of nine, nine, and ten respectively. Twice as many responses were recorded for those teaching a course in data processing with equipment than for

TABLE XXII

FREQUENCY RESPONSE FOR OTHER TYPES OF WORK EXPERIENCE AND TEACHING CATEGORIES

Categories of Work Experience	Unit	Course No Equipment	Course Equipment
Mining-Petroleum	0	0	1
Government	2	1	4
Distribution	0	1	4
Insurance	0	2	1
Manufacturing	1	4	4
Public Utilities	0	0	0
Finance	2	1	0
Military	1	2	7
Other	4	0	2
	10	11	23

N = 44

This table should be read: Of those teaching a unit in data processing, only two had experience in data processing through government operations.

the other two teaching categories for each of the other areas of work experience listed.

Work Experience in Data Processing by Industry. The majority of respondents checked no work experience for the industries listed in Table XXIII, page 90. Of those who did respond, manufacturing and wholesale/retail trade were the most frequently checked.

Methods Used to Keep Updated for the Teaching of Data Processing

Authors of data processing articles frequently list ways in which a business education teacher can keep abreast of changing conditions in the field of data processing. Rasche (42) specifically lists several of the methods which the researcher chose to include in this research study. The purpose was to determine how effective their suggestions had been in getting business data processing teachers to use the information from periodicals to keep their class presentations current.

As shown in Table XXIV, page 91, a significant difference did not occur in any of the categories except for attending night school where the null hypothesis $(H_o)_3$ was rejected.

Reading Periodicals

The reading of periodicals to keep updated in data processing was indicated by 48.2 per cent of those teaching a unit in data processing compared with 59.2 per cent of those teaching a course in data processing with no equipment and 49.4 per cent of those teaching a course in data processing with equipment.

The differences in the percentages of response for reading

TABLE XXIII

PERCENTAGE RESPONSE FOR WORK EXPERIENCE IN DIFFERENT TYPES OF INDUSTRIES AND TEACHING CATEGORIES

Types of Industries	Unit	Course No Equipment	Course Equipment
No Work Experience	92.5	86.5	81.7
Agriculture	0.0	0.0	1.7
Mining	0.0	0.0	0.0
Construction	0.0	0.0	3.3
Manufacturing	3.8	7.7	3.3
Transportation-Communication	0.0	0.0	1.7
Public Utilities	0.0	0.0	1.7
Wholesale-Retail Trade	3.8	5.8	6.7

N = 165

This table should be read: The majority of the responses were for no work experience in the industries as listed.

TABLE XXIV

PERCENTAGE RESPONSE AND CHI-SQUARE RESULTS FOR METHODS USED TO KEEP UPDATED FOR THE TEACHING OF DATA PROCESSING AND TEACHING CATEGORIES

Methods	Per Cent Response per Teaching Category			Chi Square $x^2_{(3)} = 7.82$	Results
	Unit	Course No Equipment	Course Equipment		
Reading Periodicals	48.2	59.2	49.4	2.16	NS
Attending Meetings of Data Processing Organizations	14.5	25.4	27.8	4.73	NS
Mailing Lists of Manufacturers of Data Processing Equipment and Supplies	16.9	25.4	22.8	1.68	NS
Attend Summer School	24.1	28.2	32.9	1.55	NS
Work in Data Processing Installations	1.2	4.2	7.6	None	
Classes Sponsored by Equipment Manufacturers	3.6	12.7	7.6	4.41	NS
Attend Night School	16.9	8.5	26.6	7.19	S
Seminars of Data Processing Organizations	16.9	15.5	17.7	0.13	NS
Other	13.3	8.5	8.9	1.22	NS

periodicals to keep updated in the area of data processing were not significant. However, 49.4 per cent of those teaching a separate course in data processing with equipment and 48.2 per cent of those teaching a unit in data processing read periodicals as a method of keeping current in the area of data processing. This compares to 59.2 per cent of those teaching a course in data processing with no equipment or an approximate increase of ten per cent.

Attend Meetings of Data Processing Organizations

The chi square approaches significance at the .10 level and, therefore, if differences did exist for the population, it would seem to be among those teaching a unit in data processing. Only 14.5 per cent of them attended meetings of data processing organizations compared with 25.4 per cent of those teaching a course in data processing with no equipment and 27.8 per cent of those teaching a course in data processing with equipment. Those teaching a course in data processing were more cognizant of the importance of associations of individuals who were actively engaged in data processing procedures and applications.

Mailing List of Equipment and Supplies Manufacturers

An average of 21.7 per cent in all categories were on the mailing list of equipment and supplies manufacturers. Thus, the vast majority of respondents did not use this as a method of keeping updated for the teaching of data processing.

Attend Summer School

An average of thirty per cent of the respondents attended summer school to keep updated for the teaching of data processing compared with approximately seventy per cent which did not attend summer school.

Work in Data Processing Installations

The frequency response was too small to calculate a chi square. Only 10 of the 233 respondents worked in data processing installations as a method of keeping updated: one who was teaching a unit in data processing; three who were teaching a course in data processing with no equipment; and six who were teaching a course in data processing with equipment.

Attend Classes Sponsored by Equipment Manufacturers

The calculated chi square approached significance at the .11 level of significance. The differences which existed within the sample were as follows: 7.6 per cent of those teaching a course in data processing with equipment had attended classes sponsored by equipment manufacturers to keep updated in the field of data processing compared with 3.6 per cent of those teaching a unit in data processing and 12.7 per cent of those teaching a course in data processing with no equipment.

Attend Night School

The percentages of response for attending night school were significantly different. Of those teaching a course in data processing

with equipment, 26.6 per cent attended night school as a method of keeping updated in data processing. Only 8.5 per cent of those teaching a course in data processing with no equipment and 16.9 per cent of those teaching a unit in data processing elected to do so.

Attend Seminars Sponsored by Data Processing Organizations

Less than twenty per cent in all categories attended the seminars sponsored by data processing organizations as a method of keeping updated in the area of data processing.

Summary

Less than one fourth of the individuals in all categories who were teaching data processing took advantage of the different methods available to keep updated. The two categories in which the percentages of response exceeded 25 per cent are as follows: reading of periodicals, approximately fifty per cent, and attending summer school, approximately twenty-eight per cent.

Those teaching a course in data processing with equipment had a higher percentage response for the following methods than either of the other two teaching categories: attending meetings of data processing organizations, attending summer school, work experience in data processing installations, attending night school, and attending seminars of data processing organizations. Only in one methods category, "other," did those teaching a unit in data processing exceed those teaching a separate course in data processing. It would seem that the greater the depth of course content in data processing the more likely the teacher

is to take advantage of opportunities which are available to acquire additional knowledges and skills necessary to effectively teach data processing in the classroom.

Reading of Data Processing Periodicals

The chi-square values calculated for the reading of data processing periodicals and teaching categories are shown in Table XXV. The chi-square tests of independence for all data processing magazines listed were significant; therefore, the null hypothesis $(H_o)_1$ was rejected.

Datamation

Less than fifteen per cent of all respondents in the four teaching categories read Datamation. No educator who taught no data processing read the magazine compared with 8.5 per cent of those teaching a course with no equipment, 3.6 per cent of those teaching a unit in data processing, and 1.3 per cent of those teaching a course in data processing with equipment. Datamation provides excellent background material for an introductory course in data processing and is probably more relevant to the teaching of a course in data processing with no equipment and, in some instances, to those who are teaching a unit in data processing than the articles would be to those who are teaching a separate course in data processing where the students have continuous "hands-on" experience.

Computer and Automation

Only one (0.6 per cent) individual who was teaching no data

TABLE XXV

PERCENTAGE RESPONSE FOR TEACHING CATEGORIES AND THE READING OF DATA PROCESSING MAGAZINES

Magazines	None	Unit	Course No Equipment	Course Equipment	Chi Square $x^2_{(3)} = 7.82$	Results
Datamation	0.0	3.6	8.5	1.3	23.92	S
Business Automation	7.3	15.7	21.1	22.8	13.87	S
Data Processing Magazine	3.0	9.6	17.0	16.5	16.93	S
Computer Automation	0.6	4.8	5.6	16.5	25.80	S
Journal of Data Management	0.0	3.6	7.0	5.1	10.30	S
Journal of Data Education	1.8	6.0	11.3	2.5	10.21	S
Other	0.6	9.6	11.3	8.9	16.04	S
Number of Respondents	165	83	71	79		

This table should be read: The differences which existed within the sample regarding the reading of data processing magazines and teaching categories were not by chance alone but would actually exist if data were collected from the entire population.

processing concepts read the magazine compared with four (4.8 per cent) who were teaching a unit in data processing. Thirteen respondents (16.5 per cent) who were teaching a course in data processing with equipment read it and only four (5.6 per cent) who were teaching a course with no equipment read Computer and Automation.

Journal of Data Management

No educator in teaching category one read the Journal of Data Management. The percentages of response doubled between those teaching a unit (3.6) and those teaching a course in data processing with no equipment (7.0). A slightly smaller percentage of those teaching a course with equipment (5.1) read the magazine than did those teaching a course without equipment (7.0).

Journal of Data Education

The Journal of Data Education was read by 1.8 per cent of those teaching no data processing. Since this magazine is devoted entirely to methods and curriculum development in the area of data processing, it would be very unlikely that individuals not actively engaged in the teaching of the subject matter would find the material of interest unless they were strongly motivated to become involved in the teaching of data processing.

The percentages of response almost doubled between those teaching a unit in data processing (6.0) and those teaching a course in data processing with no equipment (11.3). Only 2.5 per cent of those teaching a course with equipment read the magazine. The highest percentage of responses for reading the magazine was from those teaching a course

in data processing with no equipment.

Other Data Processing Magazines

Less than one per cent of those teaching no data processing read data processing magazines other than those previously enumerated. Approximately nine to twelve per cent of those teaching data processing read other data processing magazines. The highest percentage recorded for "other" data processing magazines were by those teaching a course in data processing with no equipment.

Reading of Business Education Periodicals

The chi-square values calculated for the reading of business education periodicals and teaching categories are shown in Table XXVI. The chi-square tests of independence for reading Business Education World and Journal of Business Education for all teaching categories were significant; therefore, the null hypothesis $(H_o)_1$ was rejected.

However, the chi-square tests for National Business Education Quarterly, Business Education Forum, and "other" business education magazines were not significant; therefore, the null hypothesis $(H_o)_1$ was retained.

No chi square was calculated for the reading of the Balance Sheet and teaching categories because of the low expected frequencies in fifty per cent of the cells.

Business Education World

The percentages of response from those teaching no data processing and from those teaching a separate course in data processing with no

TABLE XXVI

PERCENTAGE RESPONSE FOR TEACHING CATEGORIES AND THE READING OF BUSINESS EDUCATION MAGAZINES

Magazines	None	Unit	Course No Equipment	Course Equipment	Chi Square $x^2_{(3)} = 7.82$	Results
Business Education World	87.3	90.4	87.3	69.7	16.86	S
Journal of Business Education	63.0	59.0	71.8	46.8	10.51	S
National Business Education Quarterly	40.0	36.1	38.0	26.6	4.30	NS
Business Education Forum	42.4	42.2	42.3	38.0	0.49	NS
Balance Sheet	98.8	95.2	97.2	87.3	None	
Other	15.2	21.7	25.4	12.7	5.82	NS
Number in Categories	165	83	71	79		

This table should be read: Fewer respondents who were teaching a course in data processing with equipment read business education magazines than did the respondents in the other three categories.

equipment were equal (87.3). The two groups were exceeded only by those teaching a unit in data processing (90.4 per cent). The significance of the difference is in the category of teaching a separate course in data processing with equipment in which only 69.7 per cent read Business Education World. This magazine was of relative importance to each of the teaching categories.

Journal of Business Education

Sixty-three per cent of those teaching no data processing read Journal of Business Education; whereas, 59 per cent of those teaching a unit in data processing read it. A higher percentage, 71.8, of those teaching a course in data processing with no equipment read the magazine than did those teaching no data processing. Only 46.8 per cent of those teaching a course in data processing with equipment read Journal of Business Education.

National Business Education Quarterly

Less than forty per cent in any category read National Business Education Quarterly compared with sixty per cent or more who did not read the magazine. The magazine was most frequently read by those who did not teach any data processing. The greatest percentage difference which occurred within the sample was ten per cent: 26.6 per cent of those teaching a course with equipment read the magazine; 36.1 per cent of those teaching a unit in data processing read it.

Business Education Forum

Variations among the first three teaching categories were only one

tenth of one per cent. The greatest difference which occurred was between those not teaching data processing and those teaching a course in data processing with equipment.

Balance Sheet

The percentages of response varied only slightly: 98.8 per cent read the magazine who were teaching no data processing concepts; 95.2 per cent read it who were teaching a unit in data processing; 97.2 per cent of those teaching a course in data processing with no equipment; and 87.3 per cent of those teaching a course in data processing with equipment.

Other Business Education Magazines

The percentages of response for all teaching categories involving the teaching of data processing exceeded the percentage of response from those who were teaching no data processing. The highest percentages of response for reading "other" business education magazines were from those teaching a unit in data processing (21.7) and those teaching a course in data processing with no equipment (25.4). Only 15.2 per cent of those teaching no data processing concepts and 12.7 per cent of those teaching a course in data processing with equipment indicated they read business education magazines other than those listed in the study.

Summary

The Balance Sheet was the most frequently read business education magazine by all teaching categories. Over fifty per cent in each of the

categories read Business Education World and Journal of Business Education. It would seem that business educators are more likely to read magazines which they do not have to purchase than those which require membership in an organization or a subscription fee.

Organizational Memberships

The percentages of response for teaching categories and the various organizational categories are presented in Table XXVII. The percentages are a function of the number of individuals responding in each of the categories. For example, 61.5 per cent of the 39 respondents who were teaching a unit in data processing were members of NBEA. Only 2.6 per cent of those same 39 were members of DPMA.

Because of the low expected frequencies, valid chi squares could not be calculated for any of the organizations except NBEA. The calculated chi square for NBEA was less than the critical value; therefore, the null hypothesis $(H_o)_3$ was retained.

Over fifty per cent in each category held membership in NBEA and allied organizations. No one held membership in the Systems and Procedures Association, Cost Accounting Association, or the Machine Accounting Association. A higher percentage of individuals teaching a course in data processing with no equipment were members of DPMA, Data Processing Management Association, and SABE, Society for Automation in Business Education, than were those teaching a unit or a course in data processing with equipment.

The percentage of responses for those teaching a unit in data processing exceeded those in the other categories for membership in the Administrative Management Association. The percentage of responses for

TABLE XXVII

PERCENTAGE RESPONSE FOR TEACHING CATEGORIES AND VARIOUS DATA PROCESSING AND BUSINESS EDUCATION ORGANIZATIONS

Organizations	Unit	Course No Equipment	Course Equipment
NBEA	61.5	57.4	69.0
DPMA	2.6	6.4	2.4
SABE	7.7	8.5	2.4
Systems and Procedures	0.0	0.0	0.0
Administrative Management Society	7.7	4.3	2.4
Cost Accounting Association	0.0	0.0	0.0
Machine Accounting Assoc.	0.0	0.0	0.0
Other	20.5	23.4	23.8
	39	47	42

N = 128

This table should be read: Of the 39 respondents who teach a unit in data processing, 61.5 per cent are members of NBEA and allied organizations.

those teaching a course in data processing with equipment was highest for membership in NBEA and organizations other than those enumerated.

Teaching Experience in Subjects Related to Business and Business Data Processing

Tables XXVIII through XXXI give the percentages of response for twenty-four courses in three categories: data processing, business education, and general education. Because of the nature of the question, multiple responses could be made. Those who made multiple responses could have been teaching the subject in the school year the data was collected and could also have taught it previously. In instances where some respondents failed to answer the question or parts of it, the number of respondents was less than the total number of questionnaires returned. For example, in Table XXVIII, there were only 151 responses to the subject Introduction to Business, but there were 180 responses to Typewriting.

Introduction to Data Processing

The course, Introduction to Data Processing, had never been taught by 92.3 per cent of those who were teaching no data processing but had been taught by 7.7 per cent of the respondents.

Of those teaching a unit in data processing, 57.1 per cent were teaching the course, 19 per cent had taught it, and 23.9 per cent had never taught the course.

In category three, those teaching a course in data processing with no equipment, 69.7 per cent were teaching Introduction to Data Processing, 13.6 per cent had taught it, and 16.7 per cent had never taught

TABLE XXVIII

PERCENTAGE RESPONSE OF THOSE TEACHING NO DATA PROCESSING CONCEPTS REGARDING SUBJECTS THEY WERE TEACHING, HAD TAUGHT, AND HAD NEVER TAUGHT

Subjects	Number of Responses	Percentages of Response*		
		Were Teaching	Had Taught	Had Never Taught
Introduction to Data Processing	130	0.0	7.7	92.3
Unit Record Equipment	131	0.0	7.0	93.0
Unit Record Systems	130	0.0	1.5	98.5
Introduction to Systems Analysis	129	0.0	.8	99.2
Data Processing Systems	132	0.0	4.5	95.5
Introduction to Digital Computers	130	0.0	2.3	97.7
Computer Logic and Theory	128	0.0	0.0	100.0
Introduction to Programming	129	0.0	3.1	96.9
Advanced Programming	130	0.0	0.0	100.0
Data Processing Applications	131	0.0	2.3	97.7
Data Processing Math	129	0.0	0.8	99.2
Field Work in Data Processing	129	0.0	1.6	98.4
Other	62	0.0	0.0	100.0
Bookkeeping/Accounting	173	40.5	44.5	15.0
Shorthand	161	43.4	31.6	25.0
Typewriting	180	65.0	31.7	3.3
Office Procedures/ Management	142	25.3	28.9	45.8
Secretarial/Clerical Practice	158	37.3	33.5	29.2
Introduction to Business	151	23.2	46.4	30.4
Management	131	6.1	16.0	77.9
Math	129	10.0	17.8	72.2
Science	117	0.9	4.3	94.8
Social Science	128	2.3	20.3	77.4

*Percentages of response horizontally total 100 per cent.

TABLE XXIX

PERCENTAGE RESPONSE OF THOSE TEACHING A UNIT IN DATA PROCESSING REGARDING SUBJECTS THEY WERE TEACHING, HAD TAUGHT, AND HAD NEVER TAUGHT

Subjects	Number of Responses	Percentages of Response*		
		Were Teaching	Had Taught	Had Never Taught
Introduction to Data Processing	84	57.1	19.0	23.9
Unit Record Equipment	66	24.2	9.1	66.7
Unit Record Systems	65	15.4	7.7	76.9
Introduction to Systems Analysis	60	1.7	3.3	95.0
Data Processing Systems	62	11.3	4.8	83.9
Introduction to Digital Computers	63	11.1	8.0	80.9
Computer Logic and Theory	63	6.3	4.8	88.9
Introduction to Programming	65	20.0	7.7	72.3
Advanced Programming	74	17.6	4.1	78.3
Data Processing Applications	64	17.2	6.3	76.5
Data Processing Math	60	1.7	1.7	96.6
Field Work in Data Processing	61	9.8	6.6	83.6
Other	27	11.1	0.0	88.9
Bookkeeping/Accounting	85	43.5	48.2	8.3
Shorthand	30	45.0	42.5	12.5
Typewriting	86	61.6	37.2	1.2
Office Procedures/ Management	73	39.7	26.0	34.3
Secretarial/Clerical Practice	80	51.25	32.5	16.25
Introduction to Business	73	16.4	49.3	34.3
Management	61	4.9	16.4	78.7
Math	61	3.3	24.6	72.1
Science	57	0.0	7.0	93.0
Social Science	60	5.0	15.0	80.0

*Percentages of response horizontally total 100 per cent.

TABLE XXX

PERCENTAGE RESPONSE OF THOSE TEACHING A COURSE IN DATA PROCESSING WITH NO EQUIPMENT REGARDING SUBJECTS THEY WERE TEACHING, HAD TAUGHT, AND HAD NEVER TAUGHT

Subjects	Number of Responses	Percentages of Response*		
		Were Teaching	Had Taught	Had Never Taught
Introduction to Data Processing	66	69.7	13.6	16.7
Unit Record Equipment	60	30.0	8.3	61.7
Unit Record Systems	56	14.3	8.9	76.8
Introduction to Systems Analysis	53	3.8	7.5	88.7
Data Processing Systems	53	15.1	7.5	77.4
Introduction to Digital Computers	55	14.5	3.6	81.9
Computer Logic and Theory	52	5.8	3.8	90.4
Introduction to Programming	53	15.1	3.8	81.1
Advanced Programming	57	14.0	0.0	86.0
Data Processing Applications	53	20.8	1.9	77.3
Data Processing Math	53	7.5	1.9	90.6
Field Work in Data Processing	56	10.7	5.4	83.9
Other	22	4.5	0.0	95.5
Bookkeeping/Accounting	74	35.1	52.7	12.2
Shorthand	67	35.8	40.3	23.9
Typewriting	76	48.7	46.1	5.2
Office Procedures/ Management	62	30.6	35.5	33.9
Secretarial/Clerical Practice	74	51.4	36.5	12.1
Introduction to Business	57	12.3	63.1	24.6
Management	54	7.4	16.7	75.9
Math	57	3.5	15.8	80.7
Science	54	0.0	1.9	98.1
Social Science	55	0.0	12.7	87.3

*Percentages of response horizontally total 100 per cent.

TABLE XXXI

PERCENTAGE RESPONSE OF THOSE TEACHING A COURSE IN DATA PROCESSING WITH EQUIPMENT REGARDING SUBJECTS THEY WERE TEACHING, HAD TAUGHT, AND HAD NEVER TAUGHT

Subjects	Number of Responses	Percentages of Response*		
		Were Teaching	Had Taught	Had Never Taught
Introduction to Data Processing	81	63.0	28.1	8.9
Unit Record Equipment	69	47.8	18.8	33.4
Unit Record Systems	62	29.0	14.5	56.5
Introduction to Systems Analysis	57	8.8	5.3	85.9
Data Processing Systems	61	29.5	11.5	59.0
Introduction to Digital Computers	58	27.6	6.9	65.5
Computer Logic and Theory	55	18.2	1.8	80.0
Introduction to Programming	62	32.3	12.9	54.8
Advanced Programming	70	28.6	1.4	70.0
Data Processing Applications	56	28.6	5.4	66.0
Data Processing Math	55	7.3	1.8	90.9
Field Work in Data Processing	54	20.4	1.8	77.8
Other	21	14.3	4.8	80.9
Bookkeeping/Accounting	72	40.3	40.3	19.4
Shorthand	67	26.9	41.8	31.3
Typewriting	79	45.6	45.6	8.8
Office Procedures/ Management	57	26.3	33.3	40.4
Secretarial/Clerical Practice	68	42.6	33.7	23.7
Introduction to Business	63	11.1	47.6	41.3
Management	55	5.5	12.7	81.8
Math	56	8.9	17.9	73.2
Science	52	0.0	1.9	98.1
Social Science	52	1.9	15.4	82.7

*Percentages of response horizontally total 100 per cent.

the course.

A course entitled Introduction to Data Processing was being taught by 63 per cent of those teaching a course in data processing with equipment. Over thirty-five per cent of those teaching a course in data processing with equipment were not actively engaged in teaching Introduction to Data Processing.

Unit Record Equipment

Of the 131 responses from those teaching no data processing, 7 per cent had taught unit record equipment in the past and 93 per cent had never taught the course.

Of the sixty-six responses from those teaching a unit in data processing, 24.2 per cent were teaching unit record equipment, 9.1 per cent had taught it, and 66.7 per cent had never taught the course.

Of those teaching a course with equipment, 47.8 per cent were teaching unit record equipment, 18.8 per cent had taught it, and 33.4 per cent had never taught unit record equipment.

Unit Record Systems

Of the 130 responses from those teaching no data processing only 1.5 per cent had taught the course and 98.5 per cent had never taught unit record systems. Over two-thirds of the responses from those teaching a unit in data processing and those teaching a course with no equipment had never taught unit record systems. Only 15.4 and 14.3 per cent respectively were teaching unit record systems at the time of the study. Unit record systems had been taught previously by 7.7 per cent of those teaching a unit in data processing and 8.9 per cent of those teaching a

course in data processing with no equipment.

Of the respondents teaching a course in data processing with equipment, 56.5 per cent had never taught systems, 29 per cent were teaching it, and 14.5 per cent had taught unit record systems.

Introduction to Systems Analysis

A majority of responses for all categories had never taught Introduction to Systems Analysis. The highest percentage of responses for currently teaching the course was recorded by those teaching a course in data processing with equipment (8.8 per cent). While 7.5 per cent of those teaching a course in data processing with no equipment had taught Introduction to Systems Analysis previously, only 3.8 per cent were teaching it at the time of the study.

Data Processing Systems

The teaching of Data Processing Systems was indicated by 29.5 per cent of those who were teaching a course in data processing with equipment compared with 15.1 per cent of the responses from those teaching a course with no equipment and 11.3 per cent of the responses from those teaching a unit in data processing. A high percentage of the responses indicated that very few teachers had ever taught Data Processing Systems.

Introduction to Digital Computers

This course was being taught most frequently by those teaching a course in data processing with equipment (27.6 per cent). Only 6.9 per cent had taught it and 65.5 per cent had never taught the course. Of

the responses from those teaching a course in data processing with no equipment, 14.5 per cent were currently teaching Introduction to Digital Computers. The percentage of responses from those teaching a unit in data processing indicated that 11.1 per cent had taught the course and 80.9 per cent had never taught it. A very small percentage (2.3) of those teaching no data processing had ever taught Introduction to Digital Computers. Ninety-seven and seven-tenths per cent had never taught the course.

Computer Logic and Theory

A few (5.8) of those teaching data processing with no equipment were teaching Computer Logic and Theory compared with 18.2 per cent of those teaching with equipment. An even smaller percentage (3.8 and 5.8) had taught it previously and the majority, over eighty per cent in each category, had never taught Computer Logic and Theory.

Introduction to Programming Concepts

Twenty per cent of the responses from those teaching a unit in data processing indicated that they included Introduction to Programming Concepts in their units of instruction; 7.7 per cent had either taught a course by this title in the past or had included the concepts within a unit of instruction; and 72.3 per cent of the responses had never taught either the course or the concepts.

Of the responses from those teaching a course in data processing with no equipment, 15.1 per cent were teaching Introduction to Programming; 3.8 per cent had taught it; and 81.1 per cent had never taught it.

Of those teaching a course in data processing with equipment, 32.3

per cent were teaching Introduction to Programming; 12.9 per cent had taught it; and 54.8 per cent had never taught the course.

Advanced Programming

More respondents teaching a course in data processing with equipment were teaching advanced programming than were respondents teaching a course with no equipment. The teaching of advanced programming concepts was indicated by 17.6 per cent of those responding who were teaching a unit in data processing. A range of 70 to 100 per cent in all categories had never taught advanced programming concepts.

Data Processing Applications

Of the 131 responding who were teaching no data processing, 2.3 per cent had taught data processing applications previously and 97.7 per cent had never taught data processing applications. Approximately two thirds, or 66 per cent, of those responding who were teaching a course in data processing with equipment had never taught data processing applications. Data processing applications were, however, being taught by 28.6 per cent of those in category four. Over three fourths, or 76.5 per cent, of those teaching a unit in data processing had never taught data processing applications; whereas, 77.3 per cent of those teaching a course in data processing with no equipment had never taught applications of data processing.

Data Processing Math

Only one individual in category one had previously taught data processing math; 99.2 per cent had never taught it. Equal percentages

of response were recorded from those teaching a unit in data processing for the categories of "were teaching" and "had taught" data processing math; 96.6 per cent had never taught the course. The majority of teachers who were teaching a course in data processing indicated they had never taught data processing math.

Field Work in Data Processing

Field work in data processing was being taught by 20.4 per cent of those teaching a course in data processing with equipment; 1.8 per cent had taught it previously; and 77.8 per cent had never been involved in the teaching of field work in data processing.

Of those responding who were teaching a course in data processing with no equipment, 10.7 per cent were teaching field work in data processing; 5.4 per cent had taught it; and 83.9 per cent had never taught the course.

The lowest percentage recorded, 9.8 per cent, for teaching field work in data processing was by the group teaching a unit in data processing; 6.6 per cent had taught it; and 83.6 per cent had never taught field work in data processing.

Other

Approximately half of those who had been responding to this question failed to do so for this category. Very few were teaching or had taught data processing courses or concepts other than those enumerated.

Summary for Data Processing Courses

Since category one consisted of those who were teaching no data

processing, it was only natural that there would be no responses for the current teaching of the data processing courses listed. Less than eight per cent in teaching category one had ever taught in the area of data processing.

The highest percentage of response for the current teaching of the data processing courses among the three categories of data processing teachers was from those teaching a separate course in data processing with equipment. The only exception was for the course Introduction to Data Processing where 69.7 per cent of those teaching a separate course in data processing with no equipment indicated they were teaching Introduction to Data Processing compared with 63.0 per cent of those teaching a course in data processing with equipment.

Business Education Courses

Bookkeeping/Accounting. Fifteen per cent of those in category one had never taught bookkeeping/accounting compared with 8.3 per cent of those teaching a unit in data processing, 12.2 per cent of those teaching a separate course in data processing with no equipment, and 19.4 per cent of those teaching a separate course in data processing with equipment. A higher percentage of individuals who were teaching a unit in data processing were teaching bookkeeping/accounting than in the other three teaching categories. Educators teaching a separate course in data processing with no equipment were less likely to be teaching bookkeeping/accounting than were the educators who were teaching no data processing.

Shorthand. Percentages of response indicate that those who were teaching a course in data processing with equipment were the least

likely of the four teaching categories to have taught shorthand. Those who were teaching a unit in data processing had the highest percentage of responses for the teaching of shorthand some time in their teaching careers.

Typewriting. Of the 180 responses from those teaching no data processing, 65 per cent were currently teaching typewriting, 57 per cent had taught it in the past, and 3.3 per cent had never taught typewriting.

Typewriting was being taught by 61.6 per cent of the 86 responses from those teaching a unit in data processing. There was a 37.2 per cent response for teaching typewriting in the past and a 1.2 per cent response for never having taught the course.

The highest percentage of response for never teaching typewriting came from those teaching a course in data processing with equipment (8.8 per cent). Only 1.2 per cent of the responses from those teaching a unit in data processing had never taught typewriting. More educators teaching a course in data processing with no equipment were teaching typewriting than had taught the course in the past.

Office Procedures/Management. Of the 142 responses to the teaching of Office Procedures/Management from those teaching no data processing, 25.3 per cent were presently teaching the course; 28.9 per cent had taught it; and 45.8 per cent had never taught it.

Office Procedures/Management was being taught by 39.7 per cent of those teaching a unit in data processing. Twenty-six per cent had taught the course and 34.3 per cent had never taught it.

Of those who were teaching a course with no equipment, 30.6 per cent indicated that they were currently teaching Office Procedures/ Management, 35.5 per cent had taught it in the past, and 33.9 per cent

had never taught the course.

Of the responses from those teaching a course in data processing with equipment, 26.3 per cent were teaching Office Procedures/Management, 33.3 per cent had taught it, and 40.4 per cent had never taught it.

Secretarial/Clerical Practice. Of the 158 responses from those teaching no data processing, 37.3 per cent were for the current teaching of the course, 33.5 per cent for had taught it, and 29.2 per cent for had never taught it.

Secretarial/Clerical Practice was being taught by 51.25 per cent of those responding who were teaching a unit in data processing. The course had been taught by 32.5 per cent and had never been taught by 12.1 per cent.

There was a higher percentage response from those teaching a course in data processing with no equipment (51.4 per cent) for the current teaching of Secretarial/Clerical Practice than from those teaching a course in data processing with equipment (42.6 per cent). Of those teaching a course with equipment, 23.7 per cent had never taught the course.

Introduction to Business. The teachers with the least involvement in the teaching of Introduction to Business were those teaching a course in data processing with equipment. Only 11.1 per cent were presently teaching the course, 47.6 per cent had taught it, and 41.3 per cent had never taught it.

The teachers with the greatest percentage involvement were those teaching no data processing: 23.2 per cent were teaching the course, 46.4 per cent had taught it, and 30.4 per cent had never taught

Introduction to Business.

Of those teaching a unit in data processing, 16.4 per cent were teaching Introduction to Business; 49.3 per cent had taught the course; and 34.3 per cent had never taught it. Twelve and three-tenths per cent of those teaching data processing with no equipment were teaching Introduction to Business, 63.1 per cent had taught it, and 24.6 per cent had never taught the course.

Management. Over seventy-five per cent of all responses in the three teaching categories indicated that Management had never been taught. A higher percentage had taught the course previously than were currently teaching it.

Math. Approximately seventy-two per cent of the responses in teaching categories 1, 2, and 4 had never taught math. Math had not been taught by 80.7 per cent of those who were teaching a course with no equipment.

Math was being taught by 10 per cent of those who were teaching no data processing compared with 17.8 per cent who had previously taught math. The percentages of response from those teaching a unit in data processing were 3.3 per cent for teaching math currently and 24.6 per cent for having taught it.

Science. Less than seven per cent in each category had taught science or were teaching it at the time of the study. One of the respondents who was teaching no data processing indicated the current teaching of science. The highest percentage of respondents who had taught science was from those who were teaching a unit in data processing.

Social Science. A small percentage of the responses, 2.3, from

those teaching no data processing were teaching social science; 20.3 per cent had taught in the area; and 77.4 per cent had never taught in the social sciences. Of those who were teaching a unit in data processing, 80 per cent indicated they had never taught a course in social science. Only 12.7 per cent of those teaching a course in data processing with no equipment had ever taught in the social science area compared with 17.3 per cent of those teaching a course in data processing with equipment.

In Table XXXII, a percentage response summary for subject areas and teaching categories is given. There are thirteen subject listings for data processing, seven subject listings for business education, and four subject listings for general education. Each respondent had a possibility of forty-eight responses.

The highest percentages of response were in the data processing courses, "had never taught." The highest percentage of response for data processing courses which were being taught was recorded for the group teaching a course in data processing with equipment (14.7 per cent). The highest percentage of response of business education courses being taught was from those teaching a unit in data processing (13.6 per cent).

The group which was teaching a course with equipment ranked highest in the number of responses for the number of data processing courses which they had taught in the past and ranked lowest for the data processing courses which they had never taught.

Of those teaching business education courses at the time of the study, those teaching a unit in data processing ranked highest with 13.6 per cent. Fourteen and one-half per cent of the responses from the

TABLE XXXII

PERCENTAGE RESPONSE SUMMARY FOR SUBJECT AREAS AND TEACHING CATEGORIES

Subject Areas	None	Unit	Course No Equipment	Course Equipment
Were Teaching:				
Data Processing	0.0	8.2	9.5	14.7
Business Education	12.5	13.6	11.6	9.8
General Education	1.3	.9	.7	.6
Had Taught:				
Data Processing	1.3	3.7	2.8	5.3
Business Education	11.7	12.7	14.5	12.3
General Education	2.5	2.5	1.9	2.2
Had Never Taught:				
Data Processing	49.9	39.7	38.8	33.2
Business Education	10.4	8.3	8.5	10.9
General Education	10.4	10.3	11.7	10.9
Total Responses	3163	1553	1341	1396

N = 7453

This table should be read: 12.5 per cent of the total responses for those teaching a unit in data processing were in the category of teaching courses in business education at the time of the study.

group teaching a course in data processing without equipment had taught business education courses previously.

Category four, those teaching a data processing course with equipment, ranked highest for business education courses "had never taught" (10.9 per cent).

The responses from those teaching no data processing ranked highest for the teaching of general education subjects at the time of the study. Of those who had taught general education subjects previously, those teaching no data processing at all and those teaching a unit in data processing tied for the highest percentages of response. Those teaching a course in data processing with no equipment ranked highest for "had never taught" the general education subjects.

Findings seem to indicate that the more specialized one becomes in the area of data processing, the less likely it is that he will teach in the area of secretarial skills. The tendency is for continued involvement in the teaching of bookkeeping/accounting and typewriting, but very little, if any, involvement in the teaching of general education subjects.

Conclusion

This chapter has presented a summary of the findings regarding the environmental characteristics of four selected groups of business educators in the United States. Chapter V will be a presentation of the educational characteristics of each of the four groups and the similarities and differences which existed among them.

CHAPTER V

ANALYSIS OF DATA REGARDING THE EDUCATIONAL CHARACTERISTICS OF SECONDARY BUSINESS DATA PROCESSING TEACHERS IN THE UNITED STATES

An attempt was made to determine the differences in the educational characteristics of business educators in the United States in four categories: (1) a group teaching no data processing concepts, (2) a group teaching a unit in data processing in a traditional business class, (3) a group teaching a course in data processing with no equipment, and (4) a group teaching a data processing course with equipment. A further explanation of each of these categories was made in Chapter I. The similarities as well as the differences among the four groups will be explained in this chapter.

Educational Level Attained

Degree--No Degree

The null hypothesis $(H_o)_2$ was rejected when the chi-square value exceeded the .05 level of significance. As illustrated in Table XXXIII, 9.1 per cent of those teaching a course in data processing with equipment and 1.5 per cent of those teaching a course with no equipment had not received a degree compared with 2.5 per cent of those teaching

TABLE XXXIII

PERCENTAGE RESPONSE FOR DEGREE EARNED AND TEACHING CATEGORIES

Categories of Teaching	Number of Respondents	No Degree	Degree Earned
None	163	2.5	97.5
Unit	75	0.0	100.0
Course No Equipment	67	1.5	98.5
Course Equipment	77	9.1	90.9

$N = 382$; $x^2_{(3)} = 12.242$

This table should be read: Of the 75 respondents who were teaching a unit in data processing, 100 per cent had earned a degree from college.

no data processing. All seventy-five respondents who were teaching a unit in data processing had received a college degree.

Highest Degree Held

Of the respondents teaching no data processing, 34.4 per cent held only a bachelor's degree compared with 23.5 per cent of those teaching a unit in data processing, 29.6 per cent of those teaching a separate course in data processing with no equipment, and 30.6 per cent of those teaching a separate course in data processing with equipment. Those teaching no data processing ranked highest for the number of bachelor degrees awarded (Table XXXIV).

Graduate work beyond the bachelor's degree had been done by 19.7 per cent of those teaching in data processing with no equipment compared with 25.2 per cent of those teaching no data processing, 27.2 per cent of those teaching a unit in data processing, and 34.7 per cent of those teaching a course in data processing with equipment.

A higher percentage of those teaching a course in data processing with no equipment had received a master's degree than had those teaching no data processing. But, those teaching a unit in data processing and a separate course in data processing with equipment had earned fewer master's degrees than had those teaching no data processing.

Those who were teaching no data processing ranked the lowest for graduate work beyond the master's (15.2 per cent). Graduate work beyond the master's degree had been done by 15.5 per cent of those teaching a separate course in data processing with no equipment, 20.8 per cent of those teaching a separate course in data processing with equipment, and 29.5 per cent of those teaching a unit in data processing.

TABLE XXXIV

PERCENTAGE RESPONSE FOR DEGREES HELD AND TEACHING CATEGORIES

Categories of Teaching	Number of Respondents	B.S.	B.S.+	M.S.	M.S.+
None	163	34.4	25.2	25.2	15.2
Unit Course	81	23.5	27.2	19.8	29.5
No Equipment Course	71	29.6	19.7	35.2	15.5
Equipment	72	30.6	34.7	13.9	20.8

N = 387

This table should be read: 34.4 per cent of the 163 respondents who were teaching no data processing held a Bachelor of Science degree.

A lower percentage of those teaching a course in data processing with equipment (34.7) had earned a master's degree than either of the other three teaching categories. For 40.4 per cent of those teaching no data processing, the highest degree earned was the bachelor's compared with 49.3 per cent of those teaching a unit in data processing and 50.7 per cent of those teaching a separate course in data processing with no equipment.

Year Highest Degree Received

In Table XXXV, 77.9 per cent of those teaching no data processing had received their highest degree since 1960; 13.5 per cent between 1951 and 1960; and 8.6 per cent prior to 1951.

Seventy-three per cent of those teaching a unit in data processing received degrees from 1961-1970; 18.6 per cent from 1951-1960; and 7.4 per cent prior to 1951.

Those teaching a course in data processing with no equipment earned 71.8 per cent of their highest degrees between 1961 and 1970; 19.7 per cent between 1951 and 1960; and 8.5 per cent prior to 1951.

Category four, those teaching a course in data processing with equipment, was unique in that a larger percentage received their degrees prior to 1951 than any of the other categories: 15.3 per cent were earned prior to 1951; 18.1 per cent from 1951 to 1960; and 66.6 per cent from 1961 to 1970.

The years in which the degrees were awarded may be some indication of the amount of training available in data processing and the degree of implementation of that training into the teaching process. Even though 77.9 per cent of those teaching no data processing had received

TABLE XXXV

PERCENTAGE RESPONSE FOR YEAR HIGHEST DEGREE WAS OBTAINED AND TEACHING CATEGORIES

Categories of Teaching	Number of Respondents	Prior to 1951	1951-1960	1961-1970
None	163	8.6	13.5	77.9
Unit Course	81	7.4	18.6	73.0
No Equipment Course	71	8.5	19.7	71.8
Equipment	72	15.3	18.1	66.6

N = 387

This table should be read: 15.3 per cent of those who were teaching a course in data processing with equipment earned their degree prior to 1951.

their highest degrees since 1960, none of them were in any way teaching about the automatic handling of data in the business world. With the advent of the computer for commercial use in 1951 and the development of curriculum for data processing within the colleges and universities during the late 1950's and early 1960's, it would seem that individuals involved in the teaching process would have received some training in the use of the computer and would be looking for opportunities to integrate the material into the courses they are teaching.

Major and Minor Areas in Undergraduate and Graduate Programs

Undergraduate Majors. There were no responses for undergraduate majors in the physical sciences, industrial arts, biological sciences, or chemistry from those teaching data processing as shown in Table XXXVI. There was only one math major in the category of teaching a course in data processing with equipment.

Over seventy per cent of the majors in each category majored either in business or business education. The per cent of majors exceeded five per cent in only three other areas: social science, those teaching a unit in data processing; education, those teaching a unit in data processing; and other, those teaching no data processing.

This data would indicate that the majority of individuals involved in the teaching of data processing have degrees with majors in business or business education. The undergraduate minors as listed in Table XXXVIII show approximately twenty per cent of those teaching no data processing, those teaching a unit in data processing and those teaching a course in data processing with equipment had minored in business or

TABLE XXXVI

PERCENTAGE RESPONSE FOR TEACHING CATEGORIES AND UNDERGRADUATE MAJORS

Undergraduate Majors	None	Unit	Course No Equipment	Course Equipment
Business	24.6	27.2	28.0	20.5
Business Education	59.2	50.5	56.0	54.2
Math	0.0	0.0	0.0	4.8
Physical Science	0.0	0.0	0.0	0.0
Biological Science	0.6	0.0	0.0	0.0
Chemistry	1.1	0.0	0.0	0.0
Social Science	1.7	7.1	1.3	4.8
Psychology	0.6	1.0	0.0	1.2
Engineering	0.0	0.0	0.0	1.2
English	2.2	2.0	4.0	3.6
Economics	1.7	2.0	2.7	1.2
Industrial Arts	0.0	0.0	0.0	0.0
Education	2.8	6.1	4.0	4.8
Other	5.5	4.0	4.0	3.6
	179	99	75	83

N = 436

This table should be read: 59.2 per cent of the responses from those who were teaching no data processing indicated a major in business education.

business education. This leaves only ten per cent not having business majors or minors in the undergraduate program.

One must consider that over fifty per cent in all categories had received a degree higher than a B.S.; therefore, the graduate majors, Table XXXVII, and minors, Table XXXIX, should be considered in this discussion. A range of sixty-five to eighty-five per cent of those who indicated a graduate major were majors in the area of business or business education.

It would appear that the majority of those involved in the teaching of business data processing at the secondary level have a background in business.

Graduate Majors. Of the 122 responses for graduate majors from those teaching no data processing as shown in Table XXXVII, 56.6 per cent were for business education and 24.6 per cent for education. Small percentages of respondents were majoring in business, English, economics, and other. There were no graduate majors indicated for physical science, biological science, chemistry, engineering, or industrial arts.

Of those teaching a unit in data processing, 63 per cent had graduate majors in business education and 12.3 per cent in education. Other major areas were business, social science, psychology, economics, and other.

Majors in business education were indicated by 57.9 per cent of the responses from those teaching a course in data processing with no equipment; 10.5 per cent were majors in business; 22.8 per cent in education; and 8.8 per cent in other areas. Graduate majors in each of the four teaching categories were concentrated in business, business education, and education.

TABLE XXXVII

PERCENTAGE RESPONSE FOR TEACHING CATEGORIES AND GRADUATE MAJORS

Graduate Majors	None	Unit	Course No Equipment	Course Equipment
Business	9.0	6.9	10.5	19.4
Business Education	56.6	63.0	57.9	53.2
Math	0.0	0.0	0.0	1.6
Physical Science	0.0	0.0	0.0	0.0
Biological Science	0.0	0.0	0.0	0.0
Chemistry	0.0	0.0	0.0	0.0
Social Science	0.0	4.1	0.0	0.0
Psychology	0.0	2.7	0.0	1.6
Engineering	0.0	0.0	0.0	0.0
English	0.8	0.0	0.0	1.6
Economics	1.6	1.4	0.0	1.6
Industrial Arts	0.0	0.0	0.0	0.0
Education	24.6	12.3	22.8	17.7
Other	7.4	9.6	8.8	3.3
	122	73	57	62

N = 314

This table should be read: Of the 73 responses from those who were teaching a unit in data processing, 63 per cent were for graduate majors in business education.

Undergraduate Minors. Of those teaching no data processing, Table XXXVIII, physical science and chemistry were the only two fields in which no one had minored. The undergraduate minors were as follows: 20.8 per cent in English, 20.1 per cent in social science, 14.5 per cent in areas other than those enumerated, 13.2 per cent in economics, and 10.7 per cent in business education.

Minors checked by those teaching a unit in data processing were 20.2 per cent in English, 17.9 per cent in social science, 15.5 per cent in others than those enumerated, and 11.9 per cent in economics. Two minor areas not checked were biological science and engineering.

Six subject area minors were not checked by those teaching a course in data processing with no equipment: business, physical science, biological science, chemistry, engineering, and industrial arts. Minors which were indicated included 28.8 per cent for social science, 20.3 per cent for English, 15.2 per cent for economics, and 11.9 per cent each for education and other subject areas not included in this study.

The highest percentage of minors for those teaching a course in data processing with equipment was in the social sciences (26.5). For each of the following minor areas there was a 14.7 per cent response for business, English, and economics. There were no minors in biological science, chemistry, or engineering.

Minor areas which were consistently indicated for both graduate and undergraduate programs were business, business education, social science, psychology, English, economics, and education.

Graduate Minors. In Table XXXIX, minor areas of study for those teaching no data processing were 21.8 per cent in education, 21.8 per cent in business education, 15.1 per cent in other areas, and 10.9 per

TABLE XXXVIII

PERCENTAGE RESPONSE FOR TEACHING CATEGORIES AND UNDERGRADUATE MINORS

Undergraduate Minors	None	Unit	Course No Equipment	Course Equipment
Business	6.2	8.3	0.0	14.7
Business Education	10.7	9.5	5.1	5.9
Math	3.8	2.4	1.7	1.5
Physical Science	0.0	1.2	0.0	1.5
Biological Science	1.9	0.0	0.0	0.0
Chemistry	0.0	1.2	0.0	0.0
Social Science	20.1	17.9	28.8	26.5
Psychology	1.9	3.6	5.1	2.9
Engineering	0.6	0.0	0.0	0.0
English	20.8	20.2	20.3	14.7
Economics	13.2	11.9	15.2	14.7
Industrial Arts	0.6	1.2	0.0	1.5
Education	5.7	7.1	11.9	5.9
Other	14.5	15.5	11.9	10.2
	159	84	59	68

N = 370

This table should be read: 28.8 per cent of those who were teaching a course in data processing with no equipment had undergraduate minors in social science.

TABLE XXXIX

PERCENTAGE RESPONSE FOR TEACHING CATEGORIES AND GRADUATE MINORS

Graduate Minors	None	Unit	Course No Equipment	Course Equipment
Business	8.7	10.8	0.0	10.0
Business Education	21.8	19.0	17.4	30.0
Math	0.0	0.0	0.0	0.0
Physical Science	0.0	0.0	0.0	0.0
Biological Science	0.0	0.0	0.0	0.0
Chemistry	0.0	0.0	0.0	0.0
Social Science	10.9	8.1	26.1	16.7
Psychology	8.7	5.4	8.7	6.7
Engineering	0.0	0.0	0.0	0.0
English	6.5	2.7	0.0	3.3
Economics	6.5	5.4	13.0	3.3
Industrial Arts	0.0	0.0	0.0	0.0
Education	21.8	21.6	17.4	10.0
Other	15.1	27.0	17.4	20.0
	46	37	23	30

N = 136

This table should be read: 17.4 per cent of the 23 respondents who were teaching a course in data processing with no equipment had chosen business education as their minor.

cent in social science. There were no minors in math, physical science, biological science, chemistry, or engineering. Only minor incidence of responses were recorded in the other subject areas.

Of the 37 responses from those teaching a unit in data processing, 21.6 per cent were in education, 19 per cent in business education, 27 per cent in other subject areas, and 10.8 per cent in business. There were few responses in each of the other categories except for math, physical science, biological science, chemistry, and engineering for which there were no responses.

Of those who were teaching a course in data processing with no equipment, 26.1 per cent indicated minoring in the social sciences, 17.4 per cent each in business education, education, and other subject areas, 13 per cent in economics, and 8.7 per cent in psychology.

Of those teaching a course in data processing with equipment, 30 per cent indicated minors in business education, 16.7 per cent in social science, 20 per cent in "other" subject areas, 10 per cent each in business and education, 6.7 per cent in psychology, and 3.3 per cent each in English and economics.

Business education, social science, education, and "other" were the minor areas most frequently checked by each of the four teaching categories.

Educational Training in Areas of Data Processing

What Training Was Received

The null hypothesis $(H_o)_3$ of no differences in the training

received among the teaching categories for key punch simulator, data converting equipment, Introduction to Data Processing, Operations Research, Data Processing Math, computer programming, and "other" was retained at the .05 level of confidence. There was, however, a significant difference among the three categories of teachers relating to the training and instruction received on the key punch machine, sorter, accounting machine, collator, reproducer, interpreter, board wiring, "other" tabulating equipment, computer console operation, random access devices, paper-tape equipment, computer logic and theory, Introduction to Systems, and computer numbering systems; therefore, the null hypothesis $(H_o)_3$ was rejected.

Table XL not only gives the chi-square values for each of these areas but also gives the percentages of response of those who actually received training or instruction in these various areas. The percentages are a function of the total number of respondents in each category as given at the end of the table. The difference between the percentages reported and 100.0 per cent represents the percentage of respondents who did not indicate that they had received such training or instruction.

Key Punch Simulator. Over sixty per cent of all respondents in the three categories had received training on the key punch simulator. Of those teaching a course with equipment, 26.8 per cent had received training; 73.2 per cent had received no training on the key punch simulator.

Thirty-six and seven-tenths per cent of those teaching a course with equipment and 32.5 per cent of those teaching a unit in data processing had received training on the key punch simulator. The

TABLE XL

CHI-SQUARE VALUES AND PERCENTAGE RESPONSE FOR TRAINING AND INSTRUCTION RECEIVED IN VARIOUS AREAS OF DATA PROCESSING BY THE RESPONDENTS FOR THOSE CATEGORIES INVOLVED IN THE TEACHING OF DATA PROCESSING

Areas of Instruction or Training	Percentages of Response			Chi Square $x^2_{(2)} = 5.99$	Results
	Unit	Course No Equipment	Course Equipment		
Key Punch Simulator	32.5	26.8	36.7	1.70	NS
Key Punch Machine	46.9	54.9	74.7	13.45	S
Sorter	42.2	46.5	59.5	12.54	S
Accounting Machine	41.0	39.4	59.5	7.79	S
Collator	32.5	43.7	54.4	7.91	S
Reproducer	30.1	46.5	55.7	11.06	S
Interpreter	28.9	43.7	50.6	8.26	S
Board Wiring	27.7	40.8	51.9	9.91	S
Other Tabulating Equipment	7.2	15.5	20.3	5.80	S
Computer Console Operation	14.5	22.5	35.4	9.89	S
Random Access Devices:	6.0	15.5	20.3	7.18	S
Data Converting Equipment	4.8	15.5	12.7	5.02	NS
Paper-Tape Equipment	9.6	23.9	24.1	7.19	S
Introduction to Data Processing	42.2	46.5	55.7	3.07	NS
Computer Logic and Theory	13.3	16.9	31.6	9.23	S
Introduction to Systems	10.8	19.7	30.4	9.61	S
Operations Research	3.6	7.0	7.8	1.33	NS
Data Processing Math	9.6	11.3	19.0	3.43	NS
Computer Numbering Systems	24.1	23.9	43.1	8.91	S
Programming	25.3	28.2	39.2	4.04	NS
Other	2.4	1.4	3.8	.86	NS
Number of Respondents per Category	83	71	79		

differences in the percentages of response were not significant.

Key Punch Machines. A significant difference did exist among the three teaching categories relating to the training received on the key punch machine. The greatest difference occurred among those teaching a course in data processing with equipment (74.7) compared with 46.9 per cent of the respondents teaching a unit in data processing and 54.9 per cent of those teaching a course in data processing with no equipment.

Sorter. The difference between the percentages of those teaching a unit in data processing (42.2) and those teaching a course in data processing with no equipment (46.5) was very minimal. The significance which existed among the three teaching categories was in the group who were teaching a course in data processing with equipment. Sixty-eight and four-tenths per cent had received instruction on the sorter.

Accounting Machine. Even though the differences were not as great as in some of the other categories of training, they were significant. This would indicate that there is an actual difference among the three groups in the total population. Of those teaching a course with equipment, 59.5 per cent had received instruction on the accounting machine compared with 41 per cent of those teaching a unit in data processing and 39.4 per cent of those teaching a course in data processing with no equipment.

Collator. There was a significant difference in the percentages of response among the three teaching categories. Training on the collator had been received by 54.4 per cent of the respondents who were teaching a course in data processing with equipment compared with 34.5 per cent of those teaching a unit in data processing and 43.7 per cent of those teaching a course in data processing with no equipment.

Reproducer. The differences among the three teaching groups concerning training on the reproducer were highly significant. Training on the reproducer had been received by 55.7 per cent of those teaching a course with equipment. Only 30.1 per cent of those teaching a unit in data processing had received training which represented an increase of 15.6 per cent between those teaching a unit in data processing and those teaching a course in data processing with equipment. Of those teaching a course with no equipment, 46.5 per cent had received training on the reproducer.

Interpreter. A difference of 21.7 per cent existed between those who were teaching a course in data processing with equipment and who had received training on the interpreter and those who were teaching a unit in data processing. Training had been received by 50.6 per cent of those teaching a course in data processing with equipment, 43.7 per cent of those teaching a course with no equipment, and 28.9 per cent of those teaching a unit in data processing. The greatest difference occurred between those teaching a course in data processing with equipment and those teaching a unit in data processing.

Board Wiring. Fifty-one and nine-tenths per cent of the respondents who were teaching a course in data processing with equipment, 40.8 per cent of those teaching a course in data processing with no equipment, and 27.7 per cent of those teaching a unit in data processing had received training on the wiring of boards for unit record equipment. The results were significant; therefore, a significant difference did exist among the three teaching categories as to the number in each group who had received training in board wiring for unit record equipment.

Other Tabulating Equipment. Twice as many respondents who were teaching a course with no equipment (15.5 per cent) had received training on tabulating equipment other than those enumerated in this study than had those who were teaching a unit in data processing (7.2 per cent). Of those teaching a course in data processing with equipment, 20.3 per cent had received training on other pieces of tabulating equipment. The significance would appear to be in the low percentage of those teaching a unit in data processing who had received training on "other" tabulating equipment.

Computer Console Operation. Training in the operation of the computer console had been received by 35.4 per cent of the respondents who were teaching a course with equipment compared with 14.4 per cent of those teaching a unit in data processing and 22.5 per cent of those teaching a course in data processing with no equipment.

Random Access Devices. Three times the number of respondents who were teaching a course in data processing with equipment (20.3 per cent) had received training than had those who were teaching a unit in data processing (6 per cent). Of the respondents who were teaching a course in data processing with no equipment, 15.5 per cent had received training on random access devices.

Data Converting Equipment. The differences which existed within the three groups of teachers were not great enough to be significant at the .05 level but were approaching significance at the .08 level. The differences which existed within the sample population were as follows: 4.8 per cent of those teaching a unit in data processing, 15.5 per cent of those teaching a course in data processing with no equipment, and 12.7 per cent of those teaching a course in data processing with

equipment had received training on data converting equipment.

Paper-Tape Equipment. The significance of the differences would be that only 9.6 per cent of the respondents who were teaching a unit in data processing had received training on paper-tape equipment compared with 23.9 per cent of those teaching a course with no equipment and 24.1 per cent of those teaching a course in data processing with equipment. Almost three times as many who were teaching a course in data processing had received training on paper-tape equipment as had those who were only teaching a unit in data processing.

Introduction to Data Processing. The percentage differences which existed within the sample were not significant. Approximately 48.1 per cent of all respondents had taken Introduction to Data Processing.

Computer Logic and Theory. The significant difference occurred among those who were teaching a course in data processing with equipment. Of respondents who were teaching a course with equipment, 31.6 per cent had taken Computer Logic and Theory. Only 13.3 per cent of those teaching a unit in data processing had taken the course. Of those who were teaching a course in data processing with no equipment, 16.9 per cent had taken Computer Logic and Theory.

Introduction to Systems. The greatest percentage difference occurred with a response of 30.4 per cent for those teaching a course in data processing with equipment compared with 19.7 per cent for those teaching a course in data processing with no equipment and 10.8 per cent for those teaching a unit in data processing. A majority in all categories had not taken Introduction to Systems.

Operations Research. The chi-square value calculated was not significant; therefore, the percentages in all teaching categories would be

equal in a total population. An average of approximately ninety-four per cent in all teaching categories had not taken the course.

Data Processing Math. The findings were not significant; therefore, it is estimated that in a total population there would be an equal percentage response in each of the three teaching categories for those who had and had not taken data processing math. Approximately thirteen per cent of all individuals involved in the study had taken data processing math.

Computer Numbering Systems. Approximately equal percentages of those teaching a unit in data processing and those teaching a course in data processing with no equipment had studied computer numbering systems. An additional twenty per cent of those teaching a course in data processing with equipment had studied computer numbering systems.

Computer Programming. Approximately equal percentages (less than forty per cent) in all teaching categories had studied computer programming.

Other. The findings were not significant; therefore, it is assumed that an equal percentage of respondents in each of the three teaching categories had received training in areas of data processing which were not enumerated in this study.

Where Training Was Received

Table XLI supplies the data necessary for determining where training or instruction in the various areas of data processing were received by those who were teaching a unit in data processing. The major portion of the training was received in college with adult education programs and on-the-job training ranking relatively high. Some training

TABLE XLI

PERCENTAGE RESPONSE FROM THOSE TEACHING A UNIT IN DATA PROCESSING RELATING TO WHERE TRAINING AND INSTRUCTION WAS RECEIVED FOR VARIOUS AREAS OF DATA PROCESSING

Areas in Data Processing	No.[a]	1[b]	2	3	4	5	6	7	8	9	10
Key Punch Simulator	27	11.1	0.0	0.0	7.4	7.4	3.7	33.3	14.8	0.0	22.2
Key Punch Machine	39	2.6	0.0	0.0	7.7	10.3	5.1	46.2	17.9	0.0	10.3
Sorter	35	2.9	0.0	0.0	11.4	8.6	5.7	45.7	11.4	0.0	14.3
Accounting Machine	34	2.9	0.0	0.0	11.8	8.8	2.9	47.1	11.8	0.0	14.7
Collator	27	3.7	0.0	0.0	11.1	11.1	3.7	44.4	7.4	0.0	18.5
Reproducer	25	4.0	0.0	0.0	16.0	12.0	0.0	48.0	8.0	0.0	12.0
Interpreter	24	4.2	0.0	0.0	16.7	12.5	0.0	45.8	8.3	0.0	12.5
Board Wiring	23	4.3	0.0	0.0	13.0	13.0	0.0	39.1	13.0	0.0	17.4
Other Tabulating Equipment	6	0.0	0.0	0.0	33.3	0.0	0.0	50.0	0.0	0.0	16.7
Computer Console Operation	12	0.0	0.0	0.0	8.3	0.0	0.0	66.7	8.3	0.0	16.7
Random Access Devices	5	0.0	0.0	0.0	0.0	0.0	0.0	80.0	0.0	0.0	20.0
Data Converting Equipment	4	0.0	0.0	0.0	25.0	25.0	0.0	50.0	0.0	0.0	0.0
Paper-Tape Equipment	8	0.0	0.0	0.0	25.0	0.0	0.0	62.5	0.0	0.0	12.5
Introduction to Data Processing	35	2.9	0.0	0.0	8.6	5.7	2.9	68.6	2.9	0.0	8.6
Computer Logic and Theory	11	0.0	0.0	0.0	9.1	0.0	0.0	90.9	0.0	0.0	0.0
Introduction to Systems	9	0.0	0.0	0.0	0.0	11.1	0.0	88.9	0.0	0.0	0.0
Operations Research	3	0.0	0.0	0.0	0.0	0.0	0.0	66.7	0.0	0.0	33.3
Data Processing Math	8	12.5	0.0	0.0	25.0	0.0	0.0	50.0	0.0	0.0	12.5
Computer Numbering Systems	20	5.0	0.0	0.0	15.0	0.0	0.0	70.0	5.0	0.0	5.0
Programming	21	0.0	0.0	0.0	9.5	0.0	4.8	71.4	4.8	0.0	9.5
Other	2	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0

[a]Number of respondents who had received training

[b]1 - High School
2 - High School Cooperative
3 - Area Vocational
4 - Adult Education
5 - Special Data Processing Classes
6 - Private Business School
7 - College
8 - Classes by Equipment Manufacturers
9 - Military
10 - On-the-Job Training

had been received in high school, in special data processing classes, in private business schools, and in classes conducted by equipment manufacturers. No one had received training in a high school cooperative program, in area vocational schools, or in the military service.

In Table XLII the percentages of response for those teaching a course in data processing with no equipment indicate that a high percentage of all training received by this group was at the college level. Several respondents who were teaching a course in data processing with no equipment had received their training in the military service. There was a decrease in the percentage response for training received in adult education programs and in high school but an increase for training received in classes conducted by equipment manufacturers compared with those teaching a unit in data processing.

For those teaching a course in data processing with equipment, Table XLIII, training was concentrated in college, on-the-job training, and classes conducted by equipment manufacturers. The training received at the high school level was comparable with the training received at the same level by those teaching a unit in data processing.

A considerably larger percentage of those teaching with equipment indicated they had received their training for various areas in data processing in area vocational schools than had either of the other two teaching categories. No one had received training in a high school cooperative program and only a minimal amount of training was received in adult education programs, private business schools, and in the military service.

The following is a comparative analysis of the training received in the various areas listed for the three teaching categories involved

TABLE XLII

PERCENTAGE RESPONSE FROM THOSE TEACHING A COURSE IN DATA PROCESSING WITH NO EQUIPMENT RELATING TO WHERE TRAINING AND INSTRUCTION WAS RECEIVED FOR VARIOUS AREAS OF DATA PROCESSING

Areas in Data Processing	No.[a]	1[b]	2	3	4	5	6	7	8	9	10
Key Punch Simulator	19	10.5	0.0	0.0	5.3	15.8	0.0	26.3	5.3	0.0	36.8
Key Punch Machine	39	5.1	0.0	2.6	2.6	12.8	2.6	43.6	20.5	2.6	7.7
Sorter	33	3.0	0.0	3.0	3.0	9.1	3.0	45.5	15.2	3.0	15.2
Accounting Machine	28	0.0	0.0	3.6	0.0	14.3	7.1	42.9	21.4	0.0	10.7
Collator	31	3.2	0.0	3.2	3.2	9.7	3.2	41.9	16.1	0.0	19.4
Reproducer	33	3.0	0.0	3.0	3.0	9.1	3.0	42.4	18.2	0.0	18.2
Interpreter	31	3.2	0.0	3.2	3.2	9.7	3.2	45.2	19.4	0.0	12.9
Board Wiring	29	3.4	0.0	3.4	3.4	10.3	3.4	41.4	20.7	0.0	13.8
Other Tabulating Equipment	11	9.1	0.0	0.0	0.0	9.1	9.1	36.4	9.1	9.1	18.2
Computer Console Operation	16	6.3	0.0	6.3	0.0	6.3	6.3	37.5	18.8	6.3	12.5
Random Access Devices	11	9.1	0.0	0.0	0.0	0.0	9.1	54.5	0.0	9.1	18.2
Data Converting Equipment	11	9.1	0.0	0.0	0.0	9.1	0.0	45.5	18.2	9.1	9.1
Paper-Tape Equipment	17	5.9	0.0	0.0	5.9	5.9	5.9	41.2	23.5	5.9	5.9
Introduction to Data Processing	33	6.1	0.0	3.0	0.0	6.1	6.1	60.6	6.1	0.0	12.1
Computer Logic and Theory	12	8.3	0.0	0.0	0.0	8.3	0.0	58.3	8.3	0.0	16.7
Introduction to Systems	14	7.1	0.0	0.0	0.0	7.1	7.1	57.1	7.1	0.0	14.3
Operations Research	5	20.0	0.0	0.0	0.0	0.0	0.0	60.0	0.0	0.0	20.0
Data Processing Math	8	12.5	0.0	0.0	0.0	12.5	25.0	25.0	0.0	0.0	25.0
Computer Numbering Systems	17	5.9	0.0	5.9	0.0	5.9	5.9	52.9	11.8	0.0	11.8
Programming	20	10.0	0.0	0.0	0.0	5.0	5.0	50.0	15.0	0.0	15.0
Other	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0

[a] Number of respondents who had received training

[b]
1 - High School
2 - High School Cooperative
3 - Area Vocational
4 - Adult Education
5 - Special Data Processing Classes
6 - Private Business School
7 - College
8 - Classes by Equipment Manufacturers
9 - Military
10 - On-the-Job Training

TABLE XLIII

PERCENTAGE RESPONSE FROM THOSE TEACHING A COURSE IN DATA PROCESSING WITH EQUIPMENT RELATING TO WHERE TRAINING AND INSTRUCTION WAS RECEIVED FOR VARIOUS AREAS OF DATA PROCESSING

Areas in Data Processing	No.[a]	1[b]	2	3	4	5	6	7	8	9	10
Key Punch Simulator	29	6.9	0.0	6.9	0.0	6.9	0.0	27.6	27.6	3.4	20.7
Key Punch Machine	59	6.8	0.0	10.2	0.0	8.5	1.7	35.6	20.3	5.1	11.9
Sorter	54	5.6	0.0	7.4	0.0	3.7	1.9	38.9	22.2	1.9	18.5
Accounting Machine	47	2.1	0.0	6.4	0.0	10.6	4.3	38.3	21.3	0.0	17.0
Collator	43	2.3	0.0	11.6	0.0	4.7	2.3	39.5	18.6	0.0	20.9
Reproducer	44	2.3	0.0	11.4	0.0	2.3	2.3	50.0	15.9	0.0	15.9
Interpreter	40	2.5	0.0	12.5	0.0	2.5	2.5	47.5	15.0	2.5	15.0
Board Wiring	41	2.4	0.0	9.8	0.0	4.9	4.9	46.3	22.0	0.0	9.8
Other Tabulating Equipment	16	6.3	0.0	6.3	0.0	0.0	12.5	25.0	18.8	0.0	31.3
Computer Console Operation	28	3.6	0.0	7.1	0.0	10.7	0.0	50.0	3.6	0.0	25.0
Random Access Devices	16	6.3	0.0	12.5	0.0	6.3	0.0	37.5	6.3	0.0	31.3
Data Converting Equipment	10	10.0	0.0	10.0	0.0	10.0	0.0	40.0	0.0	0.0	30.0
Paper-Tape Equipment	19	5.3	0.0	5.3	0.0	5.3	0.0	21.1	5.3	10.7	47.4
Introduction to Data Processing	44	2.3	0.0	6.8	2.3	4.5	4.5	68.2	4.5	0.0	6.8
Computer Logic and Theory	25	4.0	0.0	4.0	0.0	4.0	0.0	60.0	12.0	0.0	16.0
Introduction to Systems	24	4.2	0.0	4.2	0.0	4.2	4.2	54.2	12.5	0.0	16.7
Operations Research	6	16.7	0.0	0.0	0.0	0.0	16.7	50.0	0.0	0.0	16.7
Data Processing Math	15	13.3	0.0	0.0	0.0	6.7	0.0	60.0	6.7	0.0	13.3
Computer Numbering Systems	34	8.8	0.0	0.0	5.9	0.0	0.0	64.7	2.9	0.0	17.6
Programming	31	3.2	0.0	0.0	3.2	3.2	6.5	61.3	9.7	0.0	12.9
Other	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	0.0	33.3

[a]Number of respondents who had received training

[b]1 - High School
2 - High School Cooperative
3 - Area Vocational
4 - Adult Education
5 - Special Data Processing Classes
6 - Private Business School
7 - College
8 - Classes by Equipment Manufacturers
9 - Military
10 - On-the-Job Training

in the teaching of data processing:

Key Punch Simulator. Even though several individuals received their training on the key punch simulator in high school, the percentages were very small. No one received training through a high school cooperative program. Of those responding who were teaching a course in data processing with equipment, 6.9 per cent had received training in an area vocational school. The highest percentages of response for training received on the key punch simulator were for college and on-the-job training.

Key Punch Machine. The highest percentages of response in all teaching categories for training received on the key punch machine were at the college level and through classes sponsored by equipment manufacturers. College was the source of 46.2 per cent of the training received by those teaching a unit in data processing compared with 35.6 per cent for those teaching a course in data processing with equipment. Those teaching a course in data processing with equipment had higher percentages of response for high school, area vocational schools, and on-the-job training than did the other two teaching categories.

Sorter. Thirty-eight and nine-tenths per cent of those teaching a course in data processing with equipment had received training on the sorter in college compared with 45.7 per cent of those teaching a unit in data processing and 45.5 per cent of those teaching a separate course in data processing with no equipment.

Equipment manufacturers had supplied the training for 22.2 per cent of those teaching a course in data processing with equipment; whereas, 5.2 per cent of those teaching a course in data processing with no equipment and 11.4 per cent of those teaching a unit in data processing

had received their training from the same source.

On-the-job training provided the training for 18.5 per cent of those teaching data processing with equipment, 15.2 per cent of those teaching data processing with no equipment, and 14.3 per cent of those teaching a unit in data processing.

Almost four times as many respondents who were teaching a unit in data processing had received their training on the sorter in adult education classes compared with those categories which were teaching a separate course in data processing.

Accounting Machine. Forty-seven individuals who were teaching a course in data processing with equipment received training on the accounting machine. Thirty-eight and three-tenths per cent of that training was received in college, 21.3 per cent in classes sponsored by equipment manufacturers, 10.6 per cent in special data processing schools, and 17 per cent in on-the-job training.

Of those teaching a unit in data processing, 34 had received training in the use of the accounting machine. The training was concentrated in four sources: 47.1 per cent in college, 14.7 per cent in on-the-job training, 11.8 per cent for both adult education and classes sponsored by equipment manufacturers.

Of the 28 who were teaching a course in data processing with no equipment, 42.9 per cent received their training in college, 21.4 per cent from classes sponsored by equipment manufacturers, 14.3 per cent in special data processing schools, and 10.7 per cent in on-the-job training.

Collator. Training received on the collator by those teaching a unit in data processing was as follows: 44.4 per cent in college, 18.5

per cent in on-the-job training, and 11.1 per cent each in adult education and special data processing schools.

In contrast, only 3.2 per cent of those teaching a course in data processing with no equipment had received training in adult education classes and only 9.7 per cent in special data processing schools. The major portion of the training was received in college (41.9 per cent), in classes sponsored by equipment manufacturers (16.1 per cent), and in on-the-job training (19.4 per cent).

Those teaching a course in data processing with equipment received 39.5 per cent of their training in college, 29.9 per cent in on-the-job training, 18.6 per cent in classes sponsored by equipment manufacturers, and 11.6 per cent in adult education.

The differences between the percentages of response for training received in college, in classes conducted by equipment manufacturers, on-the-job training, and adult education were minimal for the three teaching categories. Only those teaching a unit in data processing received over ten per cent of their training in special data processing schools.

Reproducer. Training on the reproducer for all teaching categories exceeded forty-two per cent at the college level. Areas ranking in excess of ten per cent by those teaching a unit in data processing were 16 per cent for adult education, 12 per cent for special data processing schools, and 12 per cent for on-the-job training.

Of the thirty-three who were teaching a course in data processing with no equipment and had received training on the reproducer, 42.4 per cent received their training in college, 18.2 per cent in classes sponsored by equipment manufacturers, and 18.2 per cent in on-the-job

training.

Forty-four of those teaching a course in data processing with equipment had received training on the reproducer. Fifty per cent had received their training in college, 11.4 per cent in area vocational schools, and 15.9 per cent through on-the-job training.

Interpreter. Of the training received by those teaching a course in data processing with equipment, 47.5 per cent was received in college, 15 per cent in classes sponsored by equipment manufacturers, 15 per cent from on-the-job training, and 12.5 per cent in area vocational-technical schools.

Of the twenty-four respondents who were teaching a unit in data processing and had received training on the interpreter, 45.8 per cent received their training in college, 16.7 per cent in adult education, 12.5 per cent in special data processing schools, and 12.5 per cent in on-the-job training.

Training on the interpreter was received in college by 45.2 per cent of those who were teaching a course in data processing with no equipment, 19.4 per cent through classes sponsored by equipment manufacturers, and 12.9 per cent through on-the-job training.

Board Wiring. Over half of those teaching a course in data processing with equipment had received training on the wiring of boards for unit record equipment. Training sources included college (46.3 per cent) and classes sponsored by equipment manufacturers (22.0 per cent).

Training for those teaching a class with no equipment was concentrated in college (41.4 per cent), classes sponsored by equipment manufacturers (20.7 per cent), on the-job training (13.8 per cent), and special data processing schools (10.3 per cent).

Of the twenty-three who were teaching a unit in data processing and had received training, 39.1 per cent of the training was received in college, 17.4 per cent from on-the-job training, and 13.0 per cent each from adult education, special data processing schools, and classes conducted by equipment manufacturers.

"Other" Tabulating Equipment. The major portion of the training received by those teaching a course in data processing with equipment was through on-the-job training, college, classes conducted by equipment manufacturers, and private business schools.

Only 7.2 per cent of those teaching a unit in data processing had received training on tabulating equipment other than the machines previously mentioned. Training on additional machines was received in college, adult education classes, and on-the-job training.

Of those teaching a course in data processing with no equipment, 15.5 per cent had received training on other tabulating equipment. Their basic source of training was in college and on-the-job training. Some received training in high school, special data processing schools, private business schools, classes conducted by equipment manufacturers, and military service.

Computer Console Operation. Approximately twenty-four per cent of all respondents who were teaching data processing had received training in computer console operation. Training was received by 14.5 per cent of those teaching a unit in data processing. College accounted for 66.7 per cent of that training and on-the-job training for 16.7 per cent.

Those teaching a course with no equipment had obtained 37.5 per cent of their training in college, 18.8 per cent in classes sponsored by equipment manufacturers, and 12.5 per cent in on-the-job training.

Note that only 22.5 per cent had received training in computer console operation.

Computer console operation training was received by 35.4 per cent of those teaching a course with equipment. One half of that training was received in college, 25 per cent in on-the-job training, and 10.7 per cent in special data processing schools.

Random Access Devices. Of the respondents who were teaching a course in data processing with equipment, 20.3 per cent had received training on random access devices. Approximately forty per cent of the training was received in college, 31.3 per cent in on-the-job training, and 12.5 per cent in area vocational-technical schools.

In comparison, only 6 per cent of those teaching a unit in data processing and 15.5 per cent of those teaching a course in data processing with no equipment had received training on random access devices. Eighty per cent of the training received by those teaching a unit in data processing was received in college; the remainder in on-the-job training.

Of the training received by those teaching a course in data processing with no equipment, 54.4 per cent was received in college, 18.2 per cent in on-the-job training, and 9.1 per cent each in high school, private business school, and military service.

Data Converting Equipment. Of the 12.7 per cent who had received training on data converting equipment and were teaching a course in data processing with equipment, four received their training in college, three in on-the-job training, and one each in high school, area vocational-technical school, and special data processing school.

College training accounted for 45.5 per cent of the training

received by those teaching a course in data processing with no equipment and 50 per cent of the training received by those teaching a unit in data processing.

Paper-Tape Equipment. Of those teaching a unit in data processing, eight had received training on paper-tape equipment. Colleges provided for 62.5 per cent of that training, adult education for 25.0 per cent, and on-the-job training for 12.5 per cent.

A major percentage of the training received by those teaching a course in data processing with no equipment was received in college (41.2 per cent) and classes conducted by equipment manufacturers (23.5 per cent).

Of those teaching a data processing course with equipment, 21.1 per cent of their training was received in college, 47.4 per cent in on-the-job training, and 10.7 per cent in military service. On-the-job training ranked highest for those teaching with equipment and college ranked the highest for each of the other two teaching categories.

Introduction to Data Processing. A very small percentage of those who had received instruction in Introduction to Data Processing had received it in high school. No one had taken it in a high school co-operative program and very small percentages were recorded for each of the other categories except for college where 68.6 per cent, 60.6 per cent, and 68.2 per cent in each of three categories respectively received their training.

Computer Logic and Theory. College ranked the highest in each of the three categories for training received in computer logic and theory. Other sources of training for all three categories were as follows: on-the-job training, classes sponsored by equipment manufacturers, adult

education classes, high school, area vocational-technical schools, and special data processing schools.

Introduction to Systems. The training received by 30.4 per cent of those teaching a course in data processing with equipment was widely diversified with 54.2 per cent being received in college, 16.7 per cent in on-the-job training, 12.5 per cent through classes conducted by equipment manufacturers, and the remainder in high school, area vocational-technical schools, special data processing schools, and private business schools. College was the major source of instruction for each of the other teaching categories.

Operations Research. Only fourteen individuals had received instruction in Operations Research. The instruction was concentrated in college, 66.7 per cent, 60.0 per cent, and 50.0 per cent for each of the three teaching categories respectively. On-the-job training accounted for 33.3 per cent, 20.0 per cent, and 16.7 per cent for each of the categories. Others received training in high school and in private business schools.

Data Processing Math. Of those who were teaching a course in data processing with equipment and had received instruction in data processing math, 60 per cent of the instruction was received in college, 13.3 per cent each in high school and on-the-job training, and 6.7 per cent each in special data processing schools and classes conducted by equipment manufacturers.

Instruction for those teaching a unit in data processing occurred in college (50 per cent), adult education (25 per cent), high school (12.5 per cent), and on-the-job training (12.5 per cent).

Twenty-five per cent of the instruction received by those teaching

a course in data processing with no equipment had been received in college, 25 per cent in private business schools, 25 per cent in on-the-job training, 12.5 per cent each in high school and special data processing schools.

Computer Numbering Systems. Of the 24.1 per cent of those who were teaching a unit in data processing and had studied computer numbering systems, 70 per cent of the instruction was received in college, 15 per cent in adult education classes, and 5 per cent each in high school, classes conducted by equipment manufacturers, and on-the-job training.

Approximately twenty-four per cent of those teaching a course in data processing with no equipment had received instruction in computer numbering systems. College was the major source for 52.9 per cent of the training received in computer numbering systems. Other sources were as follows: 11.8 per cent in classes conducted by equipment manufacturers, 11.8 per cent in on-the-job training, and 5.9 per cent each in high school, area vocational-technical schools, special data processing schools, and private business schools.

The instruction received by the 43.1 per cent of those teaching a course in data processing with equipment was received from the following sources: 64.7 per cent in college, 17.6 per cent in on-the-job training, 8.8 per cent in high school, 5.9 per cent in adult education, and 2.9 per cent in classes conducted by equipment manufacturers.

Programming. The highest percentage response for instruction received in computer programming was recorded by those who were teaching a separate course in data processing with equipment (39.2). College provided 61.3 per cent of the instruction and on-the-job training, 12.9 per cent.

Instruction in programming had been received by 28.2 per cent of those teaching a course in data processing with no equipment. The major sources of the training were as follows: college, 50 per cent, classes conducted by equipment manufacturers, 15 per cent, and on-the-job training, 15 per cent.

The smallest percentage response for instruction in programming came from those teaching a unit in data processing (25.3 per cent). The major source of their instruction was college (71.4 per cent).

Other. A very small percentage of respondents had received training on machines or in subject matter other than those enumerated in the study. The basic source of the training had been in college, classes conducted by equipment manufacturers, and on-the-job training.

When Training Was Received

Seventy-two and eight-tenths per cent of the training received by those teaching a separate course in data processing with equipment was received before they began to teach data processing compared with 81.5 per cent for those teaching a separate course in data processing with no equipment and 57.1 per cent for those teaching a unit in data processing. This remainder, 27.2 per cent, of the training received by those teaching a course with equipment was received after they began to teach data processing; whereas, those teaching a unit in data processing and those teaching a separate course in data processing with no equipment received 42.9 per cent and 18.5 per cent of their training after they began to teach.

From the data presented one might conclude that formal education in various areas of data processing is of greater necessity when one is

going to teach a course in data processing compared with someone who is going to teach a unit on data processing in another course.

Methods in Data Processing

The null hypothesis $(H_o)_2$ was retained for methods of teaching in data processing as shown in Table XLIV. The test was significant, however, at the .07 level of significance. The differences which existed within the sample show that a higher percentage of those teaching a course in data processing with no equipment had taken a methods course in data processing than had those respondents in either of the other three teaching categories.

Twenty-five per cent of those teaching a course with no equipment had taken methods compared with 14.8 per cent of those teaching no data processing. Methods in the teaching of data processing had been taken by 12.3 per cent of those teaching a unit in data processing and 13.3 per cent of those teaching a course in data processing with equipment.

Credit Granted for Data Processing Methods

Of the sixty-one respondents who indicated they had taken a methods course in data processing, only fifty-eight responded to the type of credit received for the course. As shown in Table XLV, forty-one of the fifty-eight were granted credit on a semester basis; whereas, seventeen were granted quarter hours credit. Thirty who received semester hours credit received three hours of credit, eight received two hours of credit, and three received only one hour of credit.

Of the seventeen responding who had received quarter hours credit, 10 received three quarter hours of credit, four received four quarter

TABLE XLIV

PERCENTAGE RESPONSE FOR METHODS IN DATA PROCESSING AND TEACHING CATEGORIES

Categories of Teaching	Number of Respondents	Yes	No
None	162	14.8	85.2
Unit	81	12.3	87.7
Course No Equipment	68	25.0	75.0
Course Equipment	75	13.3	86.7

$N = 386$; $x^2_{(2)} = 5.513$

This table should be read: 25 per cent of the 68 respondents who were teaching a course in data processing with no equipment had taken a methods course in the teaching of data processing.

TABLE XLV

PERCENTAGE RESPONSE FOR CREDIT RECEIVED FOR METHODS IN DATA PROCESSING AND TEACHING CATEGORIES

Categories of Teaching	Number of Respondents	Semester Hours			Quarter Hours				
		1	2	3	1	2	3	4	5
None	20	5.0	10.0	50.0	5.0	0.0	25.0	5.0	0.0
Unit	10	0.0	30.0	60.0	0.0	0.0	10.0	0.0	0.0
Course No Equipment	19	5.3	10.5	52.6	0.0	0.0	15.8	10.5	5.3
Course Equipment	9	11.1	11.1	4.0	0.0	11.1	11.1	11.1	0.0

N = 58

This table should be read: The majority of respondents who took methods of teaching data processing for semester hours credit received three hours of credit.

hours of credit, and the other three received one, two, and five quarter hours of credit.

The most frequent type of credit granted was on a semester basis with three hours being the most common number of hours received for the methods course in data processing.

Dissemination of Information

The null hypothesis $(H_o)_2$ was retained. The percentage differences which occurred within the sample as shown in Table XLVI happened by chance; therefore, an equal percentage response among the four categories regarding the receipt of information regarding various educational opportunities in data processing would be expected.

An average of seventy per cent in all categories received such information; approximately thirty per cent did not. The thirty per cent who had not been receiving information regarding educational opportunities in data processing are important to the success or failure of implementing data processing into the secondary curriculum.

Programming Languages

Tables XLVII through L give the status of each of the four categories of teachers as to their qualifications to teach various programming languages. Because the number of responses vary from language to language, a valid chi square could not be calculated; therefore, only percentages of response have been reported.

Table XLVII, page 161, indicated that very few individuals who were not teaching data processing in the secondary schools were actually qualified to teach a programming language: 2.9 per cent, COBOL; one,

TABLE XLVI

PERCENTAGE RESPONSE FOR INFORMATION RECEIVED ABOUT SUMMER WORKSHOPS, SEMINARS, EXTENSION CLASSES, ET CETERA., IN DATA PROCESSING AND TEACHING CATEGORIES

Categories of Teaching	Number of Respondents	Yes	No
None	156	63.5	36.5
Unit	77	74.0	26.0
Course No Equipment	65	73.8	26.2
Course Equipment	74	70.3	29.7

$N = 372$; $x^2_{(3)} = 3.98$

This table should be read: 74 per cent of the 77 respondents who were teaching a unit in data processing received information regarding special sessions on data processing.

TABLE XLVII

PERCENTAGE RESPONSE FOR COMPUTER LANGUAGES NOT QUALIFIED TO TEACH, QUALIFIED TO TEACH, AND ACTUALLY TEACHING FOR THOSE TEACHING NO DATA PROCESSING

Languages	Number of Respondents	Not Qualified	Qualified	Actually Teaching
ALGOL	100	100.0	0.0	0.0
COBOL	105	97.1	2.9	0.0
PL-1	102	100.0	0.0	0.0
SPS	103	99.03	0.97	0.0
SPA	100	100.0	0.0	0.0
Autocoder	104	97.1	2.9	0.0
FORTRAN	102	95.1	4.9	0.0
SOAP	101	100.0	0.0	0.0
Machine Language	101	96.0	4.0	0.0
Easycoder	101	100.0	0.0	0.0
RPG	102	100.0	0.0	0.0
Other	80	100.0	0.0	0.0

N in category = 165

This table should be read: A variable number of responses was received for each of the different languages; 101 responded for machine language and 102 responded for RPG.

TABLE XLVIII

PERCENTAGE RESPONSE FOR COMPUTER LANGUAGES NOT QUALIFIED TO TEACH, QUALIFIED TO TEACH, AND ACTUALLY TEACHING FOR THOSE WHO WERE TEACHING A UNIT IN DATA PROCESSING

Languages	Number of Respondents	Not Qualified	Qualified	Actually Teaching
ALGOL	50	98.0	0.0	2.0
COBOL	55	74.6	21.8	3.6
PL-1	50	96.0	2.0	2.0
SPS	52	78.5	3.8	7.7
SPA	51	98.0	0.0	2.0
Autocoder	52	84.6	13.5	1.9
FORTRAN	61	64.0	26.2	9.8
SOAP	50	98.0	0.0	2.0
Machine Language	56	76.8	14.3	8.9
Easycoder	50	98.0	0.0	2.0
RPG	51	90.2	5.9	3.9
Other	33	87.9	9.1	3.0

N in category = 83

This table should be read: 26.2 per cent of the 61 who responded for FORTRAN were qualified to teach the language, but only 9.8 per cent were actually teaching the programming language.

TABLE XLIX

PERCENTAGE RESPONSE FOR COMPUTER LANGUAGES NOT QUALIFIED TO TEACH, QUALIFIED TO TEACH, AND ACTUALLY TEACHING FOR THOSE WHO WERE TEACHING A COURSE IN DATA PROCESSING WITH NO EQUIPMENT

Languages	Number of Respondents	Not Qualified	Qualified	Actually Teaching
ALGOL	45	97.8	2.2	0.0
COBOL	51	66.7	25.5	7.8
PL-1	46	95.6	2.2	2.2
SPS	48	89.6	8.3	2.1
SPA	45	100.0	0.0	0.0
Autocoder	47	85.1	12.8	2.1
FORTRAN	50	80.0	18.0	4.0
SOAP	45	100.0	0.0	0.0
Machine Language	52	73.1	19.2	7.7
Easycoder	46	91.3	6.5	2.2
RPG	52	76.9	15.4	7.7
Other	29	89.6	6.9	3.5

N in category = 71

This table should be read: Of those teaching a course in data processing with no equipment, 25.5 per cent of the 51 responses to COBOL were for qualified to teach.

TABLE L

PERCENTAGE RESPONSE FOR COMPUTER LANGUAGES NOT QUALIFIED TO TEACH, QUALIFIED TO TEACH, AND ACTUALLY TEACHING FOR THOSE WHO WERE TEACHING A COURSE IN DATA PROCESSING WITH EQUIPMENT

Languages	Number of Respondents	Not Qualified	Qualified	Actually Teaching
ALGOL	54	96.6	3.4	0.0
COBOL	61	63.9	23.0	13.1
PL-1	52	96.2	3.8	0.0
SPS	53	94.3	5.7	0.0
SPA	51	100.0	0.0	0.0
Autocoder	57	84.2	8.8	7.0
FORTRAN	57	71.9	21.1	7.0
SOAP	51	100.0	0.0	0.0
Machine Language	57	75.4	15.8	8.8
Easycoder	51	92.1	5.9	2.0
RPG	57	73.7	17.5	8.8
Other	37	83.6	8.2	8.2

N in category = 79

This table should be read: Of the 61 responses for COBOL, 23 per cent were qualified to teach and 13.1 per cent were actually teaching the programming language.

or .97 per cent, SPS; 2.9 per cent, Autocoder; 4.9 per cent, FORTRAN; and 4 per cent, machine language.

Table XLVIII, page 162, gives the percentages of response for those teaching a unit in data processing. Sixteen, or 26.2 per cent, of the responses indicated being qualified to teach FORTRAN but only six, or 9.8 per cent, were actually teaching the programming language. Twelve, or 21.8 per cent, of the 55 responses indicated being qualified to teach COBOL but only 2, or 3.6 per cent, of the responses indicated the actual teaching of COBOL. Machine language ranked third with 14.3 per cent of the responses indicating they were qualified to teach; 8.9 per cent of the responses indicated the actual teaching of machine language. Autocoder ranked fourth with 13.5 per cent of the responses from those teaching a unit in data processing indicating being qualified to teach but only 1.9 per cent of the responses indicated the actual teaching of the language.

Even though a low percentage was qualified to teach the various languages, an even lower percentage was actually involved in teaching the languages. The percentages of response for those teaching a course in data processing with no equipment are reported in Table XLIX. Only one, or 2.2 per cent, of the 45 responses indicated being qualified to teach ALGOL, but no one indicated they were actually teaching the language. Thirteen, or 25.5 per cent, of the 51 responses for COBOL were qualified to teach the language. Four, or 7.8 per cent, were actually teaching COBOL.

Of the 52 responses for machine language, 19.2 per cent were qualified to teach and 7.7 per cent were actually teaching machine language. Eighteen per cent of the 50 responses for FORTRAN were qualified to

teach, but only 2, or 4 per cent, were actually teaching the language. Of the 52 responses for RPG, eight, or 15.4 per cent, were qualified to teach and four, or 7.7 per cent, were actually teaching RPG. The highest percentages of response for languages qualified to teach from those teaching a course in data processing with equipment as indicated in Table L were as follows: COBOL (23 per cent), FORTRAN (21.1 per cent), machine language (15.8 per cent), and RPG (17.5 per cent).

Even though 23 per cent of the responses indicated being qualified to teach COBOL, only 13.1 per cent were actually teaching the language. Of the 57 responses for RPG, 17.5 per cent were qualified to teach but only 8.8 per cent were actually teaching the language.

Of the total number of responses, there were 63 for qualified to teach a programming language and 30 responses for actually teaching a programming language.

Benefits of Various High School Courses in the Teaching of Data Processing

Business Education

In Table LI, the chi-square values and the percentages of response for those who indicated the study of various business education subjects taken in high school to be beneficial to the teaching of data processing are presented. The differences among the groups for all business education courses taken except bookkeeping were not significant; therefore, the null hypothesis $(H_o)_2$ was retained. The null hypothesis $(H_o)_2$ for the benefits of bookkeeping to the teaching of data processing was rejected.

TABLE LI

CHI-SQUARE VALUES AND PERCENTAGE RESPONSE FOR THE BENEFITS OF HIGH SCHOOL BUSINESS EDUCATION COURSES TAKEN FOR ALL TEACHING CATEGORIES

Courses	Percentage Response				Chi Square $x^2_{(3)} = 7.82$	Results
	None	Unit	Course No Equipment	Course Equipment		
Introduction to Business	26.0	27.7	35.2	34.2	3.0	NS
Typewriting	47.9	61.4	60.6	54.4	5.57	NS
Shorthand	24.8	36.1	24.0	22.8	4.97	NS
Calculating and Adding Machines	26.0	37.3	40.8	35.4	6.50	NS
Business Math	24.2	39.8	35.2	31.6	7.11	NS
Office or Secretarial Practice	28.5	26.5	28.1	31.6	0.54	NS
Data Processing	13.3	22.9	18.3	20.3	4.08	NS
Bookkeeping	36.9	57.8	53.5	43.0	11.97	S
Number of Respondents	165	83	71	79		

Introduction to Business. Less than thirty-six per cent in any category indicated that the instruction received in Introduction to Business at the high school level was helpful in the teaching of data processing.

Typewriting. In all categories involving the teaching of data processing, over fifty per cent of the respondents indicated that a study of typewriting in high school had been of benefit to them in the teaching of data processing. The same sentiments were expressed by 47.9 per cent of those teaching no data processing.

Shorthand. The percentages in each category indicate that a majority of the respondents considered shorthand to be of no benefit in the teaching of data processing.

Calculating and Adding Machines. Even though the test was not significant at the .05 level it was significant at the .10 level. The major differences recorded were between those who were teaching data processing and those who were not. The percentage differences were very slight for those actually teaching data processing: 37.3, 40.8, and 35.4. Individuals who were not teaching data processing seemed to feel more strongly that instruction in calculating and adding machines would not be helpful in the teaching of data processing.

Business Math. The chi-square test was significant at the .07 level of significance. The difference, if any did exist in the total population, was among all four categories. Those teaching no data processing indicated the strongest feelings regarding the lack of benefit of business math and those teaching a unit in data processing expressed the strongest feelings that it was of benefit in the teaching of data processing.

The study of business math was considered helpful in the teaching of data processing by 24.2 per cent of those teaching no data processing, 39.8 per cent of those teaching a unit in data processing, 35.2 per cent of those teaching a course in data processing with no equipment, and 31.6 per cent of those teaching a course in data processing with equipment.

Office or Secretarial Practice. The response was negative in that the majority of respondents indicated that instruction in office or secretarial practice at the high school level was not helpful in the teaching of data processing. The percentages of response for the course being of benefit in the teaching process ranged from 26.5 to 31.6 per cent.

Data Processing. The results were not significant; therefore, the percentages of response for all teaching categories are assumed to be equal. Less than twenty-three per cent of the respondents indicated that the instruction received in data processing at the high school level was beneficial in the teaching of data processing.

No opportunity was given for the respondents to indicate that they had not taken the course. It is, therefore, quite possible that a large percentage of the respondents had not taken such a course in high school.

Bookkeeping. Of all high school courses listed, bookkeeping was the only course with a significant chi-square value. The widest range of response occurring was between those teaching no data processing (36.9 per cent) and those teaching a unit in data processing (57.8 per cent).

Over fifty per cent of those teaching a unit in data processing

and of those teaching a course in data processing with no equipment indicated that the instruction received in bookkeeping in high school was of benefit in the teaching of data processing. Less than fifty per cent of those teaching no data processing and of those teaching a course in data processing with equipment indicated that bookkeeping was helpful.

General Education

In no instance where a valid chi square could be calculated was a significant difference found among the groups regarding the benefits of the various general education courses to the teaching of data processing. Therefore, the null hypothesis $(H_o)_2$ was retained. For the majority of subjects listed in Table LII, a valid chi square could not be calculated due to low expected frequencies.

There were four opportunities for response for each of the general education courses taken in high school: very helpful, of some benefit, of no benefit, and not taken.

General Math. The following percentages had taken general math: 65.7 per cent of those teaching no data processing, 61.6 per cent of those teaching a unit in data processing, 69.6 per cent of those teaching a course in data processing with no equipment, and 73.7 per cent of those teaching a course in data processing with equipment.

Of the 38 respondents who were teaching no data processing, 28.9 per cent responded with very helpful, 28.9 per cent responded with of some benefit, and 7.9 per cent of no benefit.

Fifty-two of those teaching a unit in data processing responded in the following ways: 13.5 per cent with very helpful, 34.6 per cent of some benefit, and 13.5 per cent of no benefit.

and of those teaching a course in data processing with no equipment indicated that the instruction received in bookkeeping in high school was of benefit in the teaching of data processing. Less than fifty per cent of those teaching no data processing and of those teaching a course in data processing with equipment indicated that bookkeeping was helpful.

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and of those teaching a course in data processing with no equipment indicated that the instruction received in bookkeeping in high school was of benefit in the teaching of data processing. Less than fifty per cent of those teaching no data processing and of those teaching a course in data processing with equipment indicated that bookkeeping was helpful.

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In no instance where a valid chi square could be calculated was a significant difference found among the groups regarding the benefits of the various general education courses to the teaching of data processing. Therefore, the null hypothesis $(H_o)_2$ was retained. For the majority of subjects listed in Table LII, a valid chi square could not be calculated due to low expected frequencies.

There were four opportunities for response for each of the general education courses taken in high school: very helpful, of some benefit, of no benefit, and not taken.

General Math. The following percentages had taken general math: 65.7 per cent of those teaching no data processing, 61.6 per cent of those teaching a unit in data processing, 69.6 per cent of those teaching a course in data processing with no equipment, and 73.7 per cent of those teaching a course in data processing with equipment.

Of the 38 respondents who were teaching no data processing, 28.9 per cent responded with very helpful, 28.9 per cent responded with of some benefit, and 7.9 per cent of no benefit.

Fifty-two of those teaching a unit in data processing responded in the following ways: 13.5 per cent with very helpful, 34.6 per cent of some benefit, and 13.5 per cent of no benefit.

English-Writing or Speech. Over ninety per cent in each of the teaching categories had taken the course as listed. Over two-thirds in each category indicated that the course was of benefit in the teaching of data processing.

A response of very helpful came from 35 per cent of those teaching no data processing compared with 20 per cent of those teaching a unit in data processing, 20.9 per cent of those teaching a course in data processing with no equipment, and 30.3 per cent of those teaching a course in data processing with equipment.

The highest percentage of response for the course being of no benefit came from the individuals who were teaching a unit in data processing (30.9 per cent) compared with 27.5 per cent of those teaching no data processing, 23.3 per cent of those teaching a course in data processing with no equipment, and 14.3 per cent of those teaching a course in data processing with equipment.

Reading and Literature. Almost one hundred per cent in all teaching categories had taken reading and literature in high school; but approximately fifty per cent, with the exception of those teaching a course in data processing with no equipment, felt that the course was of no benefit in the teaching of data processing. Only 29.5 per cent of that group checked it was of no benefit.

Economics. An average of seventy-five per cent of all respondents had taken economics in high school. Those teaching no data processing (22.8 per cent) had the highest percentage response that economics would be helpful in the teaching of data processing compared with 10.2 per cent of those teaching a unit in data processing, 11.6 per cent of those teaching a course in data processing with no equipment, and 11.8 per

cent of those teaching a course in data processing with equipment.

Not only did the respondents who were teaching no data processing have the highest percentage response for the course being very helpful but they also had the highest percentage response for it being of no benefit (28.6 per cent). This percentage was equaled only by the individuals who were teaching a unit in data processing (28.6). Those teaching a course in data processing had responses of 11.6 per cent and 17.6 per cent for the course being of no benefit in the teaching of data processing.

Social Science. Only 38.5 per cent of those teaching no data processing responded that the study in the social science area in high school would be of no benefit in the teaching of data processing compared with 64.7 per cent of those teaching a unit in data processing, 52.3 per cent of those teaching a course in data processing with no equipment, and 51.0 per cent of those teaching a course in data processing with equipment.

Sciences. Of the 177 respondents, 169 had taken a course in science in high school: 44.9 per cent of the 169 indicated that their study was of no benefit in the teaching of data processing, and 55.1 per cent felt that their study was of benefit.

Of the 75 who indicated the course was of no benefit, 22.7 per cent were those teaching no data processing, 34.7 per cent were those teaching a unit in data processing, 22.7 per cent were those teaching a course in data processing with no equipment, and 19.9 per cent were those teaching a course in data processing with equipment.

Industrial Arts. Over fifty per cent in each of the categories had not taken any industrial arts courses in high school. Twelve and

one-half per cent of those teaching no data processing who had taken courses in industrial arts indicated they were helpful. Percentages recorded by each of the other groups are as follows: 6.8 per cent of those teaching a unit in data processing, 34.2 per cent of those teaching a course in data processing with no equipment, and 20.8 per cent of those teaching a course in data processing with equipment.

Other Vocational Classes. The chi-square test was significant at the .10 level. The differences were as follows: 21.9 per cent of those teaching a course with no equipment had taken other vocational classes compared with 53.3 per cent of those teaching a course with equipment. The percentages for the other two categories were 31 per cent for those not teaching any data processing and 39.5 per cent for those teaching a unit in data processing.

The percentages of response for the vocational classes being of benefit in the teaching of data processing were approximately equal for each of the teaching categories.

College Courses Taken

Percentages of response for business courses taken in college are shown in Tables LIII through LV. To determine the number of respondents who were teaching a unit in data processing and had taken typewriting in college, it is necessary to multiply 44.9 per cent times 165. The "Number of Responses" column gives the total number who responded and had taken typewriting in college. Since there is an unequal number of responses for each subject, each number is a function of the number of responses in each teaching category rather than the total number of responses per subject.

TABLE LIII

PERCENTAGE RESPONSE FOR TEACHING CATEGORIES AND BUSINESS COURSES TAKEN IN COLLEGE

Subjects	Number of Responses	None	Unit	Course No Equipment	Course Equipment
Business Skills					
Typewriting	231	44.9	67.5	73.2	62.0
Shorthand	186	33.3	59.0	59.2	50.6
Data Processing Equipment Operation	86	13.0	18.1	31.0	34.2
Calculating Machines	192	33.3	57.8	66.2	53.2
Adding Machines	193	33.9	56.6	66.2	54.4
Office and Secretarial Procedures	194	34.5	63.9	59.2	53.2
Other	26	6.1	7.2	7.0	6.3
Accounting					
Principles 1	251	47.9	72.3	78.9	70.9
Principles 2	237	46.1	66.3	73.2	68.4
Intermediate 1	167	30.3	44.6	60.6	46.8
Intermediate 2	138	23.6	39.8	49.3	39.2
Cost 1	100	17.0	34.9	33.8	24.1
Cost 2	58	13.9	14.4	22.5	8.9
Personal Income Tax	86	16.4	20.5	29.6	26.6
Corporate Tax	40	7.9	9.6	15.5	10.1
Advanced Theory 1	42	6.7	18.1	15.5	6.3
Advanced Theory 2	29	6.1	10.8	9.9	3.8
Management					
Principles of Management	160	26.1	47.0	50.7	53.2
Office Management	122	23.0	36.1	40.8	49.7
Personnel Management	76	13.9	21.7	26.8	20.3
Decision Theory	17	3.0	3.6	8.5	3.8
Operations Research	15	3.0	3.6	5.6	3.8
Data Processing Applications	35	4.8	4.8	16.9	13.9
Other	15	3.0	3.6	4.3	5.1
General Business					
Introduction to Business	181	32.1	50.6	56.3	58.2
Business Math	156	26.7	44.6	54.9	45.6
Statistics	132	23.6	42.2	36.6	27.8
Marketing	158	30.9	45.8	47.9	44.3
Finance	133	24.2	38.6	38.0	43.0

TABLE LIII (Continued)

Subjects	Number of Responses	None	Unit	Course No Equipment	Course Equipment
Business Communications	165	30.3	50.6	53.5	44.3
Business Report Writing	84	15.2	19.3	26.8	30.4
Other	30	6.7	7.2	11.3	6.3

Number in Category 1 = 165; Number in Category 2 = 83; Number in Category 3 = 71; Number in Category 4 = 79

This table should be read: Of the possible 165 respondents in Category 1, those teaching no data processing, 32.1 per cent had taken Introduction to Business in college.

TABLE LIV

FREQUENCY RESPONSE FOR TEACHING CATEGORIES AND THE TWO MOST HELPFUL COURSES TAKEN IN COLLEGE

Subjects	Number of Responses	None	Unit	Course No Equipment	Course Equipment
Business Skills					
Typewriting	102	32	28	23	19
Shorthand	11	4	3	2	2
Data Processing Equipment Operation	65	14	11	17	23
Calculating Machines	67	13	19	22	13
Adding Machines	17	5	5	3	4
Office and Secretarial Procedures	39	10	13	10	6
Other	3	2	0	0	1
Accounting					
Principles 1	83	19	23	19	22
Principles 2	55	9	16	13	17
Intermediate 1	27	3	6	11	7
Intermediate 2	22	1	8	6	7
Cost 1	10	5	0	1	4
Cost 2	8	4	1	2	1
Personal Income Tax	5	4	0	0	1
Corporate Tax	0	0	0	0	0
Advanced Theory 1	5	2	0	2	1
Advanced Theory 2	2	0	0	2	0
Management					
Principles of Management	24	5	3	4	9
Office Management	17	5	3	4	5
Personnel Management	10	3	3	2	2
Decision Theory	5	1	3	1	0
Operations Research	4	1	2	1	0
Data Processing Applications	23	4	4	7	8
Other	3	0	0	1	2
General Business					
Introduction to Business	21	4	5	4	8
Business Math	34	7	9	10	8
Statistics	39	10	11	8	10
Marketing	10	4	1	1	4
Finance	10	1	4	4	1

TABLE LIV (Continued)

Subjects	Number of Responses	None	Unit	Course No Equipment	Course Equipment
Business Communications	19	5	3	3	8
Business Report Writing	11	2	2	3	4
Other	0	0	0	0	0

This table should be read: The course receiving the most responses was typewriting.

TABLE LV

FREQUENCY RESPONSE FOR TEACHING CATEGORIES AND THE TWO LEAST HELPFUL COURSES TAKEN IN COLLEGE

Subjects	Number of Responses	None	Unit	Course No Equipment	Course Equipment
Business Skills					
Typewriting	22	3	8	3	8
Shorthand	123	25	34	30	34
Data Processing Equipment Operation	2	0	1	1	0
Calculating Machines	10	4	5	0	1
Adding Machines	27	4	8	7	8
Office and Secretarial Procedures	44	12	13	12	7
Other	8	4	0	3	1
Accounting					
Principles 1	20	2	3	8	7
Principles 2	18	6	1	7	4
Intermediate 1	8	2	0	5	1
Intermediate 2	13	2	2	7	2
Cost 1	11	1	5	4	1
Cost 2	4	1	0	3	0
Personal Income Tax	21	2	9	4	6
Corporate Tax	7	1	2	1	3
Advanced Theory 1	7	1	3	1	2
Advanced Theory 2	3	0	1	0	2
Management					
Principles of Management	30	6	10	9	5
Office Management	17	7	4	3	3
Personnel Management	17	1	4	7	5
Decision Theory	0	0	0	0	0
Operations Research	2	0	0	1	1
Data Processing Applications	2	1	0	1	0
Other	2	0	0	0	2
General Business					
Introduction to Business	53	16	14	12	11
Business Math	7	1	0	2	4
Statistics	11	4	2	0	5
Marketing	40	10	12	10	8
Finance	22	8	2	5	7

TABLE LV (Continued)

Subjects	Number of Responses	None	Unit	Course No Equipment	Course Equipment
Business Communications	47	10	14	13	10
Business Report Writing	19	3	4	5	7
Other	6	2	2	1	1

This table should be read: The course considered by the respondents to be the least helpful was shorthand with 123 responses.

The percentages of response for those teaching no data processing are low because so many in that category failed to complete the question. The maximum percentage response for any one course from those teaching no data processing was 76, or 46.1 per cent. Sixty, or 72.3 per cent, was the maximum percentage response for any one course from those teaching a unit in data processing; 56, or 78.9 per cent, from those teaching a course in data processing with no equipment; and 56, or 70.9 per cent, from those teaching a course in data processing with equipment.

Of those teaching no data processing, 44.9 per cent had taken typewriting in college; 33.3 per cent, shorthand; 13.0 per cent, data processing equipment operation; 33.3 per cent, calculating machines; 34.5 per cent, office and secretarial procedures; and 6.1 per cent, other business skill courses. The percentage taking accounting ranked from 47.9 per cent for the first course in Principles to 6.1 per cent for Advanced Theory and Practice 2. The management course most frequently taken was Principles of Management (26.1 per cent). Those courses with the lowest frequency of response were Decision Theory and Operations Research with 3 per cent each. The most frequently taken general business courses were Introduction to Business (32.1 per cent), Marketing (30.9 per cent), and Business Communications (30.3 per cent).

Of the responses for business skill subjects from those teaching a unit in data processing, typewriting ranked the highest with 67.5 per cent and Office and Secretarial Procedures second with 63.9 per cent. The lowest percentage response was for data processing equipment operation, 18.1 per cent. Principles of Accounting 1 and 2 were the most frequently taken accounting courses. Corporate Tax had the lowest

percentage response with 9.6 per cent. Both Principles of Management (47 per cent) and Office Management (36.1 per cent) ranked high in the management area. In the general business area, over fifty per cent had taken Introduction to Business and Business Communications.

The highest percentages of response from those teaching a course in data processing with no equipment were 73.2 per cent for Typewriting, 78.9 per cent for Principles of Accounting 1, and 73.2 per cent for Principles of Accounting 2. In management, the percentages of response were 53.2 per cent for Principles of Management and 40.8 per cent for Office Management. Over fifty per cent had taken Introduction to Business, Business Math, and Business Communications.

Of those teaching a course in data processing with equipment, only 62 per cent had taken Typewriting compared with 73.2 per cent of those teaching a course in data processing with no equipment. In accounting, 70.9 per cent and 68.4 per cent had taken Principles of Accounting 1 and 2 respectively. Principles of Management with a response of 53.2 per cent ranked highest in the management field. Introduction to Business was the only course in the general business area receiving over a fifty per cent response.

Two Most Helpful College Courses

The majority of the total number of responses indicated that Typewriting and Principles of Accounting 1 were the two most helpful college courses in the teaching of data processing. Those teaching no data processing and those teaching a unit in data processing indicated Typewriting and Principles of Accounting 1 were the most helpful. Those teaching a course in data processing with no equipment had a higher

frequency of response for Typewriting and Calculating Machines. The subjects most frequently checked by those teaching a course in data processing with equipment were Calculating Machines and Principles of Accounting 1.

Two Least Helpful College Courses Taken

The two courses indicated most frequently as being the least helpful in the teaching of data processing were Shorthand with 123 responses and Introduction to Business with 53. The group response which deviated from the total responses was from those teaching a data processing course with no equipment. Shorthand with 30 responses and Business Communications with 13 responses ranked the highest for that category. Those teaching a unit in data processing had equal responses of 14 for Introduction to Business and Business Communications and, in addition, a numerical response of 34 for Shorthand.

Conclusion

This chapter has presented a summary of the findings related to the educational characteristics of four selected groups of business educators in the United States. Chapter VI will be a presentation of the conclusions and recommendations made by the researcher based on the material presented in the preceding chapters.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the research findings from questionnaires returned, the conclusions are as follows:

1. Less than half of the schools in the United States have a teacher who teaches methods and concepts about the automatic processing of data.

2. The younger teacher, one with less than ten years of experience, tends, more often, to teach data processing with equipment than do those who have had more than ten years of experience.

3. The educational background of those teaching data processing was not significantly different from those not teaching data processing; therefore, it may be motivation rather than education which determines whether or not a business education teacher begins to teach in the area of data processing.

4. Only one fourth of all respondents who received information regarding classes, seminars, etc., took advantage of the educational opportunities in data processing.

5. Few secondary schools have a formal data processing course or courses available in the curriculum where equipment is available for "hands-on" experience.

6. Those teaching a course in data processing with equipment tended to teach more often in three-year secondary or area vocational schools.

7. A higher percentage of individuals who were teaching a course in data processing read data processing periodicals than did those who were teaching a unit in data processing or those who were teaching no data processing.

8. A majority of those teaching data processing did not take advantage of educational materials available in data processing periodicals to keep abreast of changes occurring in the field of automated data processing.

9. The Balance Sheet and Business Education World were the most frequently read business education periodicals by individuals in each of the four teaching categories.

10. A larger percentage in all four teaching categories read Business Education World than all the data processing magazines combined.

11. Those individuals teaching a separate course in data processing with no equipment were the most frequent readers of the Journal of Business Education.

12. Less than one fifth of all respondents had taken a methods course in the teaching of data processing. The group with the highest percentage response were those teaching a course in data processing with equipment.

13. Females and males have equal opportunities in the teaching field of data processing.

14. There was a slight tendency for men to teach a course in data processing with equipment more often than females.

15. Over forty-six per cent of the individuals in each of the four teaching categories were between the ages of thirty-one and fifty.

16. The majority of teachers who were teaching data processing in the secondary schools had more than five years of experience at the secondary level in the area of business education. But, they had less than five years of teaching experience in data processing.

17. Most teachers were teaching high school day students; very few were involved in adult education programs.

18. Puzzle-type activities were enjoyed by equal numbers of individuals regardless of the teaching category.

19. Approximately one third of those teaching no data processing had no desire to become involved in the data processing area.

20. More individuals who were teaching a course in data processing with equipment had taken formal education courses to prepare themselves for the teaching of data processing than had those in the other three teaching categories.

21. The teachers who were teaching data processing enjoyed their teaching assignments.

22. Teachers of data processing find student motivation, relevancy of subject matter, creativity, and autonomy of position to be favorable attributes of their teaching experiences in data processing.

23. Financial resources had the highest percentage of response as an unfavorable factor in the teaching of data processing other than accessibility of machines.

24. There was a significant difference in the responses for each of the three groups teaching data processing regarding the accessibility of machines. Access to machines was considered favorable only by those

teaching a course in data processing with equipment.

25. Over sixty per cent of those teaching a unit in data processing indicated that their formal education in data processing had failed to prepare them to teach data processing compared with 47.1 per cent of those teaching a course in data processing with no equipment, and 38.2 per cent of those teaching a course in data processing with equipment. The group teaching a course in data processing without equipment had received more formal education in data processing than the group teaching a unit in data processing. But, the group teaching with no equipment had received less formal training than the group teaching a course in data processing with equipment.

26. Approximately twenty-five per cent of the respondents in all categories indicated that data processing concepts should be integrated into the junior high curriculum. This may represent the beginning of business educators recognizing the necessity of integrating data processing concepts at the junior high level.

27. A majority of individuals in the teaching categories would begin the teaching of data processing by including a unit of instruction on data processing in classes at the high school level.

28. Approximately one third in each of the four teaching categories would not begin teaching a separate course in data processing until the college level.

29. Since equal percentages of response from each of the categories were recorded for the teaching of data processing as a separate course at the senior high level, adult education, and college level, no specific level of education can be stated as the appropriate level to begin the teaching of data processing.

30. Those who teach data processing do not receive remuneration beyond the salary schedule because of their teaching assignment in data processing.

31. The majority of data processing teachers are recruited from within the system where employed to begin teaching data processing.

32. There is no difference in the hiring patterns of three- and four-year secondary schools for teachers of data processing.

33. A higher percentage of individuals who were teaching a unit in data processing and a course in data processing with equipment began to teach data processing because of a personal interest in the subject than did those who were teaching a course in data processing with no equipment.

34. Those teaching a course in data processing with no equipment began to teach in the data processing area because of the education they had received in the area.

35. The majority of teachers of data processing had no work experience in data processing. Of those who did, the highest incidence of response was for accounting firms and educational facilities.

36. Reading of periodicals is the method most frequently used by educators to keep updated in the area of data processing.

37. More individuals teaching a course in data processing with equipment attended night school to keep updated than did those teaching with no equipment or a unit in data processing.

38. Data processing periodicals are not being used extensively by teachers of data processing as a tool to keep updated on current happenings in the world of automation.

39. Business Automation was the most frequently read data processing periodical by all four groups of teachers.

40. Business education periodicals were read by the majority of respondents in all categories.

41. Those teaching a course in data processing with equipment were the least frequent readers of business education periodicals but the most frequent readers of data processing periodicals.

42. Very few respondents held membership in organizations other than the National Business Education Association and allied organizations.

43. Once an individual becomes involved in the area of data processing he is likely to continue teaching in the area.

44. The highest percentage response for having never taught shorthand came from those teaching a course in data processing with equipment.

45. Typewriting was being taught by the majority of business teachers regardless of their status as a data processing teacher.

46. Very few individuals had ever taught math. This corresponds with the findings that very few individuals had majored in math either in their undergraduate or graduate programs.

47. Those involved in the teaching of data processing at the secondary level had not received instruction in the major topics which are recommended by the literature to be taught.

48. A significantly higher percentage of those teaching a course in data processing with equipment had received training on various pieces of unit record equipment, computer console operation, random access devices, paper-tape equipment, computer logic and theory, introduction to

systems, and computer numbering systems than had those teaching a unit in data processing or a course in data processing with no equipment.

49. College was the major source of training for the various areas of training or instruction in data processing.

50. Equipment manufacturing schools and on-the-job training were also important sources of training for those teaching a course in data processing with equipment.

51. A high percentage of individuals qualified to teach a programming language is actively involved in the teaching of such languages.

52. More individuals were qualified to teach COBOL and Fortran than the other languages listed. RPG and Machine Language were the third and fourth ranking languages that teachers of data processing were qualified to teach.

53. Typewriting was the only high school course receiving over sixty per cent response as being of benefit in the teaching of data processing.

54. The majority of individuals in each of the four teaching categories indicated that the math courses they had taken in high school were of benefit in the teaching of data processing.

55. Courses related to the communication area which were taken in high school were considered of importance in the teaching of data processing by each of the four teaching categories.

56. A difference of opinion existed regarding the study of social sciences at the high school level between those not teaching data processing and those who were. Approximately forty per cent of those teaching no data processing indicated the study in the social sciences to be of benefit compared with over sixty per cent of each of the groups

teaching data processing.

57. At the college level, Typewriting and Accounting 1 were considered as the two most helpful courses in the teaching of data processing.

58. At the college level, the two courses considered to be the least helpful in the teaching of data processing were Shorthand and Introduction to Business. Business Communications ranked a close third as being the least helpful in the teaching of data processing.

Recommendations

1. Develop guidance programs at the college and university level to inform students of the opportunities in the field of data processing and the course of study which should be followed to be successful on the job.

2. Conduct research on the current status of unit record equipment being used in all size business operations. The findings would serve as the basis for curriculum revision in allocating time for unit record equipment and electronic data processing for secondary data processing classes.

3. Determine the availability of data processing equipment for student use at the secondary level: what is available, instructional and/or administrative use, teacher's responsibility relating to administrative use of the machines, data processing personnels' reaction to the necessity of machines for adequate training of students, etc.

4. Survey a selected group of colleges and universities which offer a methods course in the teaching of data processing to determine such factors as course content, required or elective, number enrolled

compared with the number of graduates, level at which the course is taught, credit hours generated, how many sessions it is offered, and the availability of the course on and off campus.

5. Conduct a follow-up study on curriculum development for an introduction to data processing course at the secondary level to determine what changes data processing personnel would recommend in the content as developed by MacDonald (7) in 1964 and Wood (37) in 1967.

6. Develop new approaches to creating interest in all business educators to become knowledgeable in the area of data processing.

7. To require a set number of hours in data processing for graduation to force business education teachers to overcome the fear of becoming involved in the area of data processing.

8. Set specific credit hour certification requirements, perhaps six, in data processing for all business education teachers as well as additional requirements, perhaps nine additional credit hours, for those who are going to be teaching vocational data processing.

9. Emphasize the importance of the computer in the business world by incorporating its use into the classroom at the collegiate level.

10. Inaugurate the three-way approach to the teaching of data processing at the collegiate level as has been recommended for the secondary schools: integrate, offer an introductory course, and develop vocational skill.

11. Encourage businessmen to take an active part in the development of curriculum in data processing since they will be hiring the graduates who are prepared by these programs.

12. Use community resources to provide the experiences necessary for students to become familiar with the processes used by businesses

which use automated data processing equipment when equipment is not available in a school system.

13. Conduct additional research to determine what courses are being taught in business data processing at the secondary level, what is the content of these courses, what methods are being used, and how much time is being allotted to each phase of the subject. Compare these findings with the opinions of a jury of experts in the field of automated data processing.

14. Conduct a feasibility study in each school district in each state to determine the needs of its students in the area of automated data processing. If the findings warrant, a formal course in data processing should be added to the curriculum. If not, teachers should be encouraged to incorporate basic sociological concepts concerning automation where they are applicable to the course or courses they are teaching in the present school curriculum.

15. Conduct research to determine if there is any correlation between certification standards for teachers of business data processing in each of the fifty states and the number of formal programs in operation in the secondary schools of each state.

16. Publicize workshops and seminars being conducted by colleges and universities by notifying the principals of area schools as well as the business education teachers. Information should be provided regarding the relevancy and necessity of such instruction at the high school level.

17. Provide in-service training for all teachers in the area of data processing.

18. Conduct experimental projects to determine the effectiveness of the in-service training sessions previously recommended.

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APPENDIX A

LETTER TO PRINCIPALS

Illinois State University
College of Business
Department of Business Education
Turner Hall
Normal, Illinois 61761

Enclosed is a questionnaire, the results of which will be used as a basis for a dissertation on the "Environmental and Educational Characteristics of Secondary Business Data Processing Teachers in the United States." The completion of the dissertation will be the final requirement for the granting of an Ed.D. in Business Education from Oklahoma State University, Stillwater, Oklahoma.

Since the names of teachers in the business education departments were not available in setting up the mailing list, would you please give the questionnaire to a member of the business education faculty who falls into the category which is checked below:

- ☐ Does not teach a unit on data processing in any course
- ☐ Does teach a unit on data processing in a course which existed in the curriculum prior to the emphasis on data processing
- ☐ Does teach a course or courses in data processing in which the students do not have any "hands-on" use of equipment
- ☐ Does teach a course or courses in data processing in which equipment is available for student use

Your prompt cooperation will be appreciated.

Sincerely,

Wilma Jean Alexander

If you do not have a business teacher who falls into the category indicated above, please return the questionnaire to me in the enclosed envelope.

APPENDIX B

LETTER TO SAMPLE MEMBERS

TO: A fellow Business Educator

FROM: Wilma Jean Alexander

SUBJECT: The Environmental and Educational Characteristics of Secondary Business Data Processing Teachers in the United States

The results of the questionnaire which has been given to you by your principal is to be used as a basis for a dissertation concerning the environmental and educational characteristics of secondary business data processing teachers. To make a comparison, four groups are included in the study: teachers who do not teach a unit of data processing; teachers who teach a unit of data processing in a course of a different title; teachers who teach a course or courses in data processing without the use of equipment; teachers who teach a course or courses in data processing but students have "hands-on" experience with equipment.

Since the survey does involve information relative to individual teachers throughout the United States, your answering of the questionnaire will be of invaluable assistance. If you would be interested in the results of the study, place a check in the box to the right of the identification number on page one of the questionnaire.

Your prompt answering and returning of the questionnaire in the enclosed addressed envelope will be greatly appreciated.

APPENDIX C

SAMPLE QUESTIONNAIRE

Identification Number ☐

QUESTIONNAIRE

I am associated with _____ school system which is located in the state of _____.

PART I

The following questions attempt to arrive at the environmental characteristics of secondary business educators who may or may not be involved in the teaching of data processing. Unless otherwise specified, place a check mark in the space adjacent to the answer which most correctly identifies your response to the question.

1. My sex is

   ☐ Male
   ☐ Female

2. My age is

   ☐ Less than 21
   ☐ 21 through 30
   ☐ 31 through 40
   ☐ 41 through 50
   ☐ 51 through 60
   ☐ Over 60

3. I have taught in each of three categories the following number of years:

	0-1	1-2	2-3	3-4	4-5	5-10	10-20	20-
Secondary schools								
Business education								
Data processing								

4. I teach the following groups of students: (You may have more than one check for this particular question.)

   ☐ High school day students
   ☐ Adult evening students
   ☐ Other

5. I am teaching in the following type of school:

   ☐ Four-year secondary
   ☐ Three-year secondary
   ☐ Area-vocational school
   ☐ Other

6. I earn an annual salary

   ☐ Equal to the salary schedule of my school system
   ☐ Higher than the salary schedule of my school system

7. If you checked "higher than salary schedule" on number 5, was it because

   ☐ You teach data processing
   ☐ Of other reasons

8. I read the following professional and trade journals:

Data Processing	Business Education
☐ Datamation	☐ Business Education World
☐ Business Automation	☐ Journal of Business Education
☐ Data Processing Magazine	☐ National Business Education Quarterly
☐ Computer and Automation	☐ Business Education Forum
☐ Journal of Data Management	☐ Balance Sheet
☐ Journal of Data Education	☐ Other
☐ Other	

9. Indicate in the appropriate column which of the following courses you are now teaching, those you have taught in the past, and those which you have never taught.

	Teaching Now	Have Taught	Have Never Taught
Introduction to data processing			
Unit record equipment			
Unit record systems			
Introduction to systems analysis			
Data processing systems			
Introduction to digital computers			
Computer logic/theory			
Introduction to programming			
Advanced programming			
Data processing applications			
Field work in data processing			
Data processing math			
Other			
Bookkeeping/accounting			
Shorthand			
Typewriting			
Office procedures/management			
Secretarial/clerical practice			
Introduction to business			
Management			
Math (Algebra, Geometry, etc.)			
Science			
Social science			
Other			

IF YOU DO NOT TEACH A UNIT ON DATA PROCESSING OR A COURSE IN DATA PROCESSING, go directly to question 17.

10. For the position as teacher of data processing, I was

☐ Initially employed for this position
☐ Recruited from within the system

11. The reason I began teaching in the field of data processing

- ☐ I was interested in it and asked to do it
- ☐ I was asked by the administration
- ☐ Thought someone had to do it
- ☐ Had worked in the field and thought I'd like to teach it
- ☐ Had some class work in it and thought I'd like to teach it

12. My work experience in the field of data processing has been in the following TWO types of business firms: (Please check only two.)

- ☐ No work experience
- ☐ Accounting
- ☐ Consulting
- ☐ Education
- ☐ Mining-petroleum
- ☐ Government
- ☐ Distributive
- ☐ Insurance
- ☐ Manufacturing
- ☐ Public Utility
- ☐ Financial
- ☐ Military
- ☐ Other_____

13. I held data processing job/s in the following types of industry prior to teaching in the field of data processing:

- ☐ None
- ☐ Agriculture, forestry, and fisheries
- ☐ Mining
- ☐ Contract construction
- ☐ Manufacturing
- ☐ Transportation, communication
- ☐ Electric, gas, and sanitary services
- ☐ Wholesale and retail trade

14. I keep updated in data processing by

- ☐ Reading periodicals
- ☐ Attending meetings of data processing organizations
- ☐ Being on the mailing list of equipment and supplies manufacturers
- ☐ Attending summer school
- ☐ Working in data processing installations
- ☐ Attending night school (extension, etc.)
- ☐ Attending manufacturers schools
- ☐ Attending seminars sponsored by data processing professional organizations
- ☐ Other

15. I belong to the following data processing organizations and/or business education organizations:

- ☐ NBEA and allied organizations
- ☐ Data Processing Management Association
- ☐ SABE
- ☐ Systems and Procedures Association
- ☐ Administrative Management Society
- ☐ Cost Accounting Association
- ☐ Machine Accountants Association
- ☐ Other _____

_____

16. **Using the code at the bottom of the question listing, place a number in the first column to indicate where training was received. Use a check mark in either of the three columns which appropriately indicates your training.**

	Where Training Was Received	Before Teaching Data Processing	After Beginning To Teach Data Processing	No Formal Training
Key punch simulator				
Key punch machine				
Card sorter				
Accounting machines (tabulator)				
Collator				
Reproducer				
Interpreter				
Wiring boards				
Computer console operation				
Random access devices				
Data converting equip.				
Paper-tape equipment				
Intro. to data processing				
Computer logic/theory				
Intro. to systems				
Operations research				
Math for data processing				
Number systems (binary)				
Programming				
Other tab equipment operation				
Other				

1-High School
2-High School Cooperative
3-Area Vocational-Technical
4-Adult Education
5-Special Data Processing School
6-Private Business School
7-College
8-Classes conducted by equipment mfgs.
9-Military
10-On-the-job training

PART II

The following questions deal with the educational characteristics of secondary business educators. Unless otherwise specified, place a check mark in the space adjacent to the answer which most correctly identifies your response to the question.

17. My highest level of education is

- ☐ High school
- ☐ Private business school
- ☐ Public vocational-technical school
- ☐ One year of college
- ☐ Two years of college
- ☐ More than two years of college but no degree
- ☐ Have at least one college degree

18. If I have a degree, the highest degree I now hold is a/an

- ☐ Associate of Arts
- ☐ Bachelor's
- ☐ Graduate work, but no advanced degree
- ☐ Master's
- ☐ Work beyond a Master's, but not a doctorate
- ☐ Doctorate
- ☐ Post doctoral work

19. I attained the above educational level in the following year:

- ☐ 1940-1945
- ☐ 1946-1950
- ☐ 1951-1955
- ☐ 1956-1960
- ☐ 1961-1965
- ☐ 1966-1970

20. My major and minor in graduate and undergraduate programs were

Major			Minor	
Under Grad	Grad		Under Grad	Grad
		Business		
		Business Education		
		Math		
		Physical Science		
		Biological Science		
		Chemistry		
		Social Sciences		
		Psychology		
		Engineering		
		English		
		Economics		
		Industrial Arts		
		Education		
		Other		

21. I obtained my college education in the state or states of

- ☐ Alabama
- ☐ Alaska
- ☐ Arizona
- ☐ Arkansas
- ☐ California
- ☐ Colorado
- ☐ Connecticut
- ☐ Delaware
- ☐ Florida
- ☐ Georgia
- ☐ Hawaii
- ☐ Idaho
- ☐ Illinois
- ☐ Indiana
- ☐ Iowa
- ☐ Kansas
- ☐ Kentucky
- ☐ Louisiana
- ☐ Maine
- ☐ Maryland
- ☐ Massachusetts
- ☐ Michigan
- ☐ Minnesota
- ☐ Mississippi
- ☐ Missouri
- ☐ Montana
- ☐ Nebraska
- ☐ Nevada
- ☐ New Hampshire
- ☐ New Jersey
- ☐ New Mexico
- ☐ New York
- ☐ North Carolina
- ☐ Other
- ☐ North Dakota
- ☐ Ohio
- ☐ Oklahoma
- ☐ Oregon
- ☐ Pennsylvania
- ☐ Rhode Island
- ☐ South Carolina
- ☐ South Dakota
- ☐ Tennessee
- ☐ Texas
- ☐ Utah
- ☐ Vermont
- ☐ Virginia
- ☐ Washington
- ☐ West Virginia
- ☐ Wisconsin
- ☐ Wyoming

_____

22. **Have you taken courses in the methods of teaching data processing?**

☐ Yes
☐ No

23. If so, what was the title of the course? _____

24. What credit did you receive? Circle the correct response.

1 2 3 semester hours
1 2 3 4 5 quarter hours

Other _____

25. Have you ever been informed of summer workshops, seminars, extension classes, etc., in the area of data processing by any college or university in the state in which you are teaching?

☐ Yes
☐ No

If so, what is the name and location of the educational institution?

_____

26. Please indicate the computer languages which you are or are not qualified to teach and the languages which you have actually taught.

	Not Qualified to Teach	Qualified to Teach	Actually Teach
ALGOL			
COBOL			
PL-1			
SPS			
SPA			
Autocoder			
FORTRAN			
SOAP			
Machine Language			
Easycoder			
RPG			
Other			

IF YOU STUDIED NO BUSINESS COURSES IN HIGH SCHOOL, go to question 28.

27. Indicate in the appropriate column your reaction concerning the benefits received from the study of the following courses in high school to the teaching of data processing.

	Helpful	Sometimes Helpful	Very Helpful
Introduction to Business (General Business)			
Typewriting			
Shorthand			
Adding and Calculating Machines			
Business Math			
Office or Secretarial Practice			
Data Processing			
Bookkeeping			

28. Indicate in the appropriate column the extent to which these courses taken in high school have helped you in your teaching of data processing.

	Very Helpful	Of Some Benefit	Of No Benefit	Not Taken
General Math				
Elementary Algebra				
Advanced Algebra				
Geometry				
Trigonometry				
Analytic Geometry				
Calculus				
English - Writing and/or Speech				
English - Reading, Literature				
Economics				
Social Studies				
Science				
Industrial Arts				
Other vocational classes				

29. Check in the appropriate column the courses which you took in college, the TWO most helpful courses, and the TWO least helpful courses in the teaching of data processing. Remember, there will be only two check marks in each of the last two columns.

	The Courses I Took	Two Most Helpful	Two Least Helpful
Business Skills			
Typewriting			
Shorthand			
Data processing equipment operation			
Calculating machines			
Adding machines			
Office and secretarial procedures			
Other			
Accounting			
Principles (1st course)			
Principles (2nd course)			
Intermediate 1			
Intermediate 2			
Cost 1			
Cost 2			
Personal Income Tax			
Corporate Tax			
Advanced Theory and Practice			
Advanced Theory and Practice (Continued)			
Management			
Principles of Management			
Office Management			
Personnel Management			
Decision Theory			
Operations Research			
Data Processing Applications			
Other			
General Business Courses			
Introduction to Business			
Business Math			
Statistics			
Marketing			
Finance			
Business Communications			
Business Report Writing			
Other			

PART III

The following questions deal with attitudes. Unless otherwise specified, place a check mark in the space adjacent to the answer which most correctly identifies your response to the question.

30. **Concerning "brain twister" or puzzle-type activities**

- ☐ I enjoy them
- ☐ They are O.K.
- ☐ I do not enjoy them

31. Of the following statements, the one which best describes my attitude toward involvement in the field of data processing is

- ☐ I am very much interested in this area and have been developing my interest through independent study
- ☐ I have no desire to become involved in the area
- ☐ I am interested in the area and have taken formal courses in data processing

32. I think business data processing should be introduced at the following educational level and in the following way: (There may be more than one check mark, possibly one check mark at a particular educational level for each of the methods by which data processing should be introduced.)

Method by Which It Should Be Introduced	Junior High	Secondary	Adult Education	Junior College	College or University
Integration of concepts					
Unit of instruction					
Separate course					

IF YOU DO NOT TEACH A UNIT OR A COURSE IN DATA PROCESSING, STOP.

33. Of the following statements, the one that best describes my attitude toward the teaching of data processing is

- ☐ I enjoy teaching data processing and desire to continue
- ☐ I enjoy teaching it but would prefer teaching in another field
- ☐ I do not enjoy teaching it but plan to continue teaching it
- ☐ I do not enjoy teaching data processing but plan to teach in another area

34. My reactions to my present teaching position regarding the following facets are

	Extremely Favorable	Favorable	Unfavorable
Student motivation			
Relevancy of subject matter			
Financial resources			
Creativity			
Autonomy of position			
Accessibility of machines			

35. I feel that the education (formal) I received before beginning to teach in the field of data processing

- ☐ Prepared me extremely well for this job
- ☐ Gave me adequate preparation for this job
- ☐ Failed to prepare me adequately for this job

APPENDIX D

NUMBER OF COMPUTERS BY STATES

NUMBER OF COMPUTERS IN EACH STATE*

State	Number of Computers	Number of Questionnaires
Alabama	373	12
Alaska	32	4
Arizona	287	12
Arkansas	141	4
California	3666	144
Colorado	375	16
Connecticut	753	28
Delaware	124	4
Florida	807	32
Georgia	634	24
Hawaii	114	4
Idaho	83	4
Illinois	2315	92
Indiana	783	32
Iowa	356	12
Kansas	258	8
Kentucky	271	8
Louisiana	370	12
Maine	95	4
Maryland	835	32
Massachusetts	1386	56
Michigan	1218	48
Minnesota	638	24
Mississippi	161	4
Missouri	904	36
Montana	58	4
Nebraska	271	8
Nevada	67	4
New Hampshire	102	4
New Jersey	1428	56
New Mexico	156	4
New York	3916	156
North Carolina	618	24
North Dakota	38	4
Ohio	1843	72
Oklahoma	377	16
Oregon	272	8
Pennsylvania	2142	84
Rhode Island	141	4
South Carolina	277	12
South Dakota	30	4
Tennessee	466	16
Texas	1779	72
Utah	160	4
Vermont	55	4
Virginia	593	24
Washington	484	20
West Virginia	131	4
Wisconsin	682	28
Wyoming	23	4

*Moody's Computer Industry Survey, 1970

VITA

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Doctor of Education

Thesis: ENVIRONMENTAL AND EDUCATIONAL CHARACTERISTICS OF SECONDARY BUSINESS DATA PROCESSING TEACHERS IN THE UNITED STATES

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