THE UTILIZATION OF COMPUTER-BASED BUSINESS TEACHING

IN KANSAS AND IMPLICATIONS FOR TEACHER TRAINING

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A Thesis

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Chapter 1

INTRODUCTION

Computers were first introduced into business offices in the
mid 1950's. They were used principally for performing the many
repetitious tasks in the office, but as the paper work explosion in
business progressed, the real need for the high speed capability of
the computer became apparent.

In addition, so that meaningful business decision making could
be effected, it became necessary to process and analyze vast amounts
of data very quickly. The computer provided this service.

The influence of computers on business education has also been
considerable.

> The computer in the office, the big technological change in
> the 1950's, made obsolete business education as it had been
> known and taught. A new dimension, business data processing
> was added to the sphere of training for business.[1]

Today, there are more than 100,000 computers in use in the
United States.[2] With more being utilized each month it is now apparent
that computers influence all aspects of modern-day society. As the

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[1]F. Kendrick Bangs and Mildred C. Hillestad, Curricular
Implications of Automated Data Processing for Educational Institutions,
(U.S. Department of Health, Education, and Welfare, September, 1968),
p. 20.

[2]Donald D. Spencer, A Guide To Teaching About Computers In
Secondary Schools, (Florida, Abacus Computer Corp., 1973), p. 1.

majority of these computers are being utilized for business

applications it has become imperative that public schools meet the

need, responsibility, and challenge of incorporating the application

of computers in business education.

If computer-based business education is to be effective it

must satisfy both the general education and vocational education

objectives. This study should provide an understanding of the extent

of computer-based business teaching, what is being taught, how it is

being taught, and if educational objectives are being achieved, in the

public secondary schools and public post-high school institutions

offering less than baccalaureat degrees in the State of Kansas.

The Problem

Statement of the problem. It was the purpose of this study

to (1) determine the utilization and scope of computer-based business

teaching in the public secondary schools and the public post-secondary

schools offering less than a baccalaureat degree—the Secondary

Schools, Area Vocational-Technical Schools, and the Community Junior

Colleges—in Kansas; and (2) to assess the implications of this for

both pre-service and in-service training of teachers in the field of

business data processing.

Importance of the study. Computers are having a profound

effect on today's society. There is no doubt that people's lives are

being influenced and, in some cases, dependent upon these electronic

devices. "Regardless of one's role in our society, a minimum knowledge of computers and data processing is essential."[3]

Throughout the United States many secondary schools, technical schools, and colleges teach about and with computers. Each year more schools and colleges introduce computer-based courses in order to meet society's needs. However, "as only about 30% of students who graduate from high school in the United States go on to college"[4] it is becoming increasingly important for education in computers to be introduced at the high school level, and for the expansion of programs in the post secondary institutions.

The information compiled in this study will describe the current commitment of the public secondary and post-secondary schools other than four year colleges of Kansas towards the teaching of and about business data processing. The study will provide a central source of information indicating the curriculum in business data processing offered by these schools, thus illustrating the contribution of the teaching of business data processing towards meeting vocational and general educational objectives of the state of Kansas.

"That educators in one school need to know what those in other schools are doing is of course a truism."[5] It is hoped that this

[3]Division of Instructional Systems of the School District of Philadelphia, Layman's Guide To The Use Of Computers, (The Association for Educational Data Systems, 1971), p. 1.00.

[4]Spencer, op. cit., p. 2.

[5]Conference Board of the Mathematical Sciences Committee on Computer Education, Recommendations Regarding Computers in High School Education, (Conference Board of the Mathematical Sciences, April, 1972), p. 21.

study will provide an effective communication link between schools in Kansas. If the information compiled in this study is made available to the individual schools it will enable schools not only to see how they compare in terms of equipment and programs with other schools, but it should also indicate areas where cooperation and mutual assistance may be possible and educationally beneficial.

If this report is made available to counselors in high schools it will provide them with information beneficial to students wishing to study business data processing at the AVTS or Community College level. This information could also be used in counseling adult students who are seeking further education and/or training in business data processing, but who do not know where to get it.

The study also describes how business data processing is being taught, the equipment and teaching materials being utilized, and teacher problems associated with the subject, in these schools. This information is extremely pertinent to educational institutions bearing the responsibilities of training future business education teachers, and for providing high quality and relevant continuing education for business teachers in the schools.

Information contained within this study will enable the business education teacher training institutions in Kansas to assess their programs in terms of the findings of this study, and to make any necessary changes to meet the expressed needs of teachers.

Definitions of Terms Used

In this research, the definitions of terms used were interpreted as follows:

Business data processing consists of the operations needed to
capture and transform business data into useful information and the
transmission of this information to managers or other specific
individuals or groups.[6]

Computer Assisted Instruction (CAI). A method of using a
computer system as a means of presenting individualized instructional
material to a number of students simultaneously.[7]

Computer Managed Instruction (CMI) is the use of computers
as an aid in the classroom management aspects of teaching. It is
generally associated with the individualization of instruction and
involves such things as record keeping, test scoring, test analysis,
student pacing, and storage and retrieval of instructional material.[8]

Computer Augumented Learning (CAL) is the use of computers
to assist or extend the instructional and learning process. A
common example is the use of canned computer programs to aid in the
computational aspects of problem solving. The use of computer
simulations is another example.[9]

AVTS. The initials AVTS as used in this report refer to the
Area Vocational-Technical Schools in Kansas.

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[6]V. Thomas Dock and Edward Essick, Principles of Business
Data Processing (Science Research Associates, Inc., 1974), p. 4.

[7]The Division of Instructional Systems of the School District
of Philadelphia, op. cit., p. 6.01.

[8]Spencer, op. cit., p. 29.

[9]Ibid.

CJC. The initials CJC are used in this report to refer to the Community Junior Colleges in Kansas. A Community Junior College is a public, two-year educational institution governed by a community board and designed to meet the post-secondary educational needs of its community. It should provide individuals of all ages educational opportunity which recognize and satisfy a wide cross section of citizen interests, capacities, and aptitude.[10]

High School. In this study, a high school was interpreted as being a junior high school, a senior high school, or one in which the junior and senior levels were combined.

Deliminations

This research was delimited to public secondary schools known to be teaching business data processing[11] and selected secondary schools with enrollments exceeding one thousand students, Area Vocational-Technical Schools, and Community Junior Colleges, within the State of Kansas.[12] The names of the secondary schools, AVTS's, and the Community Junior Colleges involved in the research, and their locations, are listed in Appendix A.

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[10]Kansas Association of Community Colleges, The Modern Kansas Community College, (November, 1974).

[11]Kansas State Department of Education, Computer Printout, (March, 1974).

[12]Arlin P. Morgan, ed, Kansas Education Directory 1974-75, (Kansas State Department of Education, 1974).

Methods of Procedure

In preparation for this study, related literature was reviewed. A two-part questionnaire was developed for the collection of data. Part I of the questionnaire related to the business data processing courses offered and methods of instruction utilized in the schools, while Part II related to teachers actually teaching business data processing and to their opinions relative to the subject.

After the questionnaire was developed it was presented to two data processing instructors, two business education instructors, and one education instructor at Emporia Kansas State College for review, evaluation and criticism. It was also sent to a senior data processing educator at Kansas State University, Manhattan for further analysis and evaluation.

All suggestions for change in the questionnaire were considered, and the final form of the questionnaire was developed. The questionnaire together with a covering letter was forwarded to either the instructor or teacher of Business Data Processing, or the Head of the Business Education Department at the selected Secondary Schools, Area Vocational-Technical Schools, and Community Junior Colleges.

The same questionnaire together with a second covering letter was further forwarded to all Secondary Schools, Area Vocational-Technical Schools, and Community Junior Colleges included in the survey which had not returned the original questionnaire within three weeks from the date of mailing that questionnaire. A copy of each of the covering letters and the questionnaire are presented in Appendix B.

After collecting the data, the results were tabulated, summarized and analyzed.

Organization of the Remainder of the Study

Chapter 2 presents the review of the current literature relating to the utilization of computer-based teaching.

Chapter 3 describes in detail, how the data was collected from the schools offering courses in business data processing.

Chapter 4 presents the collected data obtained from the questionnaire. The information is presented in quantitative form, with the interpretation of the results included in this chapter. The data is analyzed according to the type of public school--Secondary School, Area Vocational-Technical School, and Community Junior College. The data for each type of school has been analyzed independently but, where deemed necessary, comparison of relevant data has been effected.

In Chapter 5, the data is summarized, conclusions are drawn, and recommendations are presented.

Chapter 2

REVIEW OF RELATED LITERATURE

If the number of published articles on the instructional use of
computers is an indication of the amount of work going on in this field,
then it can be concluded that this must be one of the largest, fastest
growing, and most exciting areas of educational endeavor. The situation
has changed considerably since 1959. It was then that Edwards stated
". . . after having exhausted all sources of reference, the author
reached the conclusion that pertinent findings from prior research were
not available."[1]

Seven years later Musselman had this to say: "data processing is
here to stay. There is little doubt that it will increase and soon
spread throughout our school programs."[2]

This is exactly what has happened. The instructional use of
computers has become steadily more widespread such that computers are
being utilized mainly from the secondary level upwards, but also, in
many cases, in the elementary schools. Bright, former U.S. Associate

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[1]Melvin Lloyd Edwards, "The Effect of Automation on Accounting
Jobs," Unpublished Doctoral Dissertation, (1959), p. 22.

[2]Vernon A. Musselman, "Where Are We Headed In The Teaching of
Data Processing," Journal of Business Education, XLI, (January, 1966),
p. 139.

Commissioner of Education, has predicted that by 1978, the majority of elementary schools will have individualized education made possible only through computer utilization.[3]

There is no doubt that new and different ways of using computers in education and training are emerging, and it must be realized that much that is being produced is still in the experimental stages and therefore requires proper evaluation. Milner and Wildberger provide a note of caution when they state that "the vast majority of uses appear to support instructional methodologies which fail to take significant advantage of computer capabilities."[4] On can imply from this that, in many cases, traditional teaching techniques could be superior to some presently used computer-based instruction.

Both sides of the argument as to whether or not computer-based instruction is here to stay are well presented by Anderson,[5] and Bloom.[6] This argument is now well worn, and no longer can anyone doubt the future impact of computers on education. "The need for training young people for living and working in a computerized world is with us."[7]

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[3]Harvey J. Brudner, "Computer-Managed Instruction," Science, 162:970, (November, 1968).

[4]Stuart Milner and A.M. Wildberger, "How Should Computers Be Used in Learning?" Journal of Computer-Based Instruction, Vol. 1, No. 1, (August, 1974), p. 7.

[5]Ernest G. Anderson, Jr., "No One Is Sure Where New Data Are Taking Education," Nations Schools, LXXVII, (February, 1966), p. 90.

[6]Arnold M. Bloom, (Ed.), "Time Sharing Technique Allows Colleges And Public Schools To Find New Uses For Computer," American Schools and Universities, XXXVIII, (October, 1965), p. 64.

[7]F. Kendrick Bangs and Mildred C. Hillistad, "Curricular Implications of Automated Data Processing for Educational Institutions," U.S. Department of Health, Education, and Welfare, (September, 1968), p. 20.

Review of the literature dealing with computers and education indicates two major areas. They are:

1. The factors justifying the use of computers in education.[8]

2. Methods of using computers in the educational process.[9]

Factors Justifying the Use of Computers in Education

There are three basically different factors for justifying the use of computers in teaching. Firstly, the use of the computer may essentially be the only method of obtaining any worthwhile results. Secondly, only the computer contains certain unique characteristics which can provide important instructional capabilities, and thirdly, the computer may provide the most economical method of performing instruction which may be done equally well by other methods.

Essential use of computers. There are probably two areas in which the use of computers is essential if realistic teaching is to take place. The first is in the area of automation. The computer is indispensible in the instruction of students in the development of automated systems. This aspect of computer use is generally associated with higher levels of education, but both Papert[10] and Dwyer[11] have

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[8]Milner and Wildberger, op. cit., p. 7.

[9]Ronald Cody, "Computers in Education: A Review," Journal of College Science Teaching, Vol. 3, n1, (October, 1973), p. 22.

[10]S. Papert, "Teaching Children To Be Mathematicians Versus Teaching About Mathematics," International Journal of Mathematical Education in Science and Technology, (1972), pp. 249-262.

[11]T. Dwyer, "Heuristic Strategies For Using Computers To Enrich Education," International Journal of Man-Machine Studies, (1974), p. 6.

discussed how both elementary and secondary school children can use
computers to control automata and design their own automated systems.

Secondly, the utilization of the computer may be an absolute
(or practical) necessity to:

> . . . provide realistic training in the operation of unavailable
> systems, or to provide the opportunities to explore real-world
> phenomena in which a mistake can lead to a disaster, either physical
> or economic.[12]

Unique characteristics. The unique benefits derived from the
use of computers in education consist of versatility of function, rapid
real-time responsiveness, and problem-solving and computational aid.
As such, the benefits are by nature intangible and, therefore, extremely
difficult to measure.

Milner and Wildberger clearly illustrate the attributes of the
computer in this area.

> It is now possible to have a single system which:
> (1) instruction can be delivered (e.g., drill and practice,
> tutorial) and manipulated (e.g., learner-control, interactive
> graphics); (2) real-world phenomena can be simulated;
> (3) information retrieved; and (4) the full computational power
> of the computer can be used by the student to solve problems.
> Additionally, . . . generate problems, derive solutions to these
> problems, evaluate students proposed solutions, and generate
> remediation. Instructional management functions such a testing,
> prescribing, record keeping, and resource allocation would also
> exist.[13]

There is no doubt that the use of the computer in this way will
allow the student to work at his own pace on problems, either generated
by his teacher or himself, in a situation which approximates real-life
activity. This will be similar to the situation in which the problems
are met and solved in the real world.

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[12]Milner and Wildberger, op. cit., p. 8.

[13]Ibid., pp. 8-9.

The cognitive and affective outcomes of such computing, in terms of generalized problem solving skills are positive,[14] but it would be extremely difficult to evaluate the effectiveness of transfer of learning from computer problem solving to that of real life.

Economic advantages. Both the hardware and the software of a computer system are expensive in real terms, so it follows that if economies are to be gained from a computer-based instructional system a large number of students must receive instruction at a high turnover rate. It is a well known fact that an underutilized computer is extremely costly to the owner.

> Clearly, the routine use of computers in mass instruction makes education less labor intensive, makes it easier to reach a student body that is dispersed geographically and facilitates treatment of students with special handicaps or widely differing backgrounds.[15]

Many countries are presently either investigating the possibilities of, or actually establishing national computer networks for educational purposes.[16] The economic advantages of computer-based education in situations of countries with large populations and teacher shortages--Brazil, Japan, India-- and countries with sparse and/or widely dispersed populations--Australia, South Africe-- would be considerable.

It is interesting to note that the author's country, Australia, is considering a plan to establish a nationwide network of computers

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[14]S. Milner, "Learner-Controlled Computing: A Description and Rationale," Paper presented at the annual meeting of the American Educational Research Association, (Chicago, 1974).

[15]Milner and Wildberger, op. cit., p. 10.

[16]D.C. States and R.L. Lien, "Education In The Information Society," The Journal, Vol. 1, No. 4, (October, 1974), p. 8.

for their postal department. It is anticipated that the system will be utilized to piggyback high quality educational services to both remote and populated areas.

Methods of Using Computers in the Educational Process

Review of the literature indicates four ways in which the computer can be used in the educational setting. They can be used as an information system both for administration and teaching; as a tutor; as a simulator; and as a calculator and problem solver.

The computer as an information system. The computer can handle the normal routine administrative processes of a school in the same capable and efficient manner as it handles business data. It can process student records, time-tables scheduling, test-grading, payroll, and library inventories with very little difficulty, yet most people would believe that the educational computer cannot be justified if it is used merely to keep student and other purely administrative records.[17]

It is a different matter entirely if the computer is used in managing and assisting the educational process. These functions are referred to as computer-managed instruction (CMI), and computer-aided or computer-assisted instruction (CAI).

The basic difference between the two is that CMI is basically a teaching system while CAI utilizes the computer as a teaching machine. Many authors believe that greater emphasis should be placed on the

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[17]Harvey J. Brudner, "Computer Managed Instruction," Science, 162:970, (November, 1968).

development of a teaching system (CMI) rather than the development of a teaching machine (CAI).[18]

The computer has the capability of storing large amounts of data which is available for almost instantaneous retrieval.[19] Yet many people think the application of the computer is restricted to mathematics, but once this misunderstanding is cleared up it is not difficult to imagine large data banks being compiled for almost every educational pursuit from the very lowest to the very highest level of endeavor.

Thus access to computer data banks, in effect, brings an extensive library to the teacher, student, or researcher, and also streamlines information retrieval. The use of the computer as an information retrieval system must present wide application possibilities in all areas of education, but up to the present time it has largely been ignored.[20]

The computer as a tutor. The areas of computerized individual and programmed instruction have recently emerged from the research and development stage and have been implemented in large scale educational situations. As a result both CMI and CAI have been extensively utilized.

> Programs range in complexity from simple drill and practice
> exercises to elaborate computer-student dialogues in which the
> student's response to a question is in the form of regular English
> sentences or phrases, and the computer's reply is constructed by

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[18]Ronald Cody, "Computers in Education: A Review," Journal of College Science Teaching, Vol. 3, n1, (October, 1973), p. 22.

[19]Leonard Muller, Computers in the Classroom, Margolin and Misch, editors, Spartan Books, (Washington, D.C., 1970), p. 79.

[20]Cody, loc. cit.

the program. However, all the programs have in common the fact that they individualize the instructional process.[21]

In many cases educators do not take full advantage of this capability of the computer. In other cases computerized individualization and programmed instruction may not have been necessary at all.

Educators must realize that the major advantage derived from the use of the tutor function of the computer is its ability to do elaborate branching. Nevertheless, "sterile, trivial, page-turning CAI, and unnecessary computer-managed instruction systems exist on a larger scale than one might have expected."[22] It is essential that the computer should present individualized and programmed material differently from basic programmed texts.

   The computer as a simulator. A simulation is defined as:

   An imitation of real circumstances aimed at providing a learning environment . . . a technique by which the essential features of some object or process are abstracted and recombined in a model which represents the functions of the original and can be manipulated for the purpose of study or instruction.[23]

   Simulation exercises, as an instructional tool, are not new. They have been used in classrooms for at least one-hundred years.[24]

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[21]Ibid.

[22]Stuart Milner and A.M. Wildberger, "How Should Computers Be Used In Learning?" Journal of Computer-Based Instruction, Vol. 1, No. 1. (August, 1974), p. 10.

[23]R. L. Wing, "Simulation as a Method of Instruction in Science Education," The Science Teacher, 35:41, (May, 1968).

[24]James Thoman, "When New Is Really Old: A Look At Simulations and Games," Journal of Educational Data Processing, 9:13, (December, 1972).

Computer simulations, or computer augmented learning (CAL),
represents one of the most important pedagogical uses of the computer.
The learning and instructional advantages of using computer augmented
learning in the classroom are manifold.

> Students are given an insight into the importance and usefulness
> of the computer as a tool for decision making. Realistic duplication
> of business, environmental, and societal conditions can eliminate
> the artificial classroom environment and make the classroom situation
> more challenging to both the students and faculty.[25]

Not only does the computer allow the teacher and the student to
investigate conditions which are too complex, too costly, too dangerous,
or impossible to produce in the classroom, but it also provides immediate
feedback to enable more timely and more realistic decision making to
take place. Computer simulation exercises displaying the foregoing
attributes have been developed in many areas, with perhaps the bulk of
them in business, economic and science education.

The computer as a calculator and problem solver. The speed and
accuracy of the calculations are a prime advantage of using the computer.
The computer can also perform calculations which are too sophisticated
for the student.

The computer used in the mode of calculator and problem solver
has been clearly illustrated in the business and scientific worlds.[26]
These roles are also included in the function of the tutor and simulator
modes in the educational application.

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[25]Richard Loschetter and William E. Pilard, "The Computer in
the Business Classroom," Collegiate News and Views, 15:19, (Winter,
1971).

[26]Cody, op. cit., p. 27.

<u>Teacher Involvement</u>

Computer-based instruction is still in its infancy, and in common with other innovative teaching methods, teacher involvement and support are necessary for its success. But many teachers are hesitant and wary when confronted with the possibility of computer instruction. Teacher inexperience is the reason most often put forward for teacher reluctance to accept class-room assignments in data processing,[27] but Lenhart suggests the real reason might be:

> Exposing most administrators and teachers to the computer is roughly equivalent to dropping them on the far side of the moon. In other words, they're on unfamiliar territory, don't speak the language of the natives, and are completely in the dark. The question is--how, when and where do we teach the survival course for twentieth century man dropped suddenly into the twenty-first century.[28]

The competence and enthusiasm of the teaching staff will determine to a large extent the success of computer-based teaching. The importance of teacher training in computers is clearly stated by Miller:

> . . . at least that some kind of orientation in computers should be given to all teacher trainees. They would not need to be programmers, but they should at least be conversant with what computers are, what they do, and how they can be used as a learning resource by students.[29]

The classroom teacher will also need assurance that the computer will not replace nor restrict him, but will, in fact, supplement his

[27]Mary Witherow, "Development of a Data Entry Center," <u>Balance Sheet</u>, LV, No. 7, (April, 1974), p. 295.

[28]Ron Lenhart, "On the Far Side of the Moon," <u>College Management</u>, Vol. 7, No. 10, (October, 1972), p. 4.

[29]Lawrence W. Miller, "How Can Two-Year Colleges Use the Computer," <u>College Management</u>, Vol. 7, No. 1, (October, 1972), p. 31.

teaching. The teacher must be made aware that there are enormous benefits to be derived from utilization of the computer in teaching. Not only can computers maximize the teacher's flexibility and efficiency, and, at the same time, minimize his time-consuming chores, but it also provides for the student a one-for-one communication with the teacher and the computer.[30]

Summary

Computers are playing an increasingly significant role in education. Nevertheless, it still remains a difficult and complex decision for an educational institution to make as to whether or not to use computers in the educational process. Although there are three basically different factors utilized to justify the use of computers in teaching, it is very rare for any one of these factors to be sufficient for this decision to be determined. Generally, at least two of these factors need to be considered by the decision makers.

It is possible to identify a number of different types of computer-related educational activities, though in practice these types will not be independent of one another.

The use of the computer directly to assist the teacher in organizing and presenting information and ideas and in monitoring student progress is still in its infancy. The development of data banks and information-retrieval systems will undoubtedly produce an extensive range of educational applications.

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[30]Ralph Cook, "Computers With Personality," The Journal, Vol. 1, No. 4, (October, 1974), p. 5.

The application of the computer as an instructional tool has much to offer. The computer can present instructional sequences, analyze the student's responses to questions and branch according to his achievements (CAI). Further, the computer can assist in matching individual students with learning materials, rescources, and activities which fit their requirements as closely as possible (CMI).

The use of the computer to model or simulate real situations enables the student to investigate environments beyond the real ones to which he has access (CAL).

Finally, the computer can be used to relieve the student of tedious and time-consuming computation related to his investigations in various disciplines.

It is quite unnecessary for the teacher to become a skilled computer technician. On the other hand, it is most important for the teacher to understand that activities related driectly to the computer are only part of the total teaching program.

The teacher should be able to understand the nature of information processing, its contribution to teaching in general and to his discipline in particular. Further, the teacher must be aware of and be able to discuss the influence of information processing and the computer in modern society. It is fundamental that the teacher understand that the computer is a device which can extend, enhance, and supplement the teacher's role in education.

There is no doubt that computers are here to stay and that they will continue to play an increasing role in people's lives. Even though business accounts for an excess of eighty percent of computer

use, Kurtz of Dartmouth regards the computer "as more important in education than in business."[31] This is further supported by Cody when he states that "in the future, a knowledge of computers will be useful, if not essential for a person to be considered literate."[32]

It is, without doubt then that the computer will receive increasing importance in the educational arena. Review of the literature indicates what has been accomplished and the extent of the problems yet to be solved. Computers will continue to be introduced into schools and will be utilized at all levels of the educational ladder. The future for computer-based teaching is therefore exciting.

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[31]Velma A. Adams, "Dartmouth's Innovations On All Fronts," College Management, Vol. 7, No. 7, (July, 1972), pp. 9-18.

[32]Cody, op. cit., p. 27.

Chapter 3

COLLECTION OF DATA

This study was designed as an attempt to obtain an overview of
the utilization of computer-based business teaching in High Schools,
Area Vocational-Technical Schools, and Community Junior Colleges in
Kansas, and to determine from the data collected, the implications for
both pre-service and in-service training of data processing teachers.
In order to gather data from the schools the questionnaire technique
was used.

The questionnaire, as described in Chapter 1, together with a
covering letter was originally mailed on February 14, 1975, to either
the instructor or teacher of business data processing, or the head of
the business education department at seventy-six schools. The schools
consisted of forty-four High Schools, thirteen Area Vocational-
Technical Schools, and nineteen Community Junior Colleges. On March 5,
1975, the questionnaire, together with a second covering letter was
forwarded to twenty-two schools made up of nine high schools, four
Area Vocational-Technical Schools, and nine Community Junior Colleges,
which had not responded to the original questionnaire.

The Kansas Education Directory 1974-75[1] and a Kansas State Department of Education computer printout[2] of high schools teaching business data processing were used as basic sources for the names and locations of schools and colleges.

In consultation with the author's graduate committee it was determined to forward the questionnaires to the sixteen high schools included in the Kansas State Department of Education's computer printout, and to twenty-eight high school listed in the Kansas Education Directory with enrollments exceeding one thousand students. It was considered that the larger high schools in the State would be the most likely ones to either have introduced business data processing courses since March 1973, or be planning to introduce these courses in the near future.

All fourteen Area Vocational-Technical Schools listed in the Kansas Education Directory[3] were included in the survey except that a separate questionnaire was not forwarded to Cowley County AVTS as this school was incorporated with the Cowley County Community Junior College into one institution. All data relating to the Cowley County Community Junior College and Area Vocational-Technical School is included in the data relating to Community Junior Colleges.

The nineteen Kansas Community Junior Colleges listed in the Kansas Education Directory[4] were included in the survey.

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[1]Arlin P. Morgan, ed. <u>Kansas Education Directory 1974-75</u>, (Kansas State Department of Education, 1974).

[2]Kansas State Department of Education, <u>Computer Printout</u>, (March, 1974).

[3]Ibid.

[4]Ibid.

Sixty-five of the seventy-six schools and colleges which were included in the study returned completed questionnaires. The responses were from thirty-five high schools, thirteen Area Vocational-Technical Schools, and seventeen Community Junior Colleges. The response rate to the questionnaire was 85.5 percent.

Chapter 4

ANALYSIS OF DATA

This chapter constitutes a detailed analysis of data accumulated
by menas of the questionnaire described in Chapter 1 and illustrated in
Appendix B. Information based on the data accumulated is synthesized,
summarized, tabulated, analyzed and interpreted so that findings are
clearly revealed. To facilitate the presentation, the material in this
chapter is divided into sections which conform to the two parts of the
questionnaire. The first section of the chapter relates to the data
processing courses offered and the methods of instruction used in the
schools and colleges, and the second section relates to the data
processing teachers and their opinions on pertinent educational matters.

Data Processing Courses and Methods of Instruction

Schools and Colleges Offering Business
Data Processing Courses

At least one course of business data processing was taught at
twenty of the high schools included in the survey (Table 1). In
addition to this, Newton High School was planning to introduce a data
processing course integrated with accounting within the next three years,
while two other high schools, Great Bend Senior High and Shawnee
Mission West indicated that they would like to introduce business data
processing courses, but that funds and staffing were the limiting

factors. The twelve other high schools in the survey did not plan introducing data processing courses within the next three years.

Ten of the high schools presently teaching business data processing indicated that their courses were semester courses. Six schools offered mini courses of nine weeks duration, while four schools gave no indication as to the type of courses offered.

Business data processing is presently being taught in five of the thirteen Area Vocational-Technical Schools included in the survey. The respondent from the Southwest Kansas AVTS anticipated that some business data processing would be offered at that school within the next three years.

Business data processing is also being taught at Cowley County Community College and AVTS, but as these two schools are combined into one institution they have not been treated separately. Instead, data relating to Cowley County Community College and AVTS are included with the other community junior colleges.

Although business data processing courses are not taught at Liberal AVTS, a small unit of data processing incorporating a study project is included in their business course. All of the business data processing courses offered by the other Area Vocational-Technical Schools are semester courses.

Twelve of the Community Junior Colleges included in the survey reported that they taught at least one business data processing course. The twelve colleges offered one semester courses, and in addition, specialized mini courses were being offered by Barton County Community Junior College. Pratt Community Junior College reported that an

Table 1

Number and Percentage of High Schools, Area
Vocational-Technical Schools, and Community
Junior Colleges in Kansas Offering
Business Data Processing Courses,
in 1975

Time	High Schools N=35		AVTS's N=13		CJC's N=17		Totals N=65	
	No.	%	No.	%	No.	%	No.	%
Spring Semester, 1975.	20	57.1	5	38.5	12	70.6	37	56.9
Within the next 3 years	21	60.0	6	46.1	13	76.5	40	61.5

introductory data processing course would probably be offered within the next three years.

The schools and colleges that offered, or planned to offer, business data processing courses are listed in Table 2, together with their current enrollments in data processing classes, and the anticipated changes in these enrollments over the forthcoming three years.

Eighteen of the high schools currently offer business data processing courses to high school students, Lawrence High School offers courses to both high school students and adult evening classes, and Junction City Senior High School offers courses only to adult evening classes. Enrollments in data processing courses in high schools varied from five students at Burlingame High School to one hundred and fifty students at Salina High School. The current enrollment for one high school was not available. The adult evening classes conducted by Junction City Senior High School and Lawrence High School have enrollments of eighteen and twelve respectively. The mean enrollments for high schools included in the survey were 51.1 for high school students and 15.0 for adult evening classes.

Fourteen (70 percent) of the high schools in the survey anticipated that enrollments in data processing classes would increase within the next three years, two high schools suggested that enrollments would remain about the same, and five high schools gave no indication of anticipated changes. It is interesting to note that Shawnee Mission North High School anticipated doubling its current business date processing enrollments of one hundred students within the next three

years. Wichita North High School also anticipated doubling enrollments in business data processing courses in the same period.

The five (38.5 percent) Area Vocational-Technical Schools included in the survey which are currently offering business data processing courses, present these courses to a combination of high school, post-high, and adult evening classes. Both Kaw AVTS and Manhattan AVTS offer courses to the three categories, and Northeast Kansas AVTS offers courses to high school and post-high students. North Central Kansas AVTS and Northeast Kansas AVTS offer courses only to post-high students.

The Southwest Kansas AVTS indicated that it would be introducing a business data processing course within the next three years. The Salina AVTS (not included in Table 2), although not currently offering business data processing courses, is currently teaching a Key Punch course utilizing the IBM Selectric typewriter as a key punch simulator.

Mean enrollments in the five Area Vocational-Technical Schools are 17.7 students for high school classes, 16.8 for post-high classes, and 33.0 for adult evening classes. Four (80 percent) of the Area Vocational-Technical Schools in the survey anticipated increases in enrollments during the next three years, while three of the schools predicted increases from 10 to 20 percent. None of the Area Vocational-Technical Schools anticipated decreases in enrollments in the near future.

Twelve (70.6 percent) of the Community Junior Colleges included in the survey teach business data processing. Data received from an unnamed Community Junior College has been included in Table 2. Enrollments in these classes range from fifteen post-high students at

Hutchinson Community Junior College to two hundred and fifty post-high students at Johnson County Community Junior College. Johnson County Community Junior College is the largest school included in the survey in terms of enrollments, the number of data processing teachers, and the range of courses offered.

Butler County Community Junior College offered data processing courses to high school, post-high, and adult evening classes. Allen County Community Junior College, Coffeyville Community Junior College, and Cowley County Community Junior College offered programs to post-high and adult evening classes, while the eight other colleges offered business data processing courses to post-high classes. Mean enrollments for the Community Junior Colleges are 11.0 students for high school classes, 68.4 students for post-high classes, and 24.3 students for adult evening classes.

Cowley County Community Junior College anticipated a ten percent decrease in enrollments in data processing classes over the next three years, and Neosho County Community Junior College predicted a fall of five percent in similar enrollments. Three colleges anticipated that enrollments would remain constant during the next three years, while seven colleges predicted increased enrollments during the same period.

Significant increases in enrollments were forecast by three colleges. Cloud County Community Junior College predicted a twenty-five percent increase, and twenty percent increases were predicted by Barton County Community Junior College and Johnson County Community Junior College. Pratt Community Junior College indicated that it would be offering business data processing courses within the next three years.

Table 2

Current Enrollments and Anticipated Changes in Enrollments
in Data Processing Courses in High Schools, Area
Vocational-Technical Schools, and Community
Junior Colleges in Kansas, 1975

Schools and Colleges	Current Enrollments			Anticipated Changes			
	High School	Post High	Adult Ev.Cl.	Inc. %	Dec. %	Same	N/A
High Schools							
Burlingame	5						X
Emporia Senior	50			X			
Haysville Campus	100			X			
Highland Park	15			X			
Hoxie	14					X	
Hugoton	7			30			
Johnson	15			X			
Junction City Senior			18				X
Lawrence	100		12				X
Leavenworth	26			25			
Olathe Senior	135			5			
Osage City	17			X			
Perry Lecompton	23						X
Salina Central	150						X
Shawnee Mission North	100			100			
Shawnee Mission North West	60			5			
Shawnee Mission South	40			X			

Table 2 (continued)

Schools and Colleges	Current Enrollments			Anticipated Changes			
	High School	Post High	Adult Ev.Cl.	Inc. %	Dec. %	Same	N/A
High Schools							
Wichita North	N/A			100			
Wichita South	50					X	
Unnamed high school	20			15			
Newton*	N/A			X			
Mean Enrollments	51.5		15.0				
AVTS's							
Kaw	30	15	50	20			
Manhattan	20	24	16	10			
North Central Kansas		14		X			
Northeast Kansas	3	17		15			
Northwest Kansas		14				X	
Southwest Kansas*		N/A		X			
Mean Enrollments	17.7	16.8	33.0				
Community Junior Colleges							
Allen County		60	10			X	
Barton County		60		20			
Butler County	11	79	56	X			
Cloud County		26		25			
Coffeyville		12	18			X	

Table 2 (continued)

Schools and Colleges	Current Enrollments			Anticipated Changes			
	High School	Post High	Adult Ev.Cl.	Inc. %	Dec. %	Same	N/A
Community Junior Colleges							
Cowley County		56	13	10			
Highland		28					X
Hutchinson		15		5			
Johnson County		250		20			
Kansas City, Kansas		160		10			
Neosho County		35			5		
Unnamed CJC		40				X	
Pratt*		N/A		X			
Mean Enrollments	11.0	68.4	24.3				

N/A   Data not available.
  X   Change indicated but actual percentage unknown.
  *   Schools and colleges which positively indicated the
      introduction of a business data processing program
      within the next 3 years.

Departmental Responsibility for
Instruction and Equipment.

The responsibility for data processing instruction and equipment in the high schools is predominently held (approximately 86 percent) by the Business Education Departments (Table 3). In five high schools the data processing equipment and instruction are shared by the Business Education Department and the Mathematics Department. In one other school these functions are shared by the Business Education, Mathematics, and Science Departments.

In one high school, Olathe Senior High, data processing instruction and equipment is the sole responsibility of the Vocational Education Department, while, at another school, Shawnee Mission South High School, the Computer Science Department and the Business Department share instruction and equipment.

Responsibility for data processing instruction and equipment in Area Vocational-Technical Schools is held by the Business Department in three schools, and by the Data Processing Department in one school. One Area Vocational-Technical School gave no indication other than the responsibility was held by a department other than Business, Mathematics, or Science (Table 3).

The Business Departments/Divisions of the Community Junior Colleges shoulder 92.3 percent of the responsibility for data processing instruction and equipment. In two colleges this dual responsibility is shared with the Mathematics Department. Only at Barton County Community Junior College has a separate Computer Science Department been utilized to adopt this responsibility. Pratt Community Junior College is planning to introduce business data processing as a function of its business department.

Table 3

Departmental Responsibility for Data Processing
Instruction and Equipment in High Schools,
Area Vocational-Technical Schools, and
Community Junior Colleges in Kansas,
1975

Department	High Schools N=21		AVTS's N=5		CJC's N=12	
	No.	%*	No.	%	No.	%
Business/Business Education	18	85.7	3	60.0	12	92.3
Mathematics	7	33.3			2	15.4
Science	1	4.8				
Computer Science	1	4.8			1	7.7
Vocational Education	1	4.8				
Data Processing			1	20.0		
Not Indicated			1	20.0		

* Percentages may add to more than 100 because each school or college
  could make more than one response to the question because the
  responsibility for data processing instruction and equipment
  could be shared by more than one department.

Ownership of, or Access to, Computer Facilities.

The numbers of schools and colleges in the survey which reported either owning, or having access to, computer facilities for instructional purposes are shown in Table 4. A greater proportion of post-high school institutions had direct access to computers for instruction in data processing than did high schools. While nine (45 percent) of the high schools reported at least access to computers, a total of five (62.5 percent) of the Area Vocational-Technical Schools and eight (66.7 percent) of the Community Junior Colleges indicated the availability of computers for instruction.

Wichita North High School reported that business students had access to a computer terminal in the Mathematics Department, and Cloud County Community Junior College reported that their business students had indirect access to a computer at Beloit, Kansas. One high school indicated access to a computer, but gave no indication as to the type of computer or where it was located.

Equipment Available for Student Use.

The data processing equipment which the high schools, Area Vocational-Technical Schools, and the Community Junior Colleges have available for instructional purposes is listed in Table 5.

All of the equipment reported by the high schools was manufactured by IBM. One high school reported owning a key punch simulator, and seven (87.5 percent) high schools reported owning, or having access to, key punch machines. At Shawnee Mission South High School three of the key punch machines are located in the Mathematics Department and two machines

Table 4

Ownership of, or Access to, Computer Facilities by
High Schools, Area Vocational-Technical Schools,
and Community Junior Colleges Teaching
Business Data Processing, 1975

Ownership/Access to Computer Facilities	High Schools N=20		AVTS's N=8		CJC's N=12	
	No.	%	No.	%	No.	%
Yes	9	45.0	5	62.5	8	66.7
No	11	55.0	3	37.5	4	33.3

are located in the Business Department. Two high Schools reported that they owned unit record equipment other than key punch machines. Lawrence Senior High School possesses an interpreter, a reproducer, a sorter, and an accounting machine, and Olathe Senior High School has a sorter and an accounting machine.

The computer facilities which the high schools have available for instructional purposes are varied. Both Shawnee Mission North West High School and Shawnee Mission South High School indicated that they had access to a computer system and interactive terminals. Two other high schools reported having access to terminals, Shawnee Mission North has an IBM Remote Batch Terminal, and the business students at Wichita High have access to an interactive terminal located in the Mathematics Department.

The equipment used by the Area Vocational-Technical Schools included in the survey was exclusively IBM. The only equipment available for data processing classes at Liberal AVTS and Salina AVTS consisted of IBM Selectric typewriters utilized as key punch simulators. The Kaw AVTS also reported utilizing IBM Selectric typewriters as key punch simulators but, in common with the other four Area Vocational-Technical Schools reporting equipment, it also possessed IBM key punch machines and an IBM computer. The Kaw AVTS also utilized four Key/Disk Stations in its data processing instruction,

The Manhattan AVTS reported the most extensive range of equipment available for student use. The equipment at this school includes ten IBM key punch machines (three different models), an IBM unit record system consisting of a sorter, reproducer, interpreter, collator, and an

accounting machine, and three computer systems comprising an IBM 1401, an IBM 1130, and an IBM 370/158.

The computer systems available for instructional purposes in the Area Vocational-Technical Schools consisted of one IBM System/3, four IBM 1130's, one IBM 1401, and one IBM 370/158.

Table 5 also shows the equipment available for instructional purposes in the Community Junior Colleges. Whereas the equipment in the high schools and Area Vocational-Technical Schools was exclusively IBM, it is not so in the Community Junior Colleges. Eight Community Junior Colleges reported using IBM key punch machines. Four of these colleges used at least one IBM unit record machine, and one college has an NCR sorter.

The computer systems available to students at Community Junior Colleges represent a varied range consisting of one IBM System/3, two IBM 1130's, one IBM 3780, one NCR C-100, and one 360/20 LITTON MARK XI. Cloud County Community Junior College reported using an Olivetti P101. Kansas City Kansas Community Junior College reported using an IBM CRT terminal in conjunction with its Remote Batch Terminal to an IBM 3780, and Johnson County Community Junior College conducted data processing instruction on an M & M Remote Batch Terminal, three interactive terminals, and two CRT terminals.

Education Levels of Business
Data Processing Courses

Business data processing courses are offered from grade 9 through to post-high levels and as adult evening classes in the high schools, from grade 11 through to post-high levels and as adult evening classes in the Area Vocational-Technical Schools, and from grade 12 through to

Table 5

Data Processing Equipment Available for Instructional Purposes
in High Schools, Area Vocational-Technical Schools, and
Community Junior Colleges in Kansas, 1975

Schools and Colleges	Key Punch Simulator	Key Punch	Unit Record Equipment	Computer	Other
High Schools					
Haysville Campus	IBM Selectric	IBM 026 (7) IBM 029 (2)		IBM 1401	
Lawrence		IBM 024 IBM 029	IBM Interpreter Reproducer Sorter Accounting Machine	IBM 360/25	
Leavenworth Senior		IBM 5496 (2)		IBM system/3	
Olathe Senior		IBM 029 (6) IBM 129	IBM Sorter Accounting Machine	IBM 370	
Shawnee Mission North		IBM		IBM Remote Batch Terminal	

Table 5 (continued)

Schools and Colleges	Key Punch Simulator	Key Punch	Unit Record Equipment	Computer	Other
High Schools					
Shawnee Mission North West		IBM 029 (2)		IBM IBM Interactive Terminals (5)	
Shawnee Mission South		IBM 029 (5)		IBM 360 IBM Interactive Terminal	
Wichita North				Interactive Terminal	
Area Vocational-Technical Schools					
Kaw	IBM Selectric	IBM 029 (8) IBM 129 (1)	IBM Sorter IBM Verifier	IBM 1130	Key/Disk Stations
Liberal	IBM Selectric (5)				

Table 5 (continued)

Schools and Colleges	Key Punch Simulator	Key Punch	Unit Record Equipment	Computer	Other
Area Vocational-Technical Schools					
Manhattan		IBM 026 (3) IBM 029 (6) IBM 129 (1)	IBM Sorter Reproducer Interpreter Collator Accounting Machine	IBM 1401 IBM 1130 IBM 370/158	
North Central		IBM 029 (2)	IBM Sorter	IBM 1130	
Northeast Kansas		IBM 5496 (2)		IBM System/3	
Northwest Kansas		IBM 129		IBM 1130	
Salina	IBM Selectric				
Community Junior Colleges					
Barton County		IBM 029 (3)	NCR Sorter	NCR C-100	
Butler County		IBM 029 (6) IBM 129 (1)	IBM 082 Sorter 085 Collator 514 Reproducer 518 Interpret- er	360/20 LITTON MARK XI	

Table 5 (continued)

Schools and Colleges	Key Punch Simulator	Key Punch	Unit Record Equipment	Computer	Other
Community Junior Colleges					
Cloud County		IBM 029	IBM Verifier		Olivetti P101
Cowley County		IBM 024 IBM 026 IBM 029 IBM 129	IBM 082 Sorter 519 Reproducer	IBM 1130	
Hutchinson		IBM 129 (8)		IBM 1130	
Johnson County		IBM 029 (4)		M&M Remote Batch Terminal Interactive Terminal (3) CRT (2)	
Kansas City, Kansas		IBM 029 (6)	IBM Sorter Interpreter	IBM 3780 IBM CRT	
Unnamed CJC		IBM 029 {1} IBM 129 {2}		IBM System/3	

post-high levels and as adult evening classes in the Community Junior

Colleges (Table 6).

Business data processing courses were offered in twenty of the

high schools included in the survey. These courses were introduced at

the grade 9 level in three (15 percent) high schools, at the grade 10

level by a further six (30 percent) schools, and at the grade 11 level

by a further nine (45 percent) of the high schools. These eighteen,

or 90 percent, of the high schools offer business data processing courses

through to grade 12.

In addition to offering data processing courses to high school

students, Lawrence High School offered courses to twelve students

attending adult evening classes, and Leavenworth Senior High School

planned to introduce data processing courses at the post-high level, and

as adult evening classes. Junction City Senior High School does not

currently offer data processing courses to high school students, but

offered one data processing course, the unit record system, to eighteen

students attending adult evening classes.

Although business data processing was taught at one other high

school no information was provided of the grade levels to which courses

were offered. Further, Newton High School planned to commence an intro-

ductory data processing course integrated with accounting within the next

three years.

Four (80 percent) of the Area Vocational-Technical Schools

included in the survey, are currently offering business data processing

programs to high school students. Both Manhattan AVTS and Northeast

Kansas AVTS offer courses at grades 11 and 12 levels. Kaw AVTS and North

Central Kansas AVTS currently offer data processing courses to grade

Table 6

Education Levels of Business Data Processing Courses
in High Schools, Area Vocational-Technical Schools,
and Community Junior Colleges in Kansas, 1975

Education Levels	High Schools	AVTS's	CJC's
Spring Semester, 1975.			
High School			
Grade 9	3		
Grade 10	9		
Grade 11	18	2	
Grade 12	18	4	1
Post-High School	1	5	12
Adult Evening Classes	3	4	8
Not Indicated	1		
Added within next 3 years			
High School			
Grade 11	1	1	
Grade 12	1	1	
Post-High School			1
Adult Evening Classes			1

twelve high school students. These four schools also offer courses at the post-high level and to adult evening classes. Northwest Kansas AVTS, the only other Area Vocational-Technical School offering business data processing, offered courses at the post-high level.

The Southwest Kansas AVTS reported that it anticipated introducing business data processing courses within the next three years. These courses are to be offered initially to high school students in grades 11 and 12.

The twelve Community Junior Colleges offered business data processing courses at the post-high level. Eight of these colleges also offered business data processing courses to adult evening classes. Butler County Community Junior College was the only college which offered business data processing courses to high school students. Further, Pratt Community Junior College indicated that it planned to introduce business data processing courses both at the post-high level and as adult evening classes within the next three years.

Areas of Study

The data processing teacher at each school or college was asked to examine a list of six major areas of study (Table 7), to indicate those covered in their programs, and to add any other areas of study covered in their programs but not on the list.

High Schools. The areas of study in data processing courses at the high schools in this study are relatively limited. Compilation of the data regarding the areas covered revealed that the four major areas are Introduction to Data Processing, Unit Record Systems, Computer Programming, and Data Processing Applications (Table 7). Indications

are that only in a very few high schools are these four areas treated as separate subjects. The relatively small number of teachers teaching data processing in each school (Table 10), the small sizes of classes in some schools (Table 2), and comments by teachers, included on the questionnaires, suggest that the areas of study represent units within a semester course, or, in some cases, a unit of a mini course or the mini course itself.

The effects of computers on society is included in the programs of only seven high schools. It was generally indicated that this area was included as a unit in the Introduction to Data Processing course.

Computer programming languages are taught in twelve high schools (Table 7). The most common languages taught are COBOL and FORTRAN, and are taught in nine schools and six schools respectively. The languages BASIC and RPG are each taught in two schools, while APL, Autocoder, BAL, and PL/1 are each taught in one school.

The number of programming languages taught appears to be largely determined by the size of the enrollments in data processing classes (Table 2), the number of teachers teaching data processing (Table 10), and the availability of data processing equipment for instructional purposes (Table 5). Analysis of the data contained within Table 7 revealed that four languages were taught at two high schools, three languages taught at two schools, two languages taught at three schools, and one language at each of five schools.

Area Vocational-Technical Schools. Subject area coverage is broader in the Area Vocational-Technical Schools than in the high schools, both in concentration of schools covering a particular area, and in the number of areas covered. The five area Vocational-Technical

Schools reported that they taught in the areas of Introduction to Data Processing, Computer Programming, and Data Processing Applications. Four (80 percent) of the schools also taught the Unit Record System. Systems Analysis and the influences of computers on society are areas covered in three schools each. Other courses which provided greater depth in area coverage included Computer Assisted Accounting and Key punch each at two schools, and Data Processing Math and Systems Design each at one school. The three Area Vocational-Technical Schools with the largest enrollments in business data processing (Table 2), Kaw AVTS, Manhattan AVTS, and North Central Kansas AVTS, each cover a comprehensive range of areas in their data processing programs.

Although Liberal AVTS is not currently offering business data processing programs, a short introductory unit dealing with an intro-duction to the computer, the influence of the computer on the individual, and punched card accounting, together with a student project, is included in one of their business courses.

Plans for the next three years at Southwest Kansas AVTS include the introduction of business data processing. It is anticipated that the subject areas first introduced would include Introduction to Data Processing, the Unit Record System, Data Processing Applications, and Computers and Society.

The range of programming languages taught in the Area Vocational-Technical Schools was more limited than in the high schools. At the present time, four languages, BAL, COBOL, FORTRAN, and RPG, are being taught in these schools. RPG and COBOL and/or FORTRAN are being taught in each of the five schools and BAL is being taught in two schools. Kaw AVTS, with the largest enrollments in data processing classes (Table 2),

teaches the four languages, Manhattan AVTS, with the second largest enrollments (Table 2), teaches three languages, and the other three schools each teach two languages.

Community Junior Colleges. The twelve Community Junior Colleges offered the broadest coverage of subject areas in business data processing of the three different types of educational institutions included in the survey (Table 7). Johnson County Community Junior College, the largest school in the survey in terms of enrollments in data processing classes (Table 2), and the number of data processing teachers, also covers the widest range of subject areas in its data processing programs of all schools in the survey. The range of areas covered by the colleges also appear to be determined by a combination of factors including class enrollments (Table 2), the number of data processing teachers (Table 10), and ownership, or access to data processing equipment for instructional purposes (Table 5).

In addition to the six major areas of study, individual Community Junior Colleges offered other areas of study in their data processing programs including Computer Operations, Computer Software, Computer Management, Computing Systems, Data File Management, Key Punch, and Teleprocessing. Comments from teachers, which were included on the questionnaires, together with information obtained from school and college catalogs indicated that data processing programs taught in the larger colleges included topics of a more technical nature, and led to a higher academic level than did those in the Area Vocational-Technical schools.

The twelve colleges each offered an Introductory Data Processing course, while Computer Programming was offered in ten of the colleges.

The Unit Record System and Data Processing Applications were courses included in the programs of seven colleges. Further, Pratt Community Junior College indicated that it would probably commence an Introductory Data Processing course within three years.

Although one college indicated that it included computer programming languages in its data processing program, it did not indicate the language or languages taught. Each of the nine other colleges which reported teaching languages offered FORTRAN. Seven of these colleges also offered COBAL, six also offered RPG, three also offered PLI, two offered BAL, and one college also offered BASIC and Assembler languages (Table 7).

Seven of the ten colleges teaching programming languages teach three or more languages while the other three colleges each teach one language. Butler County Community Junior College and Johnson County Community Junior College each teach five different languages, and in addition, Johnson County Community Junior College teaches an advanced course in COBOL. On the other hand, Highland Community Junior College introduces three languages, COBOL, FORTRAN, and PL1, in its Introductory Data Processing course, but they are not taught in any depth.

Involvement of Outside Business Firms

Twenty-three (57.5 percent) of all the high schools, Area Vocational-Technical Schools, and Community Junior Colleges either currently offering or planning to offer business data processing courses indicated that they used the services and/or the facilities of outside business firms in their programs (Table 8). While seven (100 percent) of the Area Vocational-Technical Schools and nine (69.2 percent) of the

Table 7

Major Areas of Study and Computer Programming Languages
Taught in Data Processing Classes in High Schools,
Area Vocational-Technical Schools, and Community
Junior Colleges in Kansas, 1975

	High Schools N=20	AVTS's N=5	CJC's N=12	Totals N=37
Areas of Study				
Intro. to Data Processing	18	5	12	35
Unit Record System	14	4	7	25
Computer Programming	12	5	10	27
D. P. Applications	12	5	7	24
Computers and Society	7	3	5	15
Systems Analysis	1	3	4	8
Computer Assisted Accounting		2		2
Computer Operations			1	1
Key Punch		2	1	3
D. P. Mathematics		1		1
Systems Design		1		1
Computer Management			1	1
Computing Systems			1	1
Data File Management			1	1
Teleprocessing			1	1

Table 7 (continued)

	High Schools N=20	AVTS's N=5	CJC's N=12	Totals N=37
Programming Languages				
APL	1			1
BAL	1	2	2	5
BASIC	2		1	3
COBOL	9	3	7	19
FORTRAN	6	3	9	18
PL/1	1		3	4
RPG	2	5	6	13
Assembler			1	1
Autocoder	1			1
Not Indicated			1	1

Community Junior Colleges involved outside businesses in their programs, only seven (35 percent) of the high schools indicated that they utilized this resource. Two high schools gave no indication as to whether or not outside businesses were involved in their programs.

Table 8 also illustrates how businesses were involved in the schools' business data processing programs. Personnel from local business firms were included on the data processing advisory committees established in four high schools, five Area Vocational-Technical Schools, and six Community Junior Colleges. Comments from teachers at the schools and colleges that had advisory committees, indicated that the involvement of the outside business personnel provided positive contributions to their programs in the form of knowledge of the staffing requirements of local businesses, curriculum up-dating, and information on equipment and equipment purchases.

Fourteen of the schools indicated that they conducted field trips to local business firms for the purpose of observing data processing systems and equipment. The schools which conducted field trips tended to be those schools which did not own, or have direct access to data processing equipment. Of those schools which conducted field trips four (66.7 percent) high schools, two (100 percent) Area Vocational-Technical Schools, and four (66.7 percent) Community Junior Colleges neither owned nor had access to computers.

Further, two Area Vocational-Technical Schools and three Community Junior Colleges pointed out that the business community was utilized as a source of resource people, and that guest speakers and specialist lecturers were often used in business data processing classes. The local business community also provided on-the-job training for one high school,

one Area Vocational-Technical School, and one Community Junior College.
Other ways in which the outside business firms were involved included
the running of student programs for one high school, the rental and use
of data processing equipment to one Area Vocational-Technical School,
and in one case, the local business community assisted a Community
Junior College with the placement of its graduating students.

Utilization of Methods of Computer Instruction

Table 9 indicates how the computer was used in the teaching and
learning processes by the schools and colleges included in the study.
Computer-based teaching largely involved the use of the computer in the
problem solving role in twenty-one schools, and in conjunction with the
teaching of computer programming language skills in nineteen schools.

The use of the computer for educational games and simulation,
Computer Augmented Learning, was the third most frequently used instruc-
tional method and was used in slightly less than twenty-five percent of
the schools. Computer Managed Instruction was used in five schools, and
colleges, while Computer Aided Instruction was used in only one high
school and one Area Vocational-Technical School.

Audio/Visual Aids Used in Instruction

Most of the schools which offered business data processing
courses used some form of audio/visual teaching aids in their programs.
In general the Community Junior Colleges possessed more of these aids
than either the Area Vocational-Technical Schools or the high schools.

In most cases the teaching aids were commercially produced and
consisted of overhead projector transparencies, films, film strips,
slides, sound and video tapes and cassettes, and practice sets. These

Table 8

Involvement of Outside Business Firms in Data Processing
Courses by High Schools, Area Vocational-Technical
Schools, and Community Junior Colleges in Kansas,
1975

	High Schools	AVTS's	CJC's	Totals
Involvement of Business Firms				
Yes	7	7	9	23
No	11		4	15
Not Indicated	2			2
Methods of Involvement				
Advisory Committee	4	5	6	15
Field trips	6	2	6	14
On-the-job training	1	1	1	3
Placement of students			1	1
Rent and use of equipment		1		1
Resource people		2	3	5
Running student computer programs	1			1

Table 9

Methods of Computer Instruction Utilized in
High Schools, Area Vocational-Technical
Schools, and Community Junior Colleges
in Kansas, 1975

Methods of Instruction	High Schools N=20	AVTS's N=5	CJC's N=12	Totals N=37
Problem Solving	9	4	8	21
Computer Language Skills	6	4	9	19
Computer Aided Instruction	1	1		2
Computer Managed Instruction	2	1	2	5
Computer Augmented Learning	5	2	4	11
Not Indicated		1	3	4

aids were largely produced by South Western Publishing Co., McGraw-Hill Publishing Co., Science Research Associates Inc., 3M, IBM, and Education Development Laboratories.

Many schools and colleges also reported using audio/visual teaching aids which were produced by the teachers themselves. These aids were generally limited to overhead projector transparencies, sound and video tapes and cassettes.

Data Processing Teachers

Staffing Business Data Processing Instructional Departments

Out of the thirty-eight schools and colleges which supplied information for the study, twenty-three of them reported having full-time data processing teachers, and twenty-four of them reported using part-time teachers for data processing instruction (Table 10). The five Area Vocational-Technical Schools reported full-time teachers, while ten (50 percent) of the high schools and eight (61.5 percent) of the Community Junior Colleges had full-time teachers engaged in teaching data processing.

All of the high school teachers involved in teaching data processing part-time had full-time teaching programs in their schools. Although no specific information was given by Area Vocational-Technical Schools and the Community Junior Colleges, some of them indicated that their part-time teachers were drawn from the local business community. The Community Junior Colleges, however, hired more part-time teachers than did the Area Vocational-Technical Schools and the high schools. Eleven of the thirteen colleges reported hiring part-time teaching staff.

Table 10

Full-Time and Part-Time Data Processing Teachers in
High Schools, Area Vocational-Technical Schools,
and Community Junior Colleges in Kansas, 1975

Teachers	High Schools N=20	AVTS's N=5	CJC's N=13	Totals N=38
Full-Time Teachers				
Number of Teachers	10	7	14	31
Number of Schools	10	5	8	23
Part-Time Teachers				
Number of Teachers	14	3	18	35
Number of Schools	12	1	11	24

Table 11 shows the size and composition of the teaching staffs of the three types of educational institutions. Of the twenty high schools which offered business data processing, ten reported hiring one full-time data processing teacher, ten hired one part-time teacher and two hired two part-time data processing teachers. One Area Vocational-Technical School hired three part-time teachers. This was the only Area Vocational-Technical School to hire part-time staff in addition to its full-time teachers. One Community Junior College reported hiring three full-time, and six part-time data processing teachers.

Data Processing Background Preparation

Teachers were asked to indicate their highest education level and their background experience in order to get an indication of the type of people who are now teaching business data processing.

The data processing teachers received their background experience in data processing in a variety of ways (Table 12). Over half of the teachers, thirty-nine out of sixty-six, received their data processing preparation by attending college classes. However, this was true for more of the high school teachers than for teachers from the Area Vocational-Technical Schools and the Community Junior Colleges. Nearly three-quarters of the high school teachers had attended college classes, while only half of the teachers in Area Vocational-Technical Schools, and slightly more than half of the teachers in Community Junior Colleges had done so.

High school teachers had also attended more data processing workshops conducted during summer schools, and night classes than the teachers from the other two institutions. Almost forty-six percent of

Table 11

Sizes of the Business Data Processing Teaching Staffs
in High Schools, Area Vocational-Technical Schools,
and Community Junior Colleges in Kansas, 1975

Number of Teachers	Full-Time Teachers			Part-Time Teachers		
	High Schools N=20	AVTS's N=5	CJC's N=13	High Schools N=20	AVTS's N=5	CJC's N=13
1	10	3	4	10		9
2		2	2	2		
3			2		1	1
4						
5						
6						1
Totals	10	5	8	12	1	11

high school teachers had attended data processing summer schools, while only forty percent of the teachers from Area Vocational-Technical Schools, and only just under twenty-two percent of the teachers from the Community Junior Colleges had done so. Also, almost thirteen percent of the high school teachers had attended data processing classes at night as compared with three percent of the teachers from the Community Junior Colleges, and none of the teachers from the Area Vocational-Technical Schools.

Although approximately thirty-six percent of the teachers reported having had actual work experience in the field of data processing, this was concentrated more in the teachers from the Community Junior Colleges and the Area Vocational-Technical Schools. Just over twelve percent of the high school teachers reported actual work experience in data processing as compared with just over half of the Community Junior College teachers and forty percent of the teachers in Area Vocational Technical Schools.

Educational Levels of Teachers

A greater proportion of high school teachers held degrees than did the teachers in Area Vocational-Technical Schools and Community Junior Colleges, 100 percent, 70 percent and 87.5 percent respectively (Table 13). In Kansas, however, certification requirements are much more rigid for the secondary schools than they are for the Area Vocational-Technical Schools and the Community Junior Colleges.

Approximately seventy-five percent of the teachers in the high schools and Community Junior Colleges, and sixty percent of the teachers in Area Vocational-Technical Schools have had education beyond the

Table 12

Sources of Background Preparation in Data Processing
of the Business Data Processing Teachers in High
Schools, Area Vocational-Technical Schools, and
Community Junior Colleges in Kansas, 1975

Background Preparation	High Schools N=24		AVTS's N=10		CJC's N=32		Totals N=66	
	No.	%#	No.	%	No.	%	No.	%
College Classes	17	70.9	5	50.0	17	53.0	39	58.9
D. P. Workshop during Summer	11	45.9	4	40.0	7	21.8	22	33.2
Manufacturers Schools			4	40.0	12	37.4	16	24.2
Night Classes	3	12.5			1	3.1	4	6.0
On-the-job training	2	8.3	3	30.0	6	18.7	11	16.6
Work Experience in D. P.	3	12.5	4	40.0	17	53.0	24	36.2
Military Service			1	10.0			1	1.5

Percentages could add to more than 100 because each teacher
could make more than one response to the question.

Table 13

Educational Levels of Business Data Processing Teachers
in High Schools, Area Vocational-Technical Schools,
and Community Junior Colleges in Kansas, 1975

Highest Educational Level	High Schools N=24		AVTS's N=10		CJC's N=32		Totals N=66	
	No.	%	No.	%	No.	%	No.	%
Less than Bachelor's Degree			3	30.0	4	12.5	7	10.6
Bachelor's Degree	4	16.7	1	10.0	3	9.4	8	12.1
Graduate work, but no advanced degree	4	16.7	1	10.0	8	25.0	13	19.7
Master's Degree	7	29.1	4	40.0	6	18.7	17	25.8
Work beyond Masters, but not a Doctorate	9	37.5	1	10.0	11	34.3	21	31.8
Doctorate								
Totals	24	100.0	10	100.0	32	100.0	66	100.0

bachelor's degree. Also, the proportion of teachers who hold a master's degree is greater in the high schools than at the other two educational institutions. Further, none of the teachers reported having completed a doctorate but approximately thirty-seven percent, ten percent, and thirty-four percent of the teachers in high schools, Area Vocational-Technical Schools, and Community Junior Colleges, respectively had studied beyond the master's degree.

Minimum Requirements for Initial Employment

All schools and colleges were asked to indicate the minimum requirements necessary for the initial employment of teachers of data processing. The schools' responses are tabulated in Table 14.

The Community Junior Colleges generally required the highest academic qualifications for initial employment as a data processing teacher. Nine (69.3 percent) of the colleges required at least a master's degree from applicaants for teaching positions. The master's degree was also required by two (10 percent) of the high schools. However, a bachelor's degree was considered sufficient by fifteen (75 percent) high schools, four (80 percent) Area Vocational-Technical Schools, and by three (23.1 percent) of the Community Junior Colleges.

Work experience was considered more important by the Area Vocational-Technical Schools than by any of the other institutions. Eighty percent of the Area Vocational-Technical Schools listed it as a minimum requirement, whereas, approximately thirty-nine percent of the Community Junior Colleges, and only ten percent of the high schools did likewise.

Teacher training was listed as a minimum requirement by only one Area Vocational-Technical School and one Community Junior College.

Apparently teacher training was assumed by the respondents from the high
schools because teachers must have teacher training certification to
enable them to teach in high schools in Kansas. Three of the high
schools indicated that they also required six hours of data processing
certification, and one of the Area Vocational-Technical Schools required
vocational certification.

Teacher Recruitment Difficulties

Table 14 also indicates whether or not the schools and colleges
experienced difficulty in recruiting data processing teachers.

The greatest difficulty in recruiting data processing teachers
was reported by the high schools where thirty percent indicated some
difficulty. The high schools which experienced difficulty in recruiting
data processing teachers considered this to be due to the shortage of
teachers trained in this area. On the other hand, only one Community
Junior College reported teacher recruitment difficulties, while the
Area Vocational-Technical Schools reported no problems at all in this
area.

Teachers' Preferences for Teacher Training Programs

Teachers were asked to express their opinions as to what aspects
of both pre-service and in-service teacher training should receive
greater attention. The first two preferences of teachers for both pre-
service and in-service teacher training programs are tabulated in
Table 15. The first two preferences only were included as these were
regarded as the most significant in terms of successful teacher training
programs as perceived by practising teachers.

Table 14

Minimum Requirements Necessary for Initial Employment
as a Data Processing Teacher in High Schools, Area
Vocational-Technical Schools, and Community
Junior Colleges in Kansas, and Indications
of Difficulty in Teacher Recruitment, 1975

	High Schools N=20		AVTS's N=5		CJC's N=13	
	No. $\%^*$		No. $\%$		No. $\%$	
Minimum Requirements						
Bachelor's Degree	15	75.0	4	80.0	3	23.1
Master's Degree	2	10.0			9	69.3
Doctorate						
Teacher Training			1	20.0	1	7.7
Work Experience	2	10.0	4	80.0	5	38.5
Vocational Certification			1	20.0		
6 Hours D.P. Certification	3	15.0				
Not Indicated	2	10.0				
Difficulty in Recruiting						
Yes	6	30.0			1	7.7
No	10	50.0	5	100.0	11	84.6
Not Indicated	4	20.0			1	7.7

* Percentages for Minimum Requirements could add to more than 100
because a school or college may use more than one requirement.

Pre-service teacher training programs. The first and second preferences of teachers indicated that more "hands on" experience is considered desirable during the pre-service teacher training period. Apparently teachers consider it important to be fully conversant with the operation of all data processing equipment, including computers, in order to successfully teach the subject. The first preference of nineteen (46.3 percent) teachers and the second preference of a further eleven (36.7 percent) teachers indicated that this aspect of pre-service teacher training was considered to be the one needing greatest attention.

Although six (28.6 percent) high school teachers considered, as their first preference, that greater emphasis should be given to teaching methods and materials during pre-service training, and a further two (15.4 percent) indicated this as their second preference, it was not considered significant by teachers in Area Vocational-Technical Schools and Community Junior Colleges. Only one teacher in an Area Vocational-Technical School and three teachers in Community Junior Colleges gave this aspect their second preference.

More emphasis on data processing applications was considered necessary by twenty-five percent of the teachers in Community Junior Colleges and almost twenty percent of the teachers in high schools. The Area Vocational-Technical Schools appear to place more emphasis on practical business experience as an integral part of pre-service teacher training, as three (37.5 percent) of their teachers considered that greater attention should be given to this area.

In-service teacher training programs. Only slight differences in emphasis were perceived by teachers in relation to areas of

in-service teacher training requiring greater attention. The teachers
indicated that their requirements for in-service education were very
similar to their requirements for pre-service education. More "hands-
on" experience was listed as that area requiring greatest attention in
in-service education by the same number of teachers (19) as similarly
listed it for pre-service education.

High school teachers perceived the major areas of attention for
in-service education to be "hands-on" experience, teaching methods and
materials, and data processing applications. The data processing
teachers at the Area Vocational-Technical Schools perceived the major
areas of emphasis in in-service education to be "hands-on" experience,
prectical business experience, and teaching methods and materials.
"Hands-on" experience, relevant academic content, and data processing
applications were the areas listed by the teachers at Community Junior
Colleges as requiring greater attention in in-service training.

The major areas requiring greater attention, as perceived by
teachers in high schools and Community Junior Colleges, are the same
for both pre-service and in-service teacher training. On the other hand,
the teachers in the Area Vocational-Technical Schools would prefer more
emphasis being given to methods and materials used in teaching in in-
service education than during pre-service training.

Recommended Education Levels for Introduction of Data Processing

A majority of teachers held the opinion that business data
processing should be introduced at the high school level (Table 16).
At the same time, most of the teachers who indicated a grade level,
preferred to introduce this subject at either the eleventh or twelfth

Table 15

Preferences of Practising Business Data Processing
Teachers for Kinds of Pre-Service and In-Service
Teacher Training Programs, 1975

Teacher Training	High Schools		AVTS's		CJC's		Totals	
	Preference 1st	2nd	Preference 1st	2nd	Preference 1st	2nd	Preference 1st	2nd
Pre-Service								
Teaching Methods and Materials	6	2		1		3	6	6
Academic Content	1	1			2	2	3	3
"Hands-on" Experience	9	4	11	2	6	5	19	11
D. P. Applications	4	3	1	2	3		8	5
Influence of Computers on Society						1		1
Business Experience	1	3	3		1	1	5	4
In-Service								
Teaching Methods and Materials	4	2	1	4	2	2	7	8
Academic Content				1	2	3	2	4
"Hands-on" Experience	10	3	4		5	2	19	5
D. P. Applications	1	6	1		2	3	4	9
Influence of Computers on Society						1		1
Business Experience	2	2	2		1	1	5	3

Table 16

Education Levels for Introducing Business Data Processing
as Recommended by Practising Business Data Processing
Teachers in Kansas High Schools, Area Vocational-
Technical Schools, and Community Junior Colleges,
1975

Education Levels	High Schools	AVTS's	CJC's
Elementary School		1	
Junior High School	2		
Senior High School			
High School		1	6
Post-High School	1	2	2
Grade 7	1		1
Grade 8	1		
Grade 9			2
Grade 10	1		
Grade 11	5		
Grade 12	1		2
Grade 11 and/or 12	3	2	

grades. On the other hand, one teacher suggested introducing business data processing at the elementary school level, while five teachers preferred to wait until students were at the post-high level before introducing them to this subject area.

Methods of Introducing Business Data Processing

The teachers were also asked to express their opinions as to how business data processing should be introduced in the schools. How they responded to this question is illustrated in Table 17.

Slightly less than half of the teachers preferred introducing business data processing as a separate subject regardless of the grade level of introduction. On the other hand, twenty-eight percent of the teachers preferred integrating introductory data processing with either a business or office occupations course. A further twenty-eight percent of the teachers thought that business data processing should be introduced as a separate subject and/or integrated with a business subject. In the latter case one teacher suggested integrating business data processing with mathematics.

Data Processing Advisory Committees

Whereas the five Area Vocational-Technical Schools included in the survey reported having a local advisory committee to advise and assist with their business data processing programs, similar committees were reported by approximately forty-six percent of the Community Junior Colleges and twenty percent of the high schools (Table 18).

The teachers generally considered that the attributes of an effective advisory committee include involvement with the school,

Table 17

Methods of Introducing Business Data Processing as
Recommended by Practising Business Data Processing
Teachers in Kansas High Schools, Area Vocational-
Technical Schools, and Community Junior Colleges,
1975

Methods of Introduction	High School	AVTS's	CJC's
Separate Introductory Subject	8	2	4
Integrated with a Business Subject	4	1	4
Separate Subject or Integrated with a Business Subject		2	
Separate Subject and Integrated with a Business Subject			4
Separate Subject and/or Integrated with a Business Subject	2		
Separate Subject or Integrated with Mathematics		1	

Table 18

Existence and Effectiveness of Local Business Data
Processing Advisory Committees in Kansas High
Schools, Area Vocational-Technical Schools,
and Community Junior Colleges, 1975

	High Schools N=20	AVTS's N=5	CJC's N=13	Totals N=38
Existence of Local Advisory Committee				
Yes	4	5	6	15
No	15		7	22
Not Indicated	1			1
Effectiveness of Local Advisory Committee				
Yes	2	5	4	11
No	2		1	3
Not Indicated			1	1

keeping the school informed as to the needs of industry and the business community, assistance, advice, and provision of information relating to equipment usage and update, and advise on curriculum development. In addition, one teacher regarded the role of the advisory committee to include advice and assistance with on-the-job training placement of students.

In the majority of cases the teachers considered their committees to be operating effectively. The teachers at two high schools and one Community Junior College reported that, in their opinion, their business data processing advisory committees were, in fact, ineffective. No reasons were given as to why the committees were ineffective. Further, the teachers at one Community Junior College which reported having a business data processing advisory committee, did not comment as to its effectiveness.

Chapter 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

Statement of the Problem

It was the purpose of this study to (1) determine the utiliz-
ation and scope of computer-based business teaching in the public
secondary schools and the public post-secondary schools offering less
than a baccalaureat degree--the secondary schools, Area Vocational-
Technical Schools, and the Community Junior Colleges--in Kansas, and (2)
to assess the implications of this for both pre-service and in-service
training of teachers in the field of business data processing.

Methods of Procedure

The first step taken in this study involved an extensive review
of the current literature relating to the utilization of computer-based
business teaching in order to gain an overview of the current state of
the use of the computer in business education. A two-part questionnaire
was then developed. The first part of the questionnaire dealt with
business data processing courses and instructional methods used in
teaching them, and the second part related to business data processing
teachers and their opinions relative to the subject. The questionnaire
was reviewed, evaluated, and criticised by a panel of educators and then
revised.

The sample was then selected. Questionnaires were sent to the fourteen Kansas Area Vocational-Technical Schools, the nineteen Community Junior Colleges, and forty-four Kansas high schools. Business data processing was either being taught at the high schools[1] or school enrollments exceeded one thousand students[2]. The same questionnaire was further forwarded to all the schools and colleges which had not returned the original questionnaire within three weeks of the first mailing. The response rate to the questionnaire was 85.5 percent.

The data accumulated from the questionnaire was then synthesized, summarized, tabulated, analyzed, and interpreted. The final step of this study involved preparation of this research report.

Findings Concerning Data Processing Courses and Methods of Instruction

1. Business data processing courses are currently being offered in thirty-seven out of the sixty-five schools and colleges included in the survey. Proportionately more of the Community Junior Colleges (70.6 percent) offered these courses than either the high schools (57.1 percent), or the Area Vocational-Technical Schools (38.5 percent). In addition, business data processing is to be included in the programs of one high school, one Area Vocational-Technical School, and one Community Junior College within the next three years.

2. The high schools generally offer business data processing only to high school students. Only two out of the twenty high schools

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[1]Kansas State Department of Education, Computer Printout, (March, 1974).

[2]Arlin P. Morgan, ed. Kansas Education Directory 1974-75, (Kansas State Department of Education, 1974).

in the survey which offered business data processing offered these
courses to adult evening classes. On the other hand, the five Area
Vocational-Technical Schools presented data processing courses at the
post-high level, and two of them also offered courses to high school
students and to adult evening classes. The twelve Community Junior
Colleges also offered courses at the post-high level, and although only
one of these colleges also offered courses to high school students and
to adults at evening classes, a further three colleges conducted adult
evening classes.

    3. A large majority of the schools and colleges anticipated
increased enrollments in business data processing within the next three
years. Other than the five high schools and one Community Junior
College which gave no indication of anticipated changes in enrollments,
only two Community Junior Colleges forecast declining enrollments.
Many schools and colleges anticipated enrollments to increase between
ten and thirty percent, while two high schools expected one hundred
percent increases in enrollments in data processing classes within the
next three years.

    4. The responsibility for data processing instruction and
equipment in the schools and colleges is predominently held by the
business or business education departments.

    5. Over sixty percent of the post-high institutions teaching
business data processing have direct access to computer facilities for
instructional purposes as compared with forty-five percent of the high
schools. The equipment used for instructional purposes by the high

schools and Area Vocational-Technical Schools included in the survey was exclusively of IBM manufacture. Except in three cases, the equipment used by the Community Junior Colleges was also manufactured by IBM.

6. The business data processing programs in the high schools, Area Vacational-Technical Schools, and the Community Junior Colleges are somewhat similar except that the courses are more concentrated in the post-high institutions. The courses in the Area Vacational-Technical Schools and Community Junior Colleges generally progress to a higher academic level, and in a few cases, a wider range of courses is offered. However, in all cases the major objective of the courses was vocational.

7. The most frequently taught programming languages are COBOL, FORTRAN, and RPG. The Community Junior Colleges tend to teach more languages than the other two institutions. Whereas approximately fifty-eight percent of the Community Junior Colleges taught three or more languages only forty percent of the Area Vocational-Technical Schools and twenty percent of the high schools did this.

8. Relatively few high schools involved outside business firms in their business data processing classes. Only seven out of twenty high schools indicated that they utilized this resource. On the other hand, all of the Area Vocational-Technical Schools and almost seventy percent of the Community Junior Colleges involved outside businesses in their programs.

9. Computer-based business teaching in the schools and colleges largely involved the use of the computer in the problem solving role,

and in conjunction with the teaching of computer programming language skills. Very few schools and colleges used the computer in its instructional mode either for Computer Augmented Learning, Computer Managed Instruction, or Computer Aided Instruction.

10. Although most schools and colleges possess some audio/visual aids the quantity and variety are generally limited.

Findings Concerning Data Processing Teachers

11. Out of the thirty-eight schools and colleges which supplied information for the study, twenty-three of them reported having full-time data processing teachers, and twenty-four schools and colleges used part-time teachers for data processing instruction. All of the Area Vocational-Technical Schools had full-time teaching staff, whereas just over sixty percent of the Community Junior Colleges, and only fifty percent of the high schools had full-time data processing teachers.

12. More high school data processing teachers received at least some of their background experience by attending college classes, workshops during the summer, and night classes than did the post-high school data processing teachers. On the other hand, the teachers from the Area Vocational-Technical Schools and the Community Junior Colleges had more work experience in data processing and also more on-the-job training than did the teachers from the high schools.

13. A greater proportion of the high school data processing teachers hold degrees than the teachers in the Area Vocational-Technical Schools and the Community Junior Colleges. High School teachers also hold proportionately more advanced degrees than the teachers from the other two institutions.

14. The Community Junior Colleges generally required the highest academic qualifications for initial employment of data processing teachers. The minimum academic qualifications required by nine out of thirteen of the colleges was a master's degree. A bachelor's degree was regarded as sufficient by eighty percent of the Area Vacational-Technical Schools, and seventy-five percent of the high schools. On the other hand, work experience was considered more important by the Area Vocational-Technical Schools than by any other institution.

15. The high schools experienced greater difficulty in recruiting business data processing teachers than did the Area Vocational-Technical Schools and the Community Junior Colleges. Thirty percent of the high schools had some difficulty, whereas the Area Vocational-Technical Schools experienced no recruitment difficulties, and only one Community Junior College indicated some difficulty in recruiting teaching staff.

16. Only slight differences in emphasis were perceived by teachers in relation to areas of pre-service and in-service teacher training requiring greater attention. In both cases teachers requested that greater emphasis be given to "hands-on" experience, data processing applications, and teaching methods and materials.

17. A majority of the teachers held the opinion that business data processing should be introduced at the high school level, preferably in the eleventh and twelfth grades. More teachers preferred introducing business data processing as a separate subject, regardless of the grade level of introduction, than in any other way.

18. Whereas all of the Area Vocational-Technical Schools have local advisory committees to advise and assist with their business data

processing programs similar committees exist in a relatively few high schools and Community Junior Colleges. In the majority of cases these committees functioned effectively.

19. Review of the related literature indicated that many teachers were hesitant and wary when confronted with the possibility of computer instruction. Although this aspect was not specifically tested in this study, comments from teachers indicate some resistance by teachers to computer-based teaching.

Conclusions

On the basis of this particular study, the following conclusions appear warranted:

1. It appears that computer-based business teaching is reasonably well established in the Area Vocational-Technical Schools and Community Junior Colleges in Kansas. On the other hand, computer-based business teaching represents, except in a very few cases, a new, growing and experimental area in the public secondary schools in Kansas. The public schools and colleges included in this study are well dispersed throughout Kansas and offer a variety of business data processing programs up to the associate degree level in the Community Junior Colleges, which largely meet the needs of students and the Kansas business community.

2. Results of this study indicate that a majority of the schools and colleges were using modern data processing equipment similar to that used by business firms. Business data processing train-ing provided on modern equipment similar to that used by businesses

results in more adequate instruction than training on older or obsolete equipment.

3. Data processing equipment manufactured by IBM was found to be almost exclusively used by the schools and colleges in the survey for instructional purposes.

4. In all cases the major objective of computer utilization in the schools and colleges was vocational. Not only were the programs offered by the three different types of institutions very similar, but, more importantly, only a very few schools and colleges utilized the computer in the instructional mode. In other words, students were being taught about computers and how to use them from a vocational point of view, but in only a few cases were teachers teaching with computers. It appears that teachers either do not know how to use the computer as a teaching machine (CAI), or as a teaching system (CMI), or for simulation and gaming (CAL), or they are unaware of the advantages of using the computer in its instructional capacity.

5. A real need exists for the training of more teachers in the field of business data processing. If the predicted increases in student enrollments in data processing programs eventuate many more data processing teachers will be required. Probably the greatest effects will be felt by the high schools as they are presently experiencing difficulty in obtaining data processing teachers, and many of them anticipate increased enrollments in business data processing in the near future.

6. Being able to have "hands-on" experience and therefore becoming fully conversant with the operation of the data processing equipment, including computers, is perceived by many teachers as an

essential aspect of pre-service and in-service teacher training.
These teachers apparently believe that their teaching would be more
meaningful and made more relevant if they understood the operation of
the equipment about which they have to teach.

Recommendations

In view of the findings of this study the following recommend-
ations are made:

1. A study similar to this one should be made which incorpor-
ates other states. A further comparison of state results would add
considerably to the knowledge in this field.

2. Further research is needed to determine better utilization
of the computer in the educational context. Greater emphasis should
be placed on the instructional function of the computer.

3. Teacher training institutions should train more teachers
for the field of business data processing. Approaches to increasing
the number of teachers should include pre-service degree programs,
summer schools, and workshops and in-service programs located at
strategic locations in Kansas.

4. Teacher training institutions should review their business
teacher training programs in terms of the findings of this study. These
programs should be changed, if necessary, to overcome the deficiencies
as perceived by business data processing teachers in the field.

5. Further research is needed in the development of adequate
teacher training programs for teachers of business data processing.

6. Research in the human relations area would be valuable.
this should include the social or behavioral implications of data

processing teacher attitudes toward fellow teachers and towards students to determine ideal teaching conditions and environment in a data processing instructional situation.

7. A study similar to this one should be conducted at least every five years in order to determine the current commitment of education in Kansas to computer-based business teaching, and to recommend changes in data processing curriculums and business teacher training programs as a result of new developments in this field.

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APPENDIXES

APPENDIX A

LIST OF HIGH SCHOOLS, AREA VOCATIONAL-TECHNICAL SCHOOLS, AND
COMMUNITY JUNIOR COLLEGES RESPONDING TO THE QUESTIONNAIRE

HIGH SCHOOLS

Burlingame High School,
Burlingame, Kansas, 66413.

Campus High School,
2100 W. 55th Street,
Wichita, Kansas, 67217.

Clay Center High School,
Clay Center, Kansas, 67432.

Emporia High School,
3301 W. 18th,
Emporia, Kansas, 66801.

Garden City High School,
1412 N. Main
Garden City, Kansas, 67846.

Great Bend High School,
2027 Morton,
Great Bend, Kansas, 67530.

Highland Park High School,
2424 California,
Topeka, Kansas, 66605.

Hoxie High School,
Hoxie, Kansas, 67440.

Hugoton Secondary School,
115 W. 11th,
Hugoton, Kansas, 67951.

Johnson High School,
Johnson, Kansas, 67855.

Junction City High School,
9th and Westside,
Junction City, Kansas, 66441,

Lawrence High School,
19th and Louisiana,
Lawrence, Kansas, 66044.

Leavenworth High School,
10th and Halderman,
Leavenworth, Kansas, 66048.

Manhattan High School,
2100 Poyntz,
Manhattan, Kansas, 66502.

Newton High School,
130 W. Broadway,
Newton, Kansas, 67114.

Olathe High School,
600 E. Prairie,
Olathe, Kansas, 66061.

Osage City High School,
Osage City, Kansas, 66523.

Perry Lecompton High School,
Perry, Kansas, 66073.

Salina Central High School,
Front and Crawford,
Salina, Kansas, 67401.

Salina South High School,
730 Magnolia Road,
Salina, Kansas, 67401.

Shawnee Mission North High School,
7401 Johnson Drive,
Shawnee Mission, Kansas, 66202.

Shawnee Mission North West High
   School,
12701 W. 67th,
Shawnee Mission, Kansas, 66216.

Shawnee Mission South High School,
5800 W. 107th
Shawnee Mission, Kansas, 66207.

Shawnee Mission West High School,
8800 West 85th,
Shawnee Mission, Kansas, 66212.

Topeka High School,
800 W. 10th,
Topeka, Kansas, 66612.

Topeka West High School,
2001 Fairlawn,
Topeka, Kansas, 66604.

Turner High School,
1312 S. 55th Street,
Turner, Kansas, 66106.

Wichita Heights High School,
5301 N. Hillside,
Wichita, Kansas, 67219.

Wichita North High School,
1437 Rochester,
Wichita, Kansas, 67203.

Wichita South High School,
701 W. 33rd Street,
South Wichita, Kansas, 67217.

Wichita Southeast High School,
903 S. Edgemoor,
Wichita, Kansas, 67218.

Wichita West High School,
820 S. Osage,
Wichita, Kansas, 67213.

Winfield High School,
300 Isaac Everett,
Winfield, Kansas, 67156.

Wyandotte High School,
25th and Minnesota,
Kansas City, Kansas, 66102.

Unnamed High School

AREA VOCATIONAL-TECHNICAL SCHOOLS

Central Kansas AVTS,
218 East 7th Street,
Newton, Kansas, 67114.

Cowley County Community Junior
   College AVTS Division,
125 South Second,
Arkansas City, Kansas, 67005.

Flint Hills AVTS,
3301 West 18th Avenue,
Emporia, Kansas, 66801.

Kansas City AVTS,
2220 N. 59th Street,
Kansas City, Kansas, 66104.

Kaw AVTS,
5724 Huntoon,
Topeka, Kansas, 66604.

Liberal AVTS,
P.O. Box 949,
Liberal, Kansas, 67901.

Manhattan AVTS,
3136 Dickens Avenue,
Manhattan, Kansas, 66502.

North Central Kansas AVTS,
1320 North Walnut,
Beloit, Kansas, 67420.

Northeast Kansas AVTS,
1501 Riley,
Atchison, Kansas, 66002.

Northwest Kansas AVTS,
1209 Harrison,
Goodland, Kansas, 67735.

Salina AVTS,
2562 Scanlan Avenue,
Salina, Kansas, 67401.

Southeast Kansas AVTS,
Sixth and Roosevelt,
Coffeyville, Kansas, 67335.

Southwest Kansas AVTS,
1000 Second,
Dodge City, Kansas, 67801.

COMMUNITY JUNIOR COLLEGES

Allen County CJC,
1801 North Cottonwood,
Iola, Kansas, 66749.

Barton County CJC,
Great Bend, Kansas, 67530.

Butler County CJC,
El Dorado, Kansas, 67042.

Cloud County CJC,
2221 Campus Drive,
Concordia, Kansas, 66901.

Coffeyville CJC,
11th and Willow,
Coffeyville, Kansas, 67337.

Cowley County CJC,
125 South Second,
Arkansas City, Kansas, 67005.

Dodge City CJC,
U.S. Bypass at 14th Avenue,
Dodge City, Kansas, 67801.

Fort Scott CJC,
2108 South Horton,
Fort Scott, Kansas, 66701.

Highland CJC,
Highland, Kansas, 66035.

Hutchinson CJC,
1300 North Plum,
Hutchinson, Kansas, 67501.

Johnson County CJC,
111th and Quivira Road,
Overland Park, Kansas, 66201.

Kansas City Kansas CJC,
7250 State Avenue,
Kansas City, Kansas, 66112.

Labette CJC,
200 South 14th Street,
Parsons, Kansas, 67357.

Neosho County CJC,
1000 South Allen,
Chanute, Kansas, 66720.

Pratt CJC,
Pratt, Kansas, 67124.

Unnamed CJC.

Unnamed CJC.

APPENDIX B

COVERING LETTER, QUESTIONNAIRE, AND FOLLOW-UP LETTER

1201 Triplett Drive, Apt. H-93,
EMPORIA, KANSAS, 66801.

14 February, 1975.

Dear Sir/Madam,

As a part of my graduate work at Emporia Kansas State College, I am
undertaking a research project involving a study of the utilization of
computer-based business teaching in Kansas with its implications for
teacher training. In order to assist me with this study I would appreciate
it if you would complete the attached questionnaire and return it to me at
your earliest convenience.

My reasons for undertaking this research project are -

(i) to determine what Data Processing is being taught, at what
level, and how it is being taught in Kansas, and

(ii) to determine the implications of this for both pre-service
and in-service teacher training.

I believe that the results of this study will be extremely useful in the
determination of future business teacher training courses in Kansas.
Further, the information derived from the study will be of considerable
assistance to me in establishing similar educational and teacher training
programs in my country - Queensland, Australia.
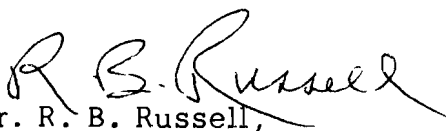
I would appreciate it if you would also enclose either a catalog or course
outlines of courses offered in Data Processing when you return the
questionnaire.

Your cooperation in completing the questionnaire, and any additional
comments will be greatly appreciated.

Please accept my thanks for the valuable help you are giving.

Sincerely yours,

Arnold V. Wolff

Dr. R. B. Russell,
Chairman, Department of Business
and Business Education.

QUESTIONNAIRE

THE UTILIZATION OF COMPUTER-BASED BUSINESS TEACHING
IN KANSAS AND IMPLICATIONS FOR TEACHER TRAINING

NAME OF HIGH SCHOOL/AVTS/COLLEGE _____

NAME OF RESPONDENT _____

This questionnaire consists of two parts. Part I relates to Data Processing courses offered and methods of instruction in your school, while Part II relates to teachers, and teachers' opinions.

PART I   SCHOOL QUESTIONNAIRE

1. Does your school presently offer courses in Automated   Yes _____
   Data Processing?   No _____

2. Do you anticipate that your school will offer such courses   Yes _____
   within the next three years?   No _____
   If your answer to this question is "No" you have completed
   this questionnaire.

3. How many students are currently enrolled in courses
   covering data processing subjects?

              High School   _____
              Post-High School   _____
              Adult Even. Classes   _____

4. Do you anticipate an increase or decrease in enrollments   Increase _____
   within the next three years?   Decrease _____
              Approx. Percentage _____ %

5. Does your school own, or have access to, a computer?   Yes _____
       No _____

6. Which departments have, or will have, responsibility   Bus. _____
   for Data Processing instruction and equipment? (If   Math. _____
   other, please indicate.)   Science _____
       Other _____

7. Data Processing courses are, or will be, offered to –

       High School Students   Grades 9___ 10___ 11___ 12_____
       Post-High School Students   _____
       Adult Evening Classes   _____

8. What areas of study are being, or will be, covered in
   your Data Processing program(s)?

       Introduction to Data Processing   _____
       Unit Record System   _____
       Computer Programming   _____
       Data Processing Applications   _____
       Computers and Society   _____
       Systems Analysis   _____
       Other (Please indicate)   _____

9. What is the approximate percentage ratio of <u>lecture</u> hours
   to <u>laboratory</u> hours in your Data Processing program(s)?

                                        Lecture Hours   _____
                                        Laboratory Hours   _____

0. What programming languages do you teach? (If other, please list.)

        APL   _____   FORTRAL _____
        BAL   _____   PL/1   _____
        BASIC _____   RPG   _____
        COBOL _____   OTHER   _____

1. Indicate the manufacturer's name, the model, and the number of
   pieces of data processing equipment your school has available
   for instructional purposes.

Manufacturer's Name	Model	Number
Key Punch		
Key Punch Simulator		
Unit Record Equipment		
Computer		

Computer Terminal
  Remote Batch
 	
  Interactive		

Computer CRT's		
Other		

2. Do you involve outside business firms in your Data Processing   Yes _____
   courses? If "Yes", how are these firms involved?   No   _____

3. Indicate the types of computer instruction utilized in your school.

        Problem Solving
        Computer Language Skills   _____
        Computer Aided Instruction (CAI) (the computer   _____
          used as a teaching machine)
        Computer Managed Instruction (CMI) (a teaching system)   _____
        Computer Augmented Learning (CAL) (simulations, games)   _____
                                                                  _____

4. What audio/visual aids (films, O/H transparencies, etc.) are used
   in teaching your Data Processing program(s)? (Please list.)

ART II   TEACHER'S QUESTIONNAIRE

5. How many teachers do you have in your Data Processing   Full-time _____
   program?   Part-time _____

6. Indicate the highest level of education of the above
   teachers.   Number

        Less than Bachelor's Degree   _____
        Bachelor's Degree   _____
        Graduate work, but no advanced degree   _____
        Master's Degree   _____
        Work beyond Masters, but not a Doctorate   _____
        Doctorate   _____

7. What are the minimum requirements necessary for initial
   employment as a teacher of data processing in your school?
   (If other, please indicate.)

        Bachelor's Degree   _____
        Master's Degree   _____
        Doctorate   _____
        Teacher Training   _____
        Work Experience   _____
        Other   _____

8. Do, or did, you experience difficulty in recruiting data   Yes _____
   processing teaching staff? If your answer is "Yes", why   No _____
   was it difficult?

9. Please indicate your, or your teachers', data processing
   background preparation for teaching in this field.   Number

        College Classes   _____
        D.P. workshop during summer   _____
        Work Experience in D.P.   _____
        Manufacturer's Schools   _____
        Night Classes   _____
        On-the-job training   _____
        Other   _____

0. What aspects of pre-service teacher training for data processing
   teachers should receive greater attention? (Please indicate first
   choice as "1", second choice as "2", etc.)

        Teaching methods and materials   _____
        Relevant academic content   _____
        "Hands-on" experience   _____
        Data processing applications   _____
        Influence of computers on society   _____
        Business experience   _____
        Other   _____

1. What aspects of <u>in-service</u> teacher training for data processing
   teachers should receive greater attention? (Please indicate
   first choice as "1", second choice as "2", etc.)

        Teaching methods and materials   _____
        Relevant academic content   _____
        "Hands-on" experience   _____
        Data processing applications   _____
        Influence of computers on society   _____
        Business experience   _____
        Other   _____

2. At what education level do you think Business Data Processing
   should be introduced?   _____

3. How should Business Data Processing be introduced? (e.g.
   integrated with another subject, as a separate subject, etc.)

4. Do you have a local advisory committee for your Data   Yes _____
   Processing program(s)?   No _____
   Is it effective? (Please explain why.)

5. Comments.

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE.

PLEASE RETURN, IN THE ATTACHED ENVELOPE, TO –

        MR. ARNOLD V. WOLFF,
        1201 TRIPLETT DRIVE, APT. H-93,
        <u>EMPORIA, KANSAS, 66801.</u>

1201 Triplett Drive, Apt. H-93.
EMPORIA, KANSAS, 66801.

5 March, 1975.

Dear Sir/Madam,

As a part of my graduate work at Emporia Kansas State College, I am undertaking a research project involving a study of the utilization of computer-based business teaching in Kansas with its implications for teacher training.

In order to assist me with this, I forwarded to your school, on February 14 last, the attached questionnaire and covering letter, but up to the time of writing had not received a response.

As it is expected that the study will make a valuable contribution to the training of future business education teachers both in Kansas and in Australia your cooperation is solicited. Your response to the questionnaire will greatly assist the outcome of this study.

Would you please return, at your earliest convenience, the completed questionnaire in the attached envelope. If you have already returned the questionnaire would you please write the name of your school on the questionnaire and return it to me.

Any assistance you can give me will be greatly appreciated. Please accept my thanks for the valuable help you are giving.

Sincerely yours,

Arnold V. Wolff