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A Survey of the Courses Offered in Data Processing in the Secondary Schools in Kansas in 1968-69 and a Proposed Course Outline for a One-Semester Course in Introduction to Data Processing

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A SURVEY OF THE COURSES OFFERED IN DATA PROCESSING IN THE SECONDARY SCHOOLS IN KANSAS IN 1968-69 AND A PROPOSED COURSE OUTLINE FOR A ONE-SEMESTER COURSE IN INTRODUCTION TO DATA PROCESSING

A Problem Submitted to the Graduate Division in Partial Fulfillment of the Requirements for the Degree of Master of Science

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CHAPTER I

INTRODUCTION

Statement of the Problem

The purpose of this study is:

(1) To determine the high schools in Kansas that teach data processing on the secondary level, what courses are taught, and what maohines are used.

(2) To present a proposed one-semester course outline in Introduction to Data Processing

The study will present the following information about the data processing courses. 1) length of course, 2) olassification of student that may first take the oourse, 3) prerequisites for the course. 4) number of sections and students per section, and 5) equipment used in the course.

Need for the Study

Data processing is a field of business in which education needs to focus more of its attention. In Monograph 114 James F. Wenner[1] points out that there are a large number of office workers, that there is a growing demand for them, and that the changes brought about by automation are important for office workers to become aware of and acquainted with. This study will reveal the number of secondary schools in Kansas that are attempting to meet the needs of business

[1] Wenner, James F. t itA High School Orientation Course in Data Processing," Monograph 114, (Cincinnati Southwestern Publishing Company, 1966), p 11.

by having students as future employees become acquainted with data processing. The results of this survey may indicate that a school does not have to be large or own expensive equipment to offer a course or courses in data processing. Even if this does not prove to be the case in this study, the study will present a course outline for a one-semester introductory course in data processing that can be taught in any seoondary school for those desiring to update their sohool's business ourriculum in this field

Limitations of the Study

This study is limited to the secondary schools in Kansas that offered at least one oourse in data processing during the 1968-69 school year. The study is also limited as to the information contained in the questionnaire. particularly the interpretation of the course titles by those responding. The course titles used on the questionnaire were obtained from Monograph 116[2] by Merle W. Wood, "The Teaching of Automated Data Processing in the High School" and from Chapter 3 of "A High School Orientation Course in Data Prooessing;" MonOgraph 114,[3] in which James F. Wenner summarizes the findings of his survey of the data processing courses in the high schools in Iowa.

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[2]Wood, Merle W•• "The Teaching of Automated Data Processing in the High School," Monograph 116, (Cincinnati: Southwestern PUblishing Co., 1967). pp. 9-34.

[3]Wenner, Ope Cit., pp. 34-36.

Definition of Terms

Data Processing. Any procedure for receiving information and producing a specific result. The rearrangement and refinement of raw data into a form suitable for further use.[4]

Secondary Schools The school division following the elementary school, comprising most often grades 9 to 12 or grades? to 12.[5]

Course. Organized subject matter in which instruction is offered within a given period of time, and for which credit toward graduation or certification is usually given 6

Related Literature

Being relatively new, there has not been as much research done in the field of automated data processing as in most of the other areas of business education. The type of survey and questionnaire used by Jack E. Rusher? for his problem, ttA Survey of the Courses Offered and Machines Used in the Business Education Department of a Selected Group of Secondary Public Schools in Northeastern Oklahoma," assisted in the preparation of the questionnaire to survey the courses taught in data processing and equipment used.

4Sippl, Charles J., Computer Dictionary, (Howard W. Sarns &Co., Inc. and The Bobbs-Merrill Company, Inc., 1966).

5Good, Carter V. (ed), Dictionary of Education, (New York. McGraw-Hill Book Company, Inc., 1945), p. 201.

6Ibid., p. 106.

7Rusher, Jack E., "A Survey of the Courses Offered and Office Machines Used in the Business Education Department of a Selected Group of Secondary Public Schools in Northeastern Oklahoma," Master's Problem, Kansas State Oollege of Pittsburg, August, 1960.

In a study of a selected group of business firms in Iowa, James F. Wenner[8] surveyed the status of job requirements for data processing jobs. He found that being a certain age and having education beyond high school were not major fa.ctors except for about four of the twelve jobs surveyed. For most of the other eight jobs, the only requirements were that the person must be eighteen and a high school graduate.

Although the study did reveal that a college degree was not required for most of the jobs, it does not mean that the employees do not need to be tra.ined for the jobs. Most of this training is being done by the businesses. High school graduates would possibly have an advantage in seouring a posltion, though. if they oould receive this training and a basic knowledge of data processing before applying for a job.

Both Wenner and Merle W Wood.[9] presented a course outline for an introductory course in data processing. Cashman and Keys' Data Process! --A Text and Pro·ect Manual[10] good reference for informa.t.on on the machines tha.t will be taught in the course.

Method of Procedure

The normative survey method of research with the questionnaire a.s the technique was used in this study. The questionnaire was prepared so that it could be completed very easily by the recipients

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[8]Wenner, Ope Cit., p. 27.

[9]Wood, Op. Cit., p. 9

10Cashman; Thomas J. and William J. Keys, Data Processing--A Text and Project Manual, (New York: McGraw-Hill Book Company, 1967).

Space was provided on the questionnaire for additions to course titles and kinds of equipment if those taught or used were not listed.

The names of schools were obtained from three lists compiled by the Office of Statistics in the State Department of Public Instruction on their data processing equipment. The lists included schools having a data processing course, data processing equipment, and data. processing services. The addresses were obtained from the Kansas Educational Directory; 1968-69.

Questionnaires; along with a letter of explanation, were sent to forty;"three schools. Thirty-three of the forty;"three seoondary schools contacted returned the questionnaires, making a percentage of response of 76.7 per cent. The interest in this subject was indicated by the number of respondents that did not offer a course in data processing but returned the questionnaires requesting the results of the study One reply indicated a real desire for the results because a course in data processing was planned for the next year.

The information was tabulated from the returned questionnaires on punched cards and a listing obtained from the printer. With most of the information coded on only one sheet, tabulation and analysis of results were much easier•

CHAPTER II

INTERPRETATION OF DATA

The enrollment of the school was requested so that the schools could be divided according to size for some comparisons. It is felt that the first category, those secondary schools with enrollments of 600 or less, would indicate the smaller schools. Even though 600 may appear to be a somewhat larger school, with the continuing unificat on of schools in the next few years, the smallest schools will have around 200 to 300 enrolled" The second category, enrollments of more than 600, would include the above average size schools and the larger schools. As seen in Table I, the replies were almost equally divided between these categories.

TABLE I

NUMBER AND SIZE OF SCHOOLS RESPONDING

Size of School	No. of Respondents	Per Cent of Total Respondents
Enrollment - 600 or Less	17	51.5%
Enrollment - More than 600	16	48.5%
TOTAL	33	100%

Courses Offered in Data Processing

As the survey intended to obtain information from those schools in Kansas that offered a course or courses in data processing during the 1968-69 school year, it was found that of those thirty-three schools responding that had indicated. having a data processing course in their curriculum, data processing equipment, or data processing services, only eighteen, or 54.5 per cent, actually offered a separate course in data. processing in the business department.

This percentage would increase somewhat if the sohoo1s that offered courses in the mathematics department were included. This information was not specifically requested but five of the responding schools indicated that such courses were included in the mathematios department Also; an additional five mentioned that a specific unit was taught in data processing or it was integrated throughout the course, while two replied that a course had been offered the year before but had been dropped because of lack of interest.

Table II compares the number and per cent of schools with 600 students or less that offers a course in data processing with the number and per cent of schools with enrollments of over 600 students that offers a course in data. processing. The smaller schools responding show a significantly larger per cent offering a separate course in data processing.

TABLE II

RESPONDING SCHOOLS OFFERING A SEPARATE COURSE IN DATA PROCESSING

Size of School	No. Respondents Offering a Course	Per Cent Respondents in Category	No. Respondents Not Offering a Course	Per Cent Respondents in Category
Enrollment - 600 or Less	11	64.7%	6	35.3%
Enrollment - More than 600	7	43.8%	9	56.2%
TOTAL	18	54.5%	15	45.5%

While a larger per cent of the smaller schools that responded offered at least one course in data. processing, all but one, or 90.9 per cent, of these schools offered only one course.

The schools with enrollments of more than 600 etudents, although having a smaller per cent of data processing courses in the curriculum, often had a more complete program in data. processing. More than half of these schools offered more than one course,

Table III shows the analysis of the scope of the course offerings in the schools reporting at least one course in data processing Combining the two categories of schools, thirteen of the schools, or 72,2 per cent, offered only one course and five, or 27.8 per cent, offered more than one.

Table IV is an analysis of the total number of courses offered in relationship to the size of schools. There were thirty-five separate courses offered in the eighteen schools offering a course in data processing, The eleven schools with enrollments of 600 or less offered only twelve of those courses, while the seven schools with enrollments of more than 600 offered twenty-three courses in data processing.

In comparison with Table II, although 64.7 per cent of the respondents with enrollments of 600 or less had data processing in their curriculum, they offered only 34.3 per cent of the total courses being taught as indicated in the survey. Just the opposite is true in the schools with enrollments of more than 600. Fewer of the respondents had data processing in their curriculum but they offered the majority of the courses,

TABLE III

AN ANALYSIS OF THE SCOPE OF COURSE OFFERINGS

IN SCHOOLS OFFERING AT LEAST A SEPARATE COURSE IN DATA PROCESSING

Size of School	No. Offering Only One Course	Per Cent Offering Data Processing Courses	No. Offering More Than One Course	Per Cent Offering Data Prooessing Courses
Enrollment - 600 or Less	10	90.9%	1	9.1%
Enrollment - More than 600	3	42.9%	4	57.1%
TOTAL	13	72.2%	5	27.8%

TABLE IV

AN ANALYSIS OF THE TOTAL NUMBER OF COURSES OFFERED IN RELATIONSHIP TO SIZE OF SCHOOL

Size of School	No. Courses Offered	Per Cent Total Courses Offered
Enrollment - 600 or Less	12	34 3%
Enrollment - More than 600	23	65.7%
TOTAL	35	100%

Although some of the schools offered no more than one or two courses" it is felt by information given on the quest onna.1re that these school ' data. processing courses may have consolidated some of the information into their one or two courses that was separated into separate courses by the schools that offered three or more data processing courses It is also felt that some respondents understood the course titles tha.t were listed on the questionnaire to mean course content. If this was the case, then some respondents might have checked these course titles when it was not actually a separate course.

Table V shows what different courses are offered in the schools surveyed. The table shows that 94.4 per cent of the schools that offer a course in data processing, offer Introduction to Data Processing. The one school that did not offer this course but did offer a course in data processing had only a six-week unit for high school students. The one course they did offer was an adult evening class.

One other point of significance brought out in the table concerns adult evening classes in data processing. Six, or 33.3 per cent, of the schools offering a course also had adult evening classes in data processing.

The courses shown in the table which no school reported as offering will be omitted in succeeding tables.

Grade Level of Students Taking Data Processing Courses

When setting up a course in data processing, the grade level at which to offer the course must be decided. Questions to consider are at what level would students be able to understand the material and at what level and time in their education would it be most beneficial.

Table VI shows the results of the responding schools on this question. Almost half of the courses offered were first offered at the eleventh grade level, with an equal number of courses offered at the tenth grade as at the twelfth. The six not given were all for the adult evening classes. Only two of the six courses offered at the tenth grade were in schools of 600 students or less.

As suspected no school offered a course of data processing on the ninth grade level. For a school to offer courses at this level, they would probably have a very complete program of courses in data processing in which they would begin at the ninth grade level to complete a major in data processing. This will very seldom be the case because most schools will not be that vocationally oriented and could not justify taking such a large amount of the student's

SCOPE OF COURSE OFFERING IN DATA PROCESSING

Possible Courses Offered	600 Students or Less	More Than 600 Students	Total Offering Course	Per Cent Total O££er-ing Courses
Intro. to Data Processing	11	6	17	94.4%
Key Punch	0	2	2	11.1%
Intro. to Unit Record Equipment	0	1	1	5.6%
Tab Equipment I	0	1	1	5.6%
Tab Equipment II	0	1	1	5.6%
Tab Equipment Operator	0	1	1	5.6%
Tab Equipment Orientation	0	1	1	5.6%
Introo.uction to Computers	0	1	1	5.6%
Computer Programming I	0	2	2	11.1%
Computer Programming II	0	2	2	11.1%
Computar Programming III	0	0	0	0
Computer Programming IV	0	0	0	0
Computer Programming V	0	0	0	0
Computer Programming VI	0	0	0	0
Others	0	0	0	0

time for a narrow field of conoentration. As found by James F. Wenner[1] in his study of the Des Moines, Iowa, schools in which three separate data processing curricula are offered, none of the programs began before the sophomore year,

TABLE VI

GRADE LEVEL AT WHICH STUDENT MAY FIRST ENROLL IN A DATA PROCESSING COURSE

Grade Level Student May First Take Course	Number	Per Cent Data Processing Courses Offered
9	a	0
10	6	17,1%
11	17	48 6%
12	6	17.1%
Not Given	6	17.1%
TOTAL	35	100%

Although Table VI gives an overall picture of the levels a.t which data. processing courses are offered, some different and signifi cant information can be gained by looking at the levels at which each course is offered as in Table VII.

[1] Wenner, James F., "A High School Orientation Course in Data Processing," Monograph 114, (Cincinnati: Southwestern Publishing Company, 1966), p. 33.

Of the five courses that were offered at the tenth grade level, three were offered in schools with enrollments of over 600 students and two of these had several other courses for which this was the beginning course.

Of the four courses offered at the twelfth grade level, three were in chools of 600 students or less. All four offered no other courses except adult evening classes, so this was the only class for the high school student and they waited until their senior year to take it. In beginning a curriculum in data processing, only one course may be offered with others to be added. if it proves feasible. As one respondent reported that while Computer Programming I was only for seniors this year, it would be offered to juniors next year with a new course, Computer Programming II, for seniors.

Table VII lists only those courses for high school students, showing only twenty-nine of the thirty-five courses offered by the responding schools, This table shows only the level at which a student may first enroll in the course. In a majority of the cases for example, if the course was offered at the eleventh grade, the twelfth grade could also enroll. One respondent also noted that if space was available, students on the next lower level could also enroll"

Length of Data Processing Courses

In setting up a course in data processing another question concerns the length of the course. Should it be for one semester or for a full year? Table VIII brings out two primary points. It gives information on the length of the courses according to the size of the

TABLE VII

GRADE LEVEL STUDENTS MAY FIRST ENROLL AND PER CENTAGE OF TOTAL NUMBER OF RESPONDENTS OFFERING THE COURSE FOR EACH COURSE OFFERED BY RESPONDING SCHOOLS

Courses Offered	Grade Level 10	Per Cent Offering Course	Grade Level 11	Per Cent Offering Course	Grade Level 12	Per Cent Offering Course	Total Offering Course
Intro, to Data. Processing	5	29.4%	8	47.1%	4	23.5%	17
Key Punch	1	50.0%	1	50.0%	0	0	2
Intro, to Unit Reoord Equipment	0	0	1	100,0%	0	0	1
Tab Equipment I	0	0	1	100.0%	0	0	1
Tab Equipment II	0	0	1	100.0%	0	0	1
Tab Equipment Operator	0	0	1	100.0%	0	0	1
Tab Equipment Orientation	0	0	1	100.0%	0	0	1
Introduction to Computers	0	0	1	100.0%	0	0	1
Computer Programming I	0	0	1	50.0%	1	50.0%	2
Computer Programming II	0	0	1	50.0%	1	50.0%	2

school and it also shows the breakdown in relationship to the total number of data processing courses offered by the responding schools.

Of the twelve oourses offered by the schools with enrollments of 600 or less, all but one of the courses were one-semester courses. The one course that was a one-year course in this group was offered by a school with less than 100 students.

It was equally divided between one semester and one year for the length of the courses offered by schools with enrollments of more than 600. Although a one;"semes'ter course, one school offering two courses in data processing had them meet in a two-hour block for each coor e Two of the three courses on which the length was not marked were adult evening classes.

In comparing the total courses offered with the length of the courses, twice as many courses were one-semester courses.

In studying the relationship of the course to the length of the course, Table IX, it can be seen that the majority of the courses that are offered for one semester are the beginning courses. The more advanced courses were more frequently the longer, one-year courses One adult evening class in data processing met for twenty two-hour sessions. The most valid picture could be concluded from the Introduction to Data Processing course. It would most likely be a one-semester course if it were offered in a school.

TABLE VIII

LENGTH OF COURSES IN RELATIONSHIP TO SIZE OF RESPONDING SCHOOL

AND IN RELATIONSHIP TO TOTAL NUMBER OF aGURSES OFFERED IN DATA PROCESSING

Length	Enrollment 600 or Less	Per Cent Courses Offered 600 or Less	Enrollment More Than 600	Per Cent Courses Offered More Than 600	Total No,	Per Cent Total Courses Offered
One Semester	11	91.7%	10	43.5%	21	60.0%
One Year	1	8.3%	10	43.5%	-11	31.4%
Not Reported.			3	13.0%	3	8.6%
TOTAL	12	100%	23	100%	35	100%

TABLE IX

LENGTH OF EACH COURSE OFFERED N DATA PROCESSING

Courses Offered	No. Offering One Semester	Per Cent Schools Offering Course	No. Offering One Year	Per Cent Schools Offering Course
Intro. to Data Processing	14	82.4%	3	17.6%
Key Punch	1	50.0%	1	50.0%
Intro. to Unit Record Equip.	0	0	1	100.0%
Tab Equipment I	0	0	1	100.0%
Tab Equipment II	0	0	1	100.0%
Tab Equipment Operator	0	0	1	100.0%
Tab Equipment Orientation	0	0	1	100.0%
Introduotion to Computers			1 Not Reported	
Computer Programming I	1	50.0%	1	50.0%
aomputer Programming II	1	50.0%	1	50.0%
Adult Evening Data Processing Class	4	66.7%	2 Not Reported	

Six other schools that did not offer a separate course for a length of one semester or one year did have units in or integrated it in existing courses. They ranged from a twelve-week unit, to a three-week unit; some also integrated it throughout the course, The school that had a twelve-week unit indicated the text and materials they used was the same as that used by other schools in their introductory course in data processing. Another school used a data processing

text for their three-week unit. And, two other schools who had six- and four-week units also had the use of some data processing equipment.

Prereguisites for Data Processing Courses

The results of the survey regarding prerequisites for entrance into data processing courses disagreed with those set up by Merle W. Wood in Monograph 116, ttThe Teaching of Automated Data. Processing in the High School." The following are his suggested standards for entrance into four different data. processing courses:[2]

> Introduction to Data Processing (one semester in fundamentals of data processing--non vocational)--No entrance requirement other than having an interest.
>
> Key Punch Operator--Typing rate of 40 Net WPM; some reporting 30 Net WPM adequate.
>
> Tab Eguipment Operator--Average grades; best if student has had a oourse in bookkeeping.
>
> Computer Programmer--Grade average of B or higher; must have had one year of algebra.

Table X reports the number and kinds of prerequisites for entrance into courses in data processingl!l Eight schools of the eighteen offering data processing courses had prerequisites for at least some of their courses. There seemed to be an unusually large percentage of schools having a prerequisite for the introductory course and it was surprising that some of the more advanoed courses did not have a prerequisite.

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[2]Wood, Merle W., "The Teaching of Automated Data Processing in the High School," Monograph 116. (Cinoinnati: Southwestern Publishing Co., 1967), p. 38.

Consent of the instructor was the only prerequisite in two cases for entrance into Introduction to Data. Processing. Typewriting would very likely be a prerequisite for this course especially if the school had access to equipment. Again, depending on the objectives of the course, the prerequisite of Algebra I and especially two units of mathematics is questionable. The three other prerequisites listed: 1) Introduction to Data Processing, 2) Data Processing I and II, and 3) Computer Programming I and II, were offered by the particular schools requiring these and were schools that had a two or three course program in data processing,

Number of Sections Offered and Size of Classes in Data Processing

On several of the oourses offered by the responding schools the number of sections that the school offered in that particular course was not indicated. Eleven, or 31.4 per cent, of the courses checked did not give this information. Fourteen of the thirty-five courses offered by the responding schools, or 40 per cent, offered only one section of it and ten, or 28,,6 per cent, of the courses had more than one section Of the ten courses that had more than one section taught, none were offered by the schools with an enrollment of 600 students or less.

Table XI gives the information on the number of sections taught according to the separate courses. Some of the courses that are taught by the responding schools do not give any information regarding this, so the table gives it for only part of the schools that offer the course and did indicate this information.

TABLE X

NUMBER OF RESPONDING SCHOOLS REQUIRING PREREQUISITES AND SPECIFIC PREREQUISITES REQUIRED FOR ENTRANCE INTO A COURSE IN DATA PROCESSING

Courses Offered	Type-writing	Intro. to Data Process,	Data Process, I and II	Computer Prog, I and II	Algebra I	2 Units Math	Others	Total No.	Per Cent Offering Course
Intro. to Data Processing	2				1	1	3	7	41.2%
Key Punch	1							1	50.0%
Intra. to Unit Record Equip.								0	
Tab Equipment I								0	
Tab Equipment II								0	
Tab Equip. Operator								0	
Tab Equips Orientation								0	
Computer Programming I		1						1	50.0%
Computer Programming II			1	1				2	100.0%
Adult Evening Data Processing Class								0	

TABLE XI

NUMBER OF SECTIONS TAUGHT IN EACH COURSE OFFERED IN DATA PROCESSING

Courses Offered	One Section Only	Per Cent Offering Oourse	More Than One Section	Per Cent Offering Course	No Comment
Intro. to Data Prooessing	13	76.5%	4	23.5%	0
Key Punch	--		1	50.0%	1
Intro, to Unit Reoord Equip,	--		--		I
Tab Equipment I	--		--		1
Tab Equipment II	--		--		1
Tab Equipment Operator	--		--		I
Tab EqUipment Orientation	--		--		1
Introduction to Computers	--		--		I
Computer Programming I	o	0	2	100.0%	0
Computer Programming II	1	50.0%	1	50.0%	0
Adult Evening Data. Prooessing Class	--		2	33.3%	4

Even fewer respondents answered the question of the average number of students per class in data processing. This information was provided by only twenty-one of the thirty-five classes offered in data processing. The majority, fourteen or two-thirds, of those courses indicates an average of ten to twenty students.

Only two courses had less than ten students; one school had an enrollment of less than one hundred students and the other was in a key punch course in which availability of machines might limit this. There were two sections of this key punch course.

As expected, all the classes reported, five, with an average of more than twenty students was the Introduction to Data. Processing!!l This would attract more students because it is generally a beginning and very basic course and more students could be taught because many times equipment is not used extensively. So, the size of the classes would not need to be limited because of lack of eqUipment. There would be fewer students interested in the more advanced courses as is the case in most other advanced courses in high school. For example, many more students will take beginning typewriting than will take advanced typewriting,

Table XII shows the average number of students in the courses offered by the responding schools. The average number of students in a class of data processing as reported by those schools responding to this part of the questionnaire was seventeen.

TABLE XII

AVERAGE NUMBER OF STUDENTS PER CLASS IN DATA PROCESSING

Courses Offered	Less Than 10 Students	10:'20 Students	More Than 20 Students
Intra. to Data. Processing	1	10	5
Key Punch	1		
Intro. to Unit Record Equip.			
Tab Equipment I			
Tab Equipment II			
Tab Equipment Operator			
Tab Equipment Orientation			
Intraduction to Computers			
Computer Programming I	--	I	
Computer Programming II	0	2	0
Adult Evening Data Processing Class	--	1	

Equipment Used

As stated in Chapter I a purpose of this study was to indicate if equipment was necessary in teaching data processing, primarily in teaching an introductory course.

Fifty per cent of the schools that offered courses in data processing had equipment or access to equipment.. A much smaller per cent of the schools with enrollments of 600 or less used equipment than the schools with enrollments of more than 600. One of the five larger schools that had equipment and offered an adult evening class in data processing did not have a course of at least a semester's length for high school students. They had a six:"week unit in another class and the equipment was used.

The four schools of 600 or less enrollment all had access only to college equipment. Their visits ranged from three per year to one hour per week Some indicated that this arrangement was helpful but more visits were needed. The one school having one hour per week on the equipment felt that the students seemed to be gaining a fair amount of information about the equipment and fair skills on the machines.

Only one of the larger schools teaching a course in data processing indicated their source of eqUipment. The equipment was at the administration building and the comment was that this was an awkward arrangement.

Several schools replied that they would like to have equipment and that it would help. One school felt that they offered a good course but eqUipment would improve it and another felt that much of the

informational part of the introductory course could be taught without equipment but that equipment would make it more vocational.

Five schools had equipment available but did not teach a course in data processing in the business department. One of these had only the simulated typewriter and the key punch, The other four all offered data processing in the mathematics department. One of the four offered three courses in the mathematics department and stated that there were no plans for any courses in the business department.

Because of the cost of equipment even most of the largest schools could not own equipment for classroom use only. Eutit seems that if data processing equipment is necessary for administrative use, it is as equally necessary for classroom use. If schools do divide the use of the equipment between the classroom activities and administrative activities, it must be regulated so that the classroom work is not pushed aside for administrative uses,

Table XIII is the first of a series of three tables presented about the use of equipment by the sohools.

Table XIV gives the total number of the thirty-five courses taught by the responding schools in which each type of equipment is used. The following table, Table XV, lists the number of schools using each type of eqUipment in the separate courses. It was evident from the questionnaires that those schools having most of the equipment, listed only part of it being used for the beginning courses,

TABLE XIII

NUMBER OF SCHOOLS USING DATA PROCESSING EQUIPMENT IN TEACHING COURSES IN DATA PROCESSING

Size of School	No. Schools Using Equipment	Per Cent Using Equipment
Enrollment - 600 or Less	4	36.4%
Enrollment - More than 600	5	71.4%
TOTAL	9	50.0%

TABLE XIV

THE NUMBER OF COURSES IN WHICH MACHINES ARE USED COMPARED WITH THE NUMBER OF COURSES TAUGHT

Equipment	No. Courses Which Machines Are Used	Per Cent Courses Taught
Simulated Typewriter	2	5.7%
Key Punch	23	65.7%
Sorter	18	51.4%
Accounting Machine	14	40.0%
Reproducer	18	51.4%
Collator	9	25 4%
Calculator	3	8.6%
Interpreter	20	57.1%
others	13	37.1%

TABLE XV

NUMBER OF RESPONDING SCHOOLS IN WHICH MACHINES ARE USED IN THE COURSES OFFERED IN DATA PROCESSING

Courses Offered	Simulated Typewriter	Key Punch	Sorter	Acctg. Mach.	Repro-ducer	Col-later	Calcu-lator	Inter-prater	Others
Intro. to Data Processing	1	8	7	6	7	6	2	7	1
Key Punch	0	2	1	0	0	0	0	1	1
Intro. to Unit Record Equip"	0	1	1	1	1	0	0	1	1
Tab Equipment I	0	1	1	1	1	a	a	1	1
Tab EqUipment II	a	1	1	1	1	0	0	1	1
Tab Equips Operator	0	1	1	1	1	a	0	1	1
Tab Equip. Orientation	0	1	1	1	1	0	0	1	1
Intro. to Computers	0	0	0	a	a	0	0	0	1
Computer Prog. I	0	1	a	a	1	0	0	1	1
Computer Frog. II	0	2	1	0	2	0	0	2	2
Adult Evening Data Processing Class	1	5	4	3	3	3	1	4	3

Data Processing Course Content

Only brief comment, if any, was made by the respondents regarding a description of the course or courses they offered in data processing. Ten responding schools that offered the Introduction to Data Processing used the course outline and materials put out by 3M Company. There are several workbooks so that these materials can be adapted to the length of course that the school might offer. One school used four workbooks from 3M which took a little more than a semester and finished the one:"year introductory course with another series. A second school that offered Introduction to Data Processing for one semester used the 3M as the text and taught office machines the second semester. Another school that did not offer a separate semester course also used the materials from 3M Company for a twelve-week unit. Transpariences to aid in teaching this course were also mentioned several times as being used.

Although only a very few schools offered separate courses in key punch, tab equipment, and computers, others stated that their introductory course gave the students a brief introduction to these various areas.

A school offering five courses in data processing covered from unit record equipment to an introduction to computers in the beginning course; business application in the key punch course; and business applications using autocoder language in their two computer programming courses. They were proud of the fact that they bad sent 220 students through their data processing courses this year.

Another respondent replied tha.t an intrcxluctory course in ciata processing makes the students aware, while another replied that the introductory course is concerned. primarily with teaching the concepts of data. processing, A school offering an introductory course for high school students and an adult evening class and having data processing equipment for use by the classes felt it was "barely a beginning."

Several answered on the questionnaire that they agreed about the need for data processing in the business curriculum and had seen interest in this area increase tremendously in the last few years, At the same time others stated that a course had been taught for one year and dropped because of lack of interest, One respondent offering a course in data processing also stated that a disadvantage was lack of student interest.

Some are looking forward to expansion in the data processing field. One is now offering one course in data processing and is anxious to extend the curriculum to include a programming course. Another is starting with four- and eight-week summer courses, still another is planning to include data processing in the curriculum next year.

CHAPTER III

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this study was to survey the secondary schools in Kansas that teach one or more courses in data processing. The size of schools, the courses they taught and the content of these courses, and the equipment available for use in these courses were of significance.

1. Thirty-three" or 76.7 per cent" of the forty-three secondary schools responded. There was information that suggested these forty-three schools either taught a data processing course, had data processing equipment, or had data processing services available,

2, The responding schools were divided according to size of enrollment, one group to include those with an enrollment of 600 or less and the other, those with an enrollmant of more than 600. Of the thirty-three responding seventeen" or .51.5 per cent, were classified. as a small or average size school and sixteen, or 48.5 per cent, were classified as above average or large.

3. Eleven of the seventeen schools with enrollments of 600 or less, or 64.7 per cent, offered a separate course in da.ta processing.. Only seven of the sixteen schools with enrollments over 600, or 43.8 per cent, offered such a course.

4 The eleven schools with enrollments of 600 or less offered twelve courses in de.ta processing" or 34.3 per cent of the total number of data processing courses offered by the responding sohools. Only one

of this size school offered more than one course in data processing, the second one being an adult education class. The seven schools with enrollments over 600 students offered twenty-three of the thirty-five courses offered. in data processing, This was 65.7 per cent of the total data processing courses.

5. Seventeen, or 94.4 per cent, of the eighteen schools offering a course in data processing offered an introductory course in data processing. The one school that did not had only a unit in data processing in an existing class for high school students but offered an adult evening class One-third of the eighteen schools had adult evening classes. The other courses listed on the questionnaire were checked by only one or two of the responding schools Four courses; Computer Programming III, IV V and VI, were not checked by any of the schools.

6. S venteen o hirty-five courses, or 48.6 per cent, could first be taken at the eleventh grade level. Six or 17.1 per cent, could be taken at the tenth grade level; five were the introductory course and one was a key punch course. There were also six courses that could not be taken until the twelfth grade, four were the introductory course in schools offering no other data processing courses and the other two were for Computer Programming I and II.

7. Almost twice as many of the courses were one semester courses rather than one year. Twenty-bne, or 60.0 per cent, were one-semester courses; while, eleven" or 31.4 per cent, were a year in length. Only one of the eleven smaller schools offered a data processing course of a year's length. In the larger schools an equal number of courses were offered for one semester and a year. Fourteen, or 82.4 per cent, of the

introductory courses were one-semester courses The majority of th courses offered for one year were advanced courses,

8. Eight of the eighteen schools offering courses in data proce ing had prerequisites for at least some of their courses. The majority of the prerequisites included Typewriting, Introduction to Data Process-ing, Algebra I or II, 2 units of mathematics; and two other prerequiaitea which were courses offered by those schools having them as prerequ sites were: 1) Data Processing I and II and 2) Computer Pro ammi I and II.

9. Of those schools completing the information on th numb r of sections offered for each course they offered, fourteen, or 40 p r cent, of the courses had only one section. More than one section was offered for ten courses, or 28.6 per cent of the thirty-five oourses offered n data processing. None of these ten courses were offered by schools with enrollments of less than 600 students.

10. Twenty-one courses included information regarding the size of the classes, fourteen of which ranged between ten and twenty students The average size class in data processing according to the survey wa.s seventeen

11. One-half of the schools offering a course in data processing had access to equipment. This ranged from three visits per year to use college equipment, to one hour per week on college equipment, to using equipment in the administration building which they stated was an awk-ward arrangement Of the smaller schools offering courses in data processing, 36.4 per cent ha.d access to equipment and 71.4 per cent of the larger schools used equipment.

12. Ten of the seventeen schools offering Introduct on to Data Processing used materials put out by 3M Company. Autocoder langu was used in two programming classes taught by one school. One school offered two of their courses for two-hour periods.

13. Some schools indicated lack of interest as a cause fo dropping a course in d.ata processing after one year and others indioated 1t wa a problem in eXisting courses.

14. One school is planning to add a data processing cour e n xt year; one is having a four- and eight-week summer clas ; and anoth r is planning to add an advanced programming class to 1ts data proo in curriculum.

Conclu ion

1. Although according to the urvey lar r t th schools with enrollments of 600 or 1 s off r ed data processing in their business curriculum than did the chool w th 01lments of more than 600; they could not offer nearly a exten ive a progr the larger schools.

2. The probable length of an introduc ory our n data process ing without extensive use of equipm nt would be one semester.

3. Prerequisitea for entrano into ocessing not thought through caref'ully and y t mat lly.

4. The size of classes in data processing were not too large According to the size indicated in the rv y, th t oher would be able to give students individual attent on

5• Although fifty per cent of the chool that offered courses in data processing had access to equipment, mo t did not use the equipment extensively. Several larger schools had uipment for administrative use but not olassroom.

6 Several larger schools had data proc 81 cour on n the mathematics department.

7. Lack of interest is surprisin ly a probl f both the students and teachers

8. Data. processing oour e ar being added to the curriculum for he f st time in some chools. In other schools additional courses in data processin are being added d to th coess of existing courses.

Recommendations

It is recommended that:

1. Business teachers become more aware and better informed in the area of data processing, They are cheating students of an opportunity to learn about a. new and growing field

2. Business teachers need to work with school administrators on the possibilities of adding a data processing course or expanding the present data processing curriculum. In some schools it is felt that data processing belongs only in the mathematics department. Business teachers need to change this idea. Maybe the courses could be combined through team teaching for part of the year for teaching the fundamentals which are the same and then split up into the mathematics and business areas the last part of the year for more specialization.

3. Business teachers should work with school administra.tors to help convince them tha.t equipment is as necessary for use in classrooms as for administrative use. If the school or school district is considering purchasing some data processing equipment, it is important to be sure that class use will not be considered to be of second importance. If this is the case, neither party will be satisfied with the arrangement.

4. Those teachers contemplating offering a course or already teaching a course in data processing should consider the objectives of the course and make sure they carry them out. Poor planning and lack of work and enthusiasm by the teacher are the major causes for lack of student interest(IJ Do some advance planning, searching for" and

preparation of materials and bring in as much outside, supplementary information as possible.

5. The proposed course outline (see Appendix A) for a one-semester Introduction to Data Processing be considered and if feasible be used in whole or part in the teaching of a similar course without regard to size of school and with equipment not necessary

APPENDIX A

COURSE OUTLINE

Introduction to Data Processing

Suggested Reference and T t Mat erial: See Bibliography (will b referred to in the outlin:Xb a and pamphlets would probablyybeuathor andllypage number) Oth r book want to select one s equa useful. A tea her ht for a text and still use others to bric in pp mentary inform .. n ormation and to keep the students from becomi bor pp –

I. DATA PROCESSING

What is Data Processing

1. Have students write a paragraph tell ng what processing and automation mean to them
2. Define data processing and automation (expla n d ifferences)

History of the Development of Data Proce 1 Mth ods and Equipment

1 Types of data processed
2. Equipment and machines used to proce s th1 (H , Pp. 13-54; Phillips, pp. 1-9; Brightman, L T J PP. 97-100; Wenner, p. 51)

C. Methods of Data Processing

Have a bulletin board

1. Manual
2 Mechanical
3. Punched Card
4. Electronic

(Give a brief summary of each type and give examples of ch)

D. Need for Modern Methods of Data Processing
1 Expanding services and paper work
2. Other internal and external needs (Freeman Hanna, nd Kahn PP. 448-449)

E Examples of Applications for Automated and Electronic D Processing (Heyel, PP. 2-11)

F. No Quiz--Additional Suggested Activities! Collect ma. zin nd newspaper articles relating to data processing

II. THE PUNCHED CARD

A. History of the Punched Card (Feingold, PP. 1-9)
B. Kinds of Cards (show examples)
C. The IBM Punched Card (pass out cards to each tud nts with all numbers, alphabetic and special character punch) (prepare and pass out a code chart for all these charact , Hass, p. 11)

1. Data representation
   a. Numeric
   b. Alphabetic
   c. Special characters

EXERCISE: Hass, Card Format and Beginning Wiring, pp. 2-16

2. Designing a card
   a. Fields
   b. Records
   c. Special characteristics of a card

EXERCISE: Hass, Card Format and Beginning Wiring, pp. 16-19

D. Summary on Punched Cards
   1. What the punched hole will do (Feingold, p. 1)
   2 Uses of the punohed card (Fe ngold, p. 5)

E. Quiz Over the Punched Card

FIELD TRIP: Make arran ement w hac01 ge that he. data. process ng equipmen o t dents may nch cards. Then have other equipment demonstrated show ng what can be done with the cards. This would be a ood ntroduction to unit record equipment and computers.

III. UNIT RECORD EQUIPMENT (Brightman, pp. 49 112)

A. The Unit Record Principle (Freeman, Hanna and Kahn, pp. 493-494; Feingold, pp. 2-3)
   1 The card
   2. Other kinds of records
   3. Machines involved (refer back to Summary in II)

B. Key Punch (Feingold, pp. 14-27; Cashman and Keys, pp. 17-31; Hartkemeier, pp. 3-19; Rass, Key Punch Machine, pp. 2-52)
   1. The machine parts (use transpariences of the machine and duplicate copies for students- do this for all succeeding machines discussed)
      a. Discuss and demonstrate operation of the key punch
      b. The keyboard (use a transparency of the keyboard chart)
      c. Program drum and preparation of a program card
   2. Features of different models of key punch machines
   3• Quiz over key punoh machine parts
   4. Review operations and machine parts of the key punch (Hass" Key Punch Machine, pp. 2-52)

C. Verifier
   1. How to operate a verifier (Hartkemeier, p. 14; Feingold, pp. 21-22)
   2. How errors are indicated

D. Sorter (Feingold, PP. 29-43; Cashman and Keys, pp. 33-56; Hartkemeier, pp. 21-37)
   1. The machine parts
   2. Functions of the sorter
). How the sorter operates (use diagrams of specific machine parts)
      a. Numeric sorting

      EXERCISE: Hass, Card Sorter, PP. 2-26C

      b. Alphabetic sorting

      EXERCISE: Hass, Card Sorter, pp. 28-48D

      c. Special sorting procedures

      EXERCISE: Hass, Card Sorter, PP. 50-60

   4. Special features and differences in various models of sorters
   5. Quiz over sorter (machine parts and problem)

E. Reproducer (Feingold, PP. 45-71; Cashman and Keys, pp. 81-94; Hartkemeier, pp. 331-340)
   1. The machine parts
   2. How the reproducer operates (use diagrams of specific machine parts)
). Functions of the reproducer
      a. Gangpunohing
      b. Reproducing
      c Additional features
   4. Quiz over machine parts and functions of the reproducer

F. Collator (Feingold, pp. 73-93; Cashman and Keys, pp. 95-105; Hartkemeier, PP. 346-354)
   1. Need for collators
   2. The machine parts
   3. Operation of the collator (use diagrams of specific machine parts)
      a. Sequence checking
      b. Selecting
      c. Merging
      d. Match merging
      e. Match selecting
   4. Additional features and functions
   5. Quiz over machine parts and functions of the collator

G. Accounting Machine (Feingold, pp. 119-159; Cashman and Keys, pp. 57:"80)
   1. Machine parts
   2. Functions of the accounting machine
      a. Detail printing
      b. Group printing
      c. Accumulating
      d. Programming
      e. Summary punching

3. Summary over accounting machines (use some questions for a final discussion)

H. Calculator (Feingold, 1'1'. 95-117; Cashman and Keys, PP. 107-109)
1. Uses of the calculator
2. The machine parts
3. Functions of the calculator
4, Summary

I. Interpreter (Feingold, 1'1'. 161-168; Cashman a.nd Keys, PP. 111-118)
1. The machine parts
2. Functions and operation of the interpreter

J. Assign some additional problems related to the use of unit record equipment

K Quiz over unit record equipment

IV. THE COMPUTER (Brightman, 1'1'. 113-135)

Have a bulletin board

MOVIE: "What is EDP," 23 min., 16mm, Color, Sound, IBM Film Activities, Department of Information, 590 Madison Avenue, New York, New York 10022

A. Computer Systems
1. Input media
a. Punched card
b. Punched tape
c. Magnetic tape
d. Edge-punched cards
2. Storage devices
a Magnetic disc
b Magnetic core
c. Magnetic drum

B. Flowcharting (there are numerous examples of flowcharts showing some everyday activity--locate one and use it as a.n introduction)
1. Purpose
2. Symbols
3. Flowchart a problem

C. Programming

MOVIE: "Computer Programming," 27 min. 16mm, B&W, Sound, Systems Development Corp , 2500 Colorado Avenue, Santa Monica, California

1. Languages
2. Flowcharting and coding programs
3. Binary code

FIELD TRIP: Take a field trip to a complete data processing installation; preferably a business rather than a college.

V. FUTURE IN DATA PROCESSING

A. Social Aspects of Data Processing
B. Expectations in the Future for Data Processing
C. Careers in Data Processing (Brightman, Luskin, and Tilton, pp. 102-109)

MOVIE: "Careers in Business Data Processing," 16 min., 16mm, Color, Sound, Film Distribution Division, Department of Cinema, University of Southern California" University Park, Los Angeles, California 90007

Contact school guidance counselor for information

Fischer, George, Your Career in Computers, (New York: Meredith Press, 1968), Aptitude Test, p. 179+.

APPENDIX B

Dear Business Instructors

With the field of data prooessing expanding rapidly, the field of education is beginning to try to meet the demands of business. But, are we really meeting the demands as well as we should? What is inoluded in the business currioulum reJAted to data processing? The information on the enclosed questionnaire can answer some of these questions.

In a research problem I will report the findings of this survey compiled from the questionnaires sent to all business teaohers in Kansas who taught a course in data prooessing during the 1968-1969 school year. The problem will also present an outline for a one-semester introductory course in data prooessing.

The information you contribute will be very helpful and appreciated. A stamped, self-addressed envelope is enclosed for your convenienoe.

Cordially yours,

Mrs. Pat 8m!th

Enclosures. Questionnaire
Envelope

A SURVEY OF THE COURSES OFFERED IN DATA PROCESSING IN THE SECONDARY SCHOOLS IN KANSAS IN 1968-69 AND A PROPOSED COURSE OUTLINE FOR A ONE-SEMESTER COURSE INTRODUCTION TO DATA PROCESSING

Name:

Name of Schooll Total Enrollment

COURSES	CHECK if Sch. Off'ers Course	CHECK Leng.oj Course 1 SEM	1 YR	CIRCLE Yr. Stud. may first take the Course	LIST any Prereq-uisites	WRITE IN No. of Sect,	Ave. Stud. Per Class	WRITE A Brief Oourse Desoription
Introduction to Data Prooessing				9 10 11 12				
Key Punch				9 10 11 12				
Introduction to Unit Record Equipment				9 10 11 12				
Tab Equipment I				9 10 11 12				
Tab Eqnipment II				9 10 11 12				
Tab Equipment Operator				9 10 11 12				
Tab Equipment Orientation				9 10 11 12				
Introduction to Computers				9 10 11 12				
Computer Programming I				9 10 11 12				
Computer Programming II				9 10 11 12				
Computer Programming III				9 10 11 12				
Computer Programming IV				9 10 11 12				
Computer Programming V				9 10 11 12				
Computer Programming VI				9 10 11 12				
Adult Evening Class								
OTHERS(list)								

EQUIPMENT (if used indicate number)	Simulat-ad Type-writer	Key Punch	Sorter	Acctg. Mach-ina	Repro-dueer	Collat-or	Calcu-lator	Inter-preter	OTHERS (list)	
COURSES Introduction to Data Processing										
Key Punch										
Introduction to Unit Record EQuine										
Tab Eauipment I										
Tab Equipment II										
Tab EqUipment O"Oerator										
Tab Equipment Orientation										
Introduction to Computers										
Computer Programming I										
Computer Programming II										
Computer Programming III										
Computer Programming IV										
Computer Programming V										
Computer Programming VI										
Adult Evening Class										
OTHERS (list)										

Please comment on your program (advantage, disadvantages, suggestions for improvements, etc.)

_____

_____

_____

___(Check) I would 11ke to receive the results of this survey.

___(Check) A data processing course is not included in our curriculum, but I would 11ke to receive the results of this survey.

Name of School_____

Address_____

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