AN ARTICULATION STUDY OF KEYBOARDING IN MONTANA'S PUBLIC SCHOOLS

by

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ABSTRACT

The purpose of this study was to evaluate and examine horizontal and vertical articulation of keyboarding skills gained by students in Montana's elementary and secondary public schools. This study will also recommend who should teach the keyboarding class.

To gather the data and information needed to complete the study, questionnaires were developed and mailed to 150 elementary and secondary schools throughout Montana, from which 81 usable returns were received. The data collected was presented in tabular form so the responses could be compared and interpreted.

The conclusions were: 1) the role of the microcomputer is expanding to include teaching concepts at every level of the public schools; 2) the instructional time on the computer is limited to the number of microcomputers available to students' use; 3) almost half of the students that have access to a microcomputer are not taught touch keyboarding first; 4) a majority of the teachers at all levels indicated that the person who should teach touch keyboarding is the business teacher; 5) the keyboarding class should be taught in either the sixth or seventh grade; 6) the keyboarding class should be scheduled during the regular school day in the building at the level in which the students are located; 7) there is no vertical or horizontal articulation taking place when touch keyboarding is taught in a school district.

The writer made the following recommendations in regard to the study: 1)schools of all levels should offer a keyboarding class just prior to the time they will apply the skill; 2) a keyboarding class should amount to a minimum of 25 hours of instruction with the maximum being 45 hours; 3) communication should be implemented between elementary teachers and secondary teachers who teach the keyboarding classes; 4) guidelines should be established for the schools concerning a keyboarding curriculum for successful skill acquisition; 5) the person who should teach keyboarding is the teacer that is qualified and prepared to deliver instruction using the correct methodology and principles for psychomotor skill development; 6) further follow-up and study should be undertaken to identify articulation constraints and limitations that may inhibit students learning and mitigate course quality.

CHAPTER 1

INTRODUCTION

Keyboarding is a skill that will be needed by everyone in the years to come. A recent survey of school districts in the United States has revealed that 555,765 public schools now use computers. That is more than double the number using computers one year ago. Market Data Retrieval (MDR) phoned all 15,275 U.S. school districts between July 1 and September 15, 1983 and found the following data:

> More schools (31,069) began using computers during the past year than in all prior years combined.
>
> Of 15,275 U.S. School districts, only 2,124 (14 percent) do not use computers.
>
> Elementary schools using microcomputers tripled to 31,991 during the last 12 months.
>
> The growth rate of first-time users increased from 56 percent in September 1982 to 125 percent in September 1983.
>
> Sixty-eight percent of all schools have computers; 62 percent of elementary schools; 81 percent of junior highs; 86 percent of senior highs.
>
> There are 325,000 microcomputers in U.S. public schools; 110,000 in elementary schools; 55,000 in junior high schools; 135,000 senior high schools; and the balance in K-12 and special ed schools.
>
> The number of computers in a school varies with the grade level; the average high school has 11 computers; the average junior high has 7; the average elementary school 3.5.

> Apple, Radio Shack, and Commodore are the leading brands of computers used in U.S. schools. Schools are using 160,000 Apples, 68,000 Radio Shacks, and 49,000 Commodores. Next in order of units used are Atari, IBM, and Texas Instruments (Computing Teacher, 1983:84-88).

It is quite appropriate to assume that microcomputers are literally invading the public schools, and it is time to evaluate the effective and ineffective use of them. Microcomputers are here to stay; their presence is felt in ever-increasing numbers in most schools. According to Headley (1983:18),

> "Everyone will soon need to know how to keyboard and how to make proficient and productive use of this skill. Keyboarding proficiency will be necessary within almost any occupational area."

It will be the charge of educators to assume students are properly trained in the use of the keyboard. As a result, this investigator has become interested in examining and evaluating existing and future keyboarding courses.

Statement of the Problem

The purpose of this study was to evaluate and examine horizontal (between courses) and vertical (between grades) articulation of keyboarding skills gained by students in Montana's elementary and secondary public schools. This study will also recommend who should teach the keyboarding class. Specifically, the study will focus upon the following points:

1. At what grade level should the keyboarding course begin?

2. What equipment is available for students to learn keyboarding?

3. Who should teach the keyboarding class?

4. What should course content include?

5. What skill or competency level is necessary for completion of the course?

6. When (hours, place) and where should the class be taught?

Need for the Study

Keyboarding is a skill that almost everyone has a need for at one time or another--in school, on the job, and increasingly in the home. This fact has prevailed in the use of the keyboarding skill at every level throughout the Montana public school system. Keyboarding is a skill that is needed in order to communicate and obtain information in a rapidly changing world of technology.

Businesses, governmental agencies, educational institutions, and individuals have all experienced the extremely rapid growth of information and increased need to access this information. Much of this information and data is communicated, summarized, calculated, recorded, classified, stored, and retrieved electronically. If any of this information is processed on a simple machine such as an electric typewriter--or on the latest model of computer or word processor--the person processing it will use a common element: the keyboard (LaBarre, Mitchell, Mach, 1982:iv).

In education, opinions differ on how students should be taught the keyboard. Concerns begin with the keyboarding class itself, and then branch out to separate problems involving: when it is taught, where it is taught, who teaches it, length of the class, and the equipment on which it is taught. It is the purpose of this study to examine keyboarding classes in Montana's public schools to determine if articulation is possible among classes and grade levels and if some degree of standardization of content is present or desirable.

Limitations of the Study

The following limitations were placed on this study:

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

2. The population sampled was determined by a random sample that was generated by a computer program (Appendix A). There were 170 secondary schools in Montana in which 35 were selected. There were 579 elementary schools in Montana of which 115 were selected.

3. Research materials utilized were limited to those found at Roland R. Renne Library, at Montana State University and the personal libraries of Dr. Daniel Hertz, Dr. Floyd Frost, and Mrs. Virginia Hartman, all of the Business Education and Office Systems Department at Montana State University.

Definitions of Terms

The following definition of terms are presented to assist the reader. These definitions have been developed

from sources used by the researcher in the review of literature and are generally accepted educational references.

Articulation

Articulation defined in the language of educationalists is the adjustment of relationship between the elementary and junior high school, between the junior and senior high schools, between the senior high schools and the colleges, and among the grades and subjects of those units which will permit students to make the greatest progress possible along a path of uninterrupted continuity from the kindergarten through the college level (Roja, 1965).

Articulation Horizontal

The relationship between programs, courses or activities which exist at any one educational competency level and provide a coordinated educational program for the student.

Articulation Vertical

Relationships which exist between institutions, programs, courses or activities to provide a coordinated program for a student moving from one educational competency level to the next.

Business Education Instructor

An instructor who is certified by the Montana Office of Public Instruction to teach business education subjects at the 5-12 grade level.

Keyboarding

The activity involving the manipulation of the keys and controls, via the touch method on a standard typewriter-like keyboard to produce copy which appears either on a display screen or is recorded and stored in memory for later access and use.

Standardization

That which is set up and established by authority as a rule for the measure of quantity, weight, extent, value, or quality.

Touch System

The touch system is the skill of being able to read copy and transmit that copy through the fingers to the keyboard without visual assistance.

Typewriting

Is that activity involving the manipulation of the keys and controls of a standard typewriting keyboard in such a manner that typed copy is produced on paper.

Organization of the Study

This research project is organized into five chapters. Chapter I containes the statement of the problem, the need for the study, the limitations of the study and the definitions of terms.

Chapter II includes a review of literature and was divided into seven distinct sections:

1. What is keyboarding?
2. What is articulation?
3. When should keyboarding instruction begin?
4. What skill level should students achieve?
5. Who should teach the keyboarding class?
6. What equipment is needed?
7. What software is needed?

Chapter III summarizes the procedures used in carrying out the study. This chapter covers the sources of data,

design of the survey instrument, administration of the survey instrument, and compilation and analysis of the data.

Chapter IV was an interpretation of the data collected and reported in the findings of the study.

Chapter V summarized and served as a synopsis of the entire study. Conclusions were drawn from the findings of the study and recommendations were presented.

CHAPTER 2

REVIEW OF LITERATURE

The purpose of this chapter was to review recent literature most relevant in the area of keyboarding articulation from elementary though the high school levels. Since no studies were found which dealt specifically with this concern, the information presented is general in nature and covers the topic from a variety of leading journals, textbooks, and position papers.

People in almost every walk of life need keyboarding skills to support their personal and business activities (LaBarre, 1983:position paper).

> "Tasks that were formerly manual operations have now become automated through the use of computers and other equipment which use a keyboard for data entry. Some of the positions that now require keyboarding skills include the bookkeeper who enters journal transactions into a computer via a keyboard; the records manager who uses the computer terminal keyboard to locate specific documents in the file; the inventory clerk who keeps track of shipments of stock and receipt of new stock via the computer terminal; the airline agent who uses the keyboard for reservations, passenger checkins, and seat assignments; and the business executive who has a computer terminal on the desk to access current information which will be useful in making managerial decisions" (Hanson and Rigby, 1981:v).

The need for keyboarding is apparent, but the development and structure of the course has not been

delineated in any manner approaching uniformity by educators. This chapter will address some of the more significant findings and conclusions of the related literature in the following areas:

1. What is keyboarding?
2. What is articulation?
3. When should keyboarding instruction begin?
4. What skill level should students achieve?
5. Who should teach the keyboarding class?
6. What equipment is needed?
7. What software is needed?

What is Keyboarding?

Many careers today, from entry-level positions to those in top management, require the use of keyboarding. Tasks that were formerly manual operations have now become automated though the use of computers and other equipment which provide a keyboard for data entry. The increased use of keyboards on various types of equipment in business, industry, government, and education has created a need to prepare people to use typewriter-like keyboards effectively. In addition, many students need keyboarding skills to interact with computers as part of their academic program. In order to use these keyboards in the most efficient manner, it is important to have basic touch keyboarding skills (Cook, 1984:7).

> "Keyboarding is the act of inputting information into various types of equipment through the use of a typewriter-like keyboard" (Hanson and Rigby, 1981:iv).

The keyboard, until voice input is perfected sometime in the future, will be the most used tool at our fingertips. Its impact may be greater than that of the printing press. A keyboard, used in conjunction with the telephone, will become the communication system for the next decade (LaBarre, 1983:position paper).

In order to satisfy personal and employment needs, students must learn to use the common input tool--the keyboard (LaBarre, 1983:position paper).

What is Articulation?

In this age of inflation and increased costs for education, it is imperative that coordinated vertical articulation be employed to maintain the quality of education and increase the educational opportunities for students.

In 1977, Dr. Spanbauer (1977:6511) reported that curriculum articulation facilitates the transition of students between the vertical levels of instruction and insures that programs meet the purpose for which they were established--educating students in the most efficient, well-planned manner possible.

Goodrich (1979:17) reported in an article entitled, "Keyboarding: An Increased Fact in Today's Society," that

each school needs standards to provide both horizontal and vertical continuity within and among the courses. Horizontal continuity is provided by identical standards of the basic requirements within all sections of the same level course. Vertical continuity is provided by the standards for each level of the courses. From the beginning course to the most advanced one, a progression of the elements (composition skills, speed, and accuracy) should exist. The horizontal and vertical standards help in providing a stable course of study in the curriculum and in placing the students in the appropriate class." To be operative, any articulation program must continuously monitor student gains to insure continuity within the educative process.

When Should Keyboarding Instruction Begin?

Although computers are designed to be accessible, students still need basic skills to use the tool effectively and efficiently. With the integration of the computer into the elementary classroom, we are experiencing a phenomenon of "little fingers" having little knowledge of the correct techniques necessary to execute the task.

Rauch and Yanke (1982:20) state from a survey they conducted, "that the time spent orienting students to microcomputers, usually through small-group instruction, ranged from 30 to 80 minutes. Depending upon equipment availability, students were permitted anywhere from 15 to 75 minutes weekly on the micro. This equates to a maximum of

45 hours at year's end, which hardly seems significant. However, multiply this by nine years--and you have a whopping 405 hours of 'hunting and pecking' before reaching ninth grade."

The keyboarding that takes place during the elementary years is the inputting of one-word responses for the most part and eventually leading to complete sentences. According to Bahniuk (1983:87) "if hunt-and-peck methods are established at the beginning of the learning cycle, it is difficult, if not impossible, to undo this later and teach the standard touch method of keyboarding."

Evidence supported by LaBarre and Zahn (1983:position paper), states that students should develop keyboarding skills just prior to the time they will apply the skill. The literature intimates therefore, that it is inappropriate to make an arbitrary decision or recommendation concerning which grade level keyboarding skills are most suitably developed. The idea that students in the elementary grades should be encouraged to learn basic keyboarding skills at the earliest feasible grade level was also endorsed through the NBEA Task Force on New Concepts and Strategies for long-range directions in business education (1983:4).

What Skill Level Should Students Achieve?

The keyboarding course is structured to give students, in a minimum amount of time, the basic touch keyboarding

skills to input information into computer terminals more efficiently.

"Students enrolled in Keyboarding courses should reach 30-40 words per minute (wpm) i.e. 3-4 lines with one error per minute on a one-, two-, or three minute timed writing. This touch skill should be reached in 25-45 hours of instruction" (LaBarre, 1983:position paper).

These standards and expectations are comparable to those identified by Dr. Patsy A. Dickey-Olson (1981:92) for her course entitled "Keyboarding Skills for Business Majors." She states:

> "The student completing the course should be able to perform the following skills:
>
> Demonstrate the correct 'touch' system techniques for operating the alpha-numeric keys.
>
> Demonstrate the correct 'touch' technique to be used on a ten-key numerical pad.
>
> Demonstrate a straight-copy speed of 30 words-per-minute and an accuracy level of not more than two errors-per-minute.
>
> Demonstrate the ability to work from typed and rough-draft material.
>
> Demonstrate the ability to detect and correct errors in completed work (proofread)
>
> Demonstrate the ability to follow oral and written directions.
>
> Demonstrate the ability to backspace and correct errors.
>
> Transfer the 'touch' system of keyboarding skills of the electronic automatic repetitive keyboards currently on the market."

By requiring these objectives, instructors are able to satisfy the needs of students who want basic keyboarding skills.

Who Should Teach The Keyboarding Class?

The development and mastery of keyboarding skills is a crucial teaching area. Teachers certified in typewriting are prepared to deliver instruction using correct methodology and psychological principles for psychomotor skill development. This same level of teaching preparedness is needed by those individuals teaching keyboarding (LaBarre: 1983, position paper).

> "The behavior of the teacher in the classroom has either a positive or a negative effect upon the learning of students (Bloom, 1975:108-38)...teaching typewriting is even more complex than learning to typewrite. Effective teaching requires knowledge of the learning process, skill in arranging the conditions of learning, and skill in the process of interacting with students and manipulating human characteristics toward worthwhile end... The kind of guidance and direction given students in the typewriting classroom is a potent factor affecting motivation to learn and rate and degree of learning" (Robinson, et al., 1979:13).

According to LaBarre and Zahn (1983:position paper) business education instructors who are prepared to teach typewriting learn to recognize student readiness for developing new typing skills. The instructors are prepared to recognize student readiness and maturation as they prescribe exercise activities for students. The same preparation is needed for those who will teach keyboarding.

Business education instructors are taught to take advantage of intrinsic and extrinsic motivational techniques for psychomotor skill development. It is the instructors' ability to utilize these diverse motivational stimulants that aid them in helping students develop the highest level of skills possible within the scheduled instructional time constraints of the classroom.

> "The teaching of typewriting is a complex and demanding activity. It is not an act to be delegated to just anyone. Almost anyone can maintain order and grade papers in a typewriting classroom (manage learners). But it takes a knowledgeable teacher who understands how skills learning occurs to teach typewriting as it can and should be taught (manage learning). The task is not easy, but anything worthwhile takes effort..." (Robinson, et al., 1979:18).

If computers are to be in the elementary classroom, business educators must become involved in the development of the keyboarding course. "A course in keyboarding taught at any level requires the development of a motor skill. Correct techniques must be used in developing this skill, and business educators are knowledgeable in this area. However, they must recognize that we do not know the learning strategies needed to adapt instruction in keyboarding to elementary students" (Rigby, 1983:13). This leaves the door open for some type of alternative instruction in the keyboarding class.

> A team-teaching approach could be used in the keyboarding class at the elementary level. By combining the business educator's knowledge of teaching typing with the elementary teacher's

> knowledge of the elementary student's learning patterns, a more effective course will be developed.
>
> Another approach would be to certify the business educator to teach at the elementary levels or to certify the elementary teacher to teach keyboarding (Rigby, 1983:13).

What Equipment Is Needed?

The keyboarding class can be taught on any keyboard that is available. In order for the system to reach its goals adequately, it is suggested that the work station should contain, at the minimum, the following components:

1. Standard typewriter keyboard containing cursor-control keys
2. Video monitor--black and white, green, or amber screen
3. Secondary storage device--floppy disk, hard disk, or cassette tape
4. 10-key numeric pad--either built into the keyboard or as an attachment to the system (LaBarre, 1983:position paper).

The most commonly available machine will be an electric typewriter. It will provide the ability to simulate the touch skill on a typewriter keyboard which can be transferred easily to any of the more sophisticated machines (Dickey-Olson, 1981:83).

If a new classroom were being equipped for this type of course, the most desirable equipment would include the systems outlined above.

What Software Is Needed?

If software is selected for use in the keyboarding class, the instructor should ensure that it compliments the course objectives. Any software selected should be pedagogically sound and supported by teacher-usable documentation.

Not all students are learning to keyboard in classroom settings. Software packages for learning and practicing keyboarding skills have been on the market for more than a year (Rubin, 1983:20).

Tutorial software can be designed to teach new concepts in several areas in which the content is relatively stable. Tutorial software can be used to teach typewriting as well as to provide keyboarding drills. Using the computer as a tutorial instructional tool permits the alternative of individual instruction.

Some of the software packages currently available (as of April, 1983) that may be used as an instructional aid include:

1. Mastertype, (Apple, IBM, Commodore 64, Atari) is the typing program that features brilliant animated color graphics and science-fiction sound effect; its exciting arcade game action will make typing drill the highlight of the day. The lessons progress from simple words and home row keys to more complex vocabulary and the full keyboard. Price for the Apple, C64, and Atari software is $39.35 and the IBM price of $49.95. (publisher Scarborough Systems)

2. Typing Tutor, (Apple) takes the student through the four levels of typing

proficiency, from beginner to advanced. Features time response monitoring, a unique system for monitoring the keyboard and analyzing skills and progress. It keeps track of the keys learned, those currently being taught, and those yet to be learned, allowing for an individualized pace. The concept of words-per-minute is introduced and developed early in the program, and all performance factors are tabulated for immediate feedback. Price for the Apple software is $24.95. (publisher Microsoft)

3. Microsoft Typing Tutor, Price for disk $24.95. (Apple) (publisher Microsoft)

4. Gregg Keyboarding for Information Processing, (Apple, TRS-80) helps develop quick, efficient keyboarding skills in a short time. Designed as a personalized program, it keeps users informed of their progress while the index enables them to select any lesson they want. The emphasis is on accuracy while building speed. Price for the Apple disk is $60.00. No price was given on the TRS-80. (publisher Gregg/McGraw Hill)

5. Typing Strategy, (Apple, IBM) are specially designed programs that can teach a person to type as quickly and accurately as a professional typist (80-120 WPM with 95% accuracy) in a way that is both easy and entertaining. It shows what keys and letters to press without having to look down at the fingers. Price for the Apple and IBM disks are $29.95. (publisher Behavioral Engineering)

6. Letter Man, (Apple, IBM) is a game designed to increase typing speed and teach typing while playing. Price for either disk is $29.95. (publisher Behavioral Engineering)

7. Typing Teacher, (Apple) is a hands-on educational program which utilizes behavioral learning principles to teach anyone to master the typewriter or keyboard. The program concentrates on drill, practice, and reinforced learning through eight phases of instruction. In each of the eight phases or practice levels, there are ten exercises to be completed at the student's own pace. The

screen displays the relevant keyboard positions and where to place fingers. Price for the disk is $19.95 (publisher Compu-Tations)

8. Touch Typing Tutor, (Commodore 64, Vic-20) starts from scratch or brush up on skills. Features an on-screen keyboard and introduces keys in color. Price for the cassette is $19.95 and the disks are $29.95 (publisher Taylormade Software)

9. Type Attack, (Apple, Commodore 64, Vic-20, IBM) involves learning a lesson from Lexitron, a distant planet whose expert-typist inhabitants defeated the armies of letters and words that are now plummeting toward the earth. The only effective weapon is typing skill in this arcade-style program. Regardless of which software purchased, the price is $39.95. (publisher Sirius Software) The information on each package was provided by Queue Educational Software Catalog #17, 1983, and Microcomputer Software Secondary and Catalog, 1984.

The major role of educational software is to allow teachers to do what they have always wanted to do but are not able to do. That is, software can enable educators and parents to promote children's thinking (O'Brien, 1983:111).

In brief, educational software solves many problems for teachers by enabling them to do the things they always wanted to do.

Summary

With the selection of content and learning activities appropriate and articulated for each level, some major decisions have been made for integrating keyboarding into educational curriculums. Criteria to be used in

articulation decisions are within the realms of all educational levels.

After reviewing the current literature about keyboarding, the key point should be made that careers available to students in years to come will most likely involve some keyboarding.

The literature seems to emphasize that a shift must be made to teach students the correct keyboarding techniques in order for them to possess a skill that will become applicable for present and future use.

Chapter 3

PROCEDURES

This study was undertaken to evaluate and examine horizontal and vertical articulation of keyboarding skills gained by students in Montana's elementary and secondary public schools. The study also recommended who should teach the keyboarding class. To accomplish this objective, a study was conducted through the use of the following procedures:

1. Sources of Data
2. Construction of the Survey Instrument
3. Administration of the Survey Instrument
4. Analysis of Data

Sources of Data

The sources of data for this study were obtained by questionnaires sent to a random sample of the elementary and secondary educators in the state of Montana.

Data for the review of literature was obtained from the Roland R. Renne Library, Montana State University; from the private libraries of Dr. Daniel Hertz, Dr. Floyd Frost, and Mrs. Virginia Hartman, all from the Business Education and Office Systems Department at Montana State University.

Construction of the Survey Instrument

After a review of the literature, which identified elements considered important to be included in the survey, a questionnaire (Appendix B) was constructed. A questionnaire developed by Rauch and Yanke (1982:19) suggested ideas for the formatting of some of the questions used in this survey instrument.

The survey instrument was developed by the writer, with the assistance of Dr. Daniel Hertz, Dr. Floyd Frost and Mrs. Virginia Hartman. The questions were submitted in rough draft form to be reviewed by the BUED 524 Research in Business Education class on March 7, 1984. After a series of revisions, the questionnaire was considered appropriate for the study.

The questionnaire was used to determine to what extent keyboarding has been implemented into Montana's elementary and secondary curriculums, and secondly, what Montana educators perceive as an articulated keyboarding curriculum.

Administration of the Survey Instrument

On May 3, 1984, each educator in Montana who was selected to be included in the survey was sent a questionnaire. A cover letter (Appendix C) accompanied the questionnaire explaining the purpose of the study. A stamped, self-addressed envelope was included for the convenience of the respondent in hopes of insuring a high percentage of return.

After three weeks, 81 of the 150 questionnaires (54 percent) had been returned. Due to the lateness of the first mailing no follow-up letter was sent because most of the schools were closed by the end of May. The assumption was made that any questionnaires not received by this time would not be received.

Analysis of the Data

Once the survey had been terminated, responses were compiled in order to summarize the data.

Tables were constructed from the data in order to present the findings in a readable and understandable form. The statistics given in these tables relate to the number of responses to each category and how those answers compared as a percentage of the total responses for that table. Since every respondent did not answer every question, the percentage was determined by analyzing the total number of questions answered.

Where a variety of possible answers were listed or where the respondent wrote in his/her own answer, the tables were set up to show the total number responding to each question, the listing of possible answers to each question, and the percent responding to each answer.

The analysis of the data relates to Chapter IV in which the writer presented, analyzed, and interpreted the data involved in the survey. After analyzing the results of the

study, conclusions and recommendations were made. The conclusions and recommendations are presented in Chapter V of this study.

Summary

This chapter described the procedure used by the researcher in conducting the survey. The following areas were examined:

1. Sources of Data
2. Construction of the Survey Instrument
3. Administration of the Survey Instrument
4. Analysis of Data

Chapter 4

FINDINGS

Introduction

This chapter presents a tabulation and analysis of the data obtained from this survey of selected elementary and public schools in Montana.

The primary objective of mailing the survey instrument to schools was to gather information concerning whether or not touch keyboarding is taught to students before they use a microcomputer.

All percentages were rounded to one decimal place. Because of this rounding process, some column totals will not add to exactly 100.0 percent.

The questionnaire contained seventeen questions, all of which were multiple choice. Ample space was provided on the survey instrument for respondents to make comments of any nature.

Summary of Responses

Questionnaires (Appendix B) were mailed to 150 selected elementary and secondary schools in Montana. As indicated in Table 1, 81, or 54 percent, of the schools responded. Of the 81 schools responding, 57 were

elementary, 6 were junior high, and 18 were high schools. The information contained in the 81 completed questionnaires is presented and analyzed in the tables and explanatory paragraphs which follow.

Table 1. Summary of Respondents.

Explanation	Number	Percent
Elementary	57	38.0
Jr. High	6	4.0
Sr. High	18	12.0
No Reply	69	46.0
Total Usable Returns	81	54.0

Eighty-one, or 54 percent, of the responses were usable. Sixty-nine, or 46 percent, of the schools did not reply.

Question 2 asked: "Do you have microcomputers in your school? If no, go to Question 11." The responses from Question 2 are tabulated in Table 2.

Table 2. Respondents Indicating Microcomputers in Their School (Percent)

	No. of Respondents	Percent Yes	Percent No
Elementary	57	84.2	15.8
Jr. High	6	100.0	0.0
Sr. High	18	94.4	5.6

Of the 81 schools responding to the questionnaire, 71 of them (87.7 percent) had a microcomputer in their school;

48 (84.2 percent) were elementary schools; 6 (100.0 percent) were junior high schools; and 17 (94.4 percent) were senior high schools. The remaining schools that responded to the survey did not have access to a microcomputer. Nine (15.8 percent) of those were elementary schools; one (5.6 percent) was a senior high school. If the responses to Question 2 were no, they were to go to Question 11 and complete the questionnaire.

Schools in which Questions 3 through 10 were not applicable were tabulated in the no response column of Tables 3 through 10. This allowed the writer to use 81 respondants as the base calculation for all tables.

Table 3 lists the results of Question 3 on the survey instrument, which read as follows: "In which grade are students first introduced to the microcomputer?" Each respondent chose one of thirteen possible answers, as shown in the table below.

Table 3. Grade in Which Students are Introduced to Microcomputers (Percent).

No. of Respondents	Kindergarten	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	No Response
81	38.2	24.7	4.9	2.5	3.7	1.2	3.7	1.2	2.5	0.0	1.2	3.7	0.0	12.3

Of the 81 responses to this question, 38.2 percent reported that students were introduced to the microcomputer in kindergarten; 24.7 percent in the 1st grade; 4.9 percent in the 2nd grade; 2.5 percent in the 3rd grade; 3.7 percent in the 4th grade; 1.2 percent in the 5th grade; 3.7 percent

in the 6th grade; 1.2 percent in the 7th grade; 2.5 percent in the 8th grade; 0.0 percent in the 9th grade; 1.2 percent in the 10th grade; 3.7 percent in the 11th grade; and 0.0 percent in the 12th grade. 12.3 percent of the respondents did not respond to this question.

Question 4 was asked to determine in which grade the most instruction on the microcomputer was taking place. It read: "At which grade level (s) are students using the microcomputer for instructional purposes? (please check all that apply)" The results are listed in Table 4 below.

Table 4. Grade(s) Students are Using the Microcomputer for Instructional Purposes (Percent).

No. of Respondents	Kindergarten	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	No Response
81	24.7	44.4	43.2	50.6	51.9	53.1	46.9	33.3	49.4	33.3	34.6	37.0	38.3	14.8

The most common grades for using the microcomputer for instructional purpose were the third, fourth, and fifth. Fifty percent or above was indicated in each of those three grade levels. The next grades that instructional use of the microcomputer was high in, were the eighth grade (49.4 percent) and the 6th grade (46.9 percent). The first and second grades produced 44.4 percent and 43.2 percent respectively.

The senior high schools use of the microcomputer was relatively high also, beginning with the 9th grade at 33.3 percent, 10th grade at 34.6 percent, 11th grade at 37.0 percent and the 12th grade at 38.3 percent.

The lowest response was for the use in kindergarten at 24.7 percent. There was a 14.8 percent no response to Question 4.

Question 5 dealt with the types of data students are inputting into the microcomputer. The purpose of this question was to determine the extent to which the keyboard is used by students. The responses are shown in Table 5.

Table 5. Types of Data Students are Inputting (Percent).

	No. of Respondents	1 Letter Responses	1 Word Responses	Sentences	Paragraphs	Documents	No Response	Other
Elementary	57	44.4	49.4	46.9	21.0	13.6	12.3	0.0
Jr. High	6	1.2	4.9	2.5	2.5	1.2	1.2	1.2
Sr. High	18	18.5	14.8	17.3	16.0	16.0	0.0	0.0

The most common type of data that is input by students is one word responses. At the elementary level 49.4 percent of the inputting is one word responses, 4.9 percent at the junior high and 14.8 percent at the senior high. Sentences are the next most utilized form of input. The elementary responses totaled 46.9 percent, junior high 2.5 percent, and high school 17.3 percent.

One letter responses involved 44.4 percent at the elementary level, 1.2 percent at the junior high and 18.5 percent at the senior high. The use of paragraphs decreased at the elementary level from the other uses but usage was 16.0 percent at the senior high, 1.2 percent at the junior high and 13.6 percent at the elementary level.

There was a 13.5 percent no response to this question. In the 'other' column was an answer at the junior high level involving the use of word processing software.

Question 6 was included to find out approximately what percent of students in the schools use the microcomputer for instructional purposes. Of the 57 elementary schools responding to the questionnaire, 13.6 percent indicated that 100 percent of their students use the micro for instructional purposes; 6.2 percent had 90 percent use; 4.9 percent had 80 percent use; 2.5 percent had 70 percent use; 4.9 percent had 60 percent use; 8.6 percent had 50 percent use; 1.2 percent had 40 percent use; 6.2 had 30 percent use; 7.4 percent had 20 percent use; 2.5 percent had 10 percent or less use on the micro. The results are listed in Table 6 below.

Table 6. Students That Use Microcomputer for Instructional Purposes (Percent).

	No. of Respondents	100%	90%	80%	70%	60%	50%	40%	30%	20%	10% or Less	No Response
Elementary	57	13.6	6.2	4.9	2.5	4.9	8.6	1.2	6.2	7.4	2.5	12.3
Jr. High	6	1.2	1.2	0.0	1.2	1.2	2.5	0.0	0.0	0.0	0.0	0.0
Sr. High	18	0.0	0.0	2.5	1.2	1.2	2.5	3.7	2.5	6.2	1.2	1.2
Totals	81	14.8	7.4	7.4	4.9	7.3	13.6	4.9	8.7	13.6	3.7	13.5

The junior high schools had 1.2 percent use of the microcomuter in the 100, 90, 70, 60 percent columns. The highest useage on the micro came in the 50 percent column for junior high schools. The remaining columns had 0 percent usage. Of the 18 high schools responding to the

questionnaire, 0 percent usage was categorized in the 100 and 90 percent columns of the use of the micro; 2.5 percent had 80 percent use; 1.2 percent had 70 and 60 percent use; 2.5 percent had 30 percent use; 6.2 percent had 20 percent use; 1.2 percent had 10 percent or less use on the micro.

Of the elementary schools there was 12.3 percent that had no response to this question and 1.2 percent of the high schools did not respond.

Question 7 was included in the survey instrument to determine the number of hours students spend on the computer. It read as follows: "On the average, how many clock hours do students spend on the microcomputer per week? (include all classes taught)." The respondents were given several choices, and the results are given in Table 7.

Table 7. An Average of the Hours a Student Spends on the Microcomputer Per Week (Percent).

	No. of Respondents	Less than 1 hr.	1 hr.	2 hrs.	3 hrs.	4 hrs.	5 hrs.	Other	No Response
Elementary	57	22.2	6.2	16.0	4.9	1.2	4.9	2.5	12.3
Jr. High	6	4.9	1.2	1.2	0.0	0.0	0.0	0.0	0.0
Sr. High	18	6.2	0.0	1.2	2.5	0.0	11.1	0.0	1.2
Totals	81	33.3	7.4	18.4	7.4	1.2	16.0	2.5	13.5

Of all respondents surveyed, the average number of hours students spend on the microcomputer, was highest for elementary and junior high in the less than one hour category. The senior high use was highest at five hours per student. The findings show a concentration of the remaining responses to be in the two and three hour categories. There

was a 12.3 percent of no responses at the elementary level and 1.2 percent at the senior high.

This section of Chapter 4 deals with the touch keyboarding class itself. The information answers questions concerning whether or not it is taught, who teaches it, and who should be teaching it.

Question 8 stated: "At which level is touch keyboarding being taught in your school? (check all that apply)" The results are shown in Table 8 below.

Table 8. Statement: At Which Level(s) is Touch Keyboarding Being Taught in Your School? (Check All That Apply) (Percent).

	No. of Respondents	Elementary Level	Jr High Level	Sr High Level	No Keyboarding Class	No Response
Elementary	57	23.5	13.6	13.6	19.8	11.1
Jr. High	6	0.0	2.5	3.7	1.2	0.0
Sr. High	18	1.2	4.9	14.8	4.9	1.2
Totals	81	24.7	21.0	32.1	25.9	12.3

Of the 81 respondents, 24.7 percent indicated touch keyboarding is taught at the elementary level; 21 percent at the junior high level and 32.1 percent at the senior high level. One-fourth (25.9 percent) of the respondents indicated touch keyboarding was not being taught. One-eighth (12.3 percent) did not respond to Question 8.

In Question 9 which asked: "Who teaches the students touch keyboarding/typing?" The results are listed in Table 9 (see page 33).

One-third (37 percent) of the respondents of the survey indicated that the person who is teaching touch keyboarding in their school district is the business teacher. The only

place the elementary teacher is teaching keyboarding is in the elementary classroom (14.8 percent) according to this survey. Nearly one-fourth (20.9 percent) of the respondents state that a touch keyboarding class is not taught at this time within their schools. In the 'other' column 3.7 percent of the respondents stated that keyboarding is a self-taught process in their school.

Table 9. Who Teaches the Students Touch Keyboarding? (Percent).

	No. of Responses	Elementary Teacher	Jr. High Teacher	Business Teacher	Math Teacher	Is Not Taught	Other	No Responses
Elementary	57	14.8	3.7	18.5	2.5	14.8	3.7	12.3
Jr. High	6	0.0	0.0	6.2	0.0	1.2	0.0	0.0
Sr. High	18	0.0	3.7	12.3	1.2	4.9	0.0	1.2
Totals	81	14.8	7.4	37.0	3.7	20.9	3.7	13.5

Table 10 displays the results of Question 10 which asked whether or not the students are taught touch keyboarding when they are introduced to the microcomputer.

Table 10. Is Touch Keyboarding Taught When Introducing the Microcomputer to Students? (Percent).

	No. of Respondents	Percent Yes	Percent No	No Response
Elementary	57	24.7	33.3	12.3
Jr. High	6	0.0	7.4	0.0
Sr. High	18	13.6	7.4	1.2
Totals	81	38.3	48.1	13.5

According to the survey, of the respondents who indicated 'yes' touch keyboarding is taught when introducing the microcomputer to students, 24.7 percent were elementary teachers, 0 percent were junior high and 13.6 percent were

senior high teachers. In the 'no' catagory 33.3 percent were elementary, 7.4 were junior high, and 7.4 were senior high. There were 13.5 percent of the respondents who did not respond to this question.

When asked to give their opinion on who should teach the touch keyboarding class, the majority of respondents answered "the business teacher." The results to Question 11 are given in Table 11. Question 11 asked: "In your opinion, who should be teaching touch keyboarding/typing regardless of which level it is taught at?"

Table 11. Who Should Teach Touch Keyboarding? (Percent).

	No. of Responses	Elementary Teacher	Jr. High Teacher	Business Teacher	Math Teacher	Other	No Responses
Elementary	57	19.8	2.5	28.4	2.5	13.6	3.7
Jr. High	6	1.2	1.2	4.9	0.0	0.0	0.0
Sr. High	18	0.0	0.0	22.2	0.0	0.0	0.0
Totals	81	21.0	3.7	55.5	2.5	13.6	3.7

Over half of the respondents (55.5 percent) indicated that the person to teach touch keyboarding should be the business teacher. Twenty-one percent of the respondents indicated the elementary teacher should teach touch keyboarding, 3.7 percent stated "the junior high teacher" and 2.5 percent suggested "the math teacher." The 13.6 percent responses written in as "other" include the following suggestions about who should teach the keyboarding class: specialist, anyone trained in this area, aide, all teachers could instruct keyboarding, keyboarding skill should be taught at the lowest-grade level possible by the

business teacher accompanied by lower grade teacher. There was a 3.7 percent no response to Question 11.

The respondents were next asked (Question 12) at what level students should be taught touch keyboarding. The question asked: "If knowing how to touch keyboard/type would be helpful, at what level should students be taught?" The answers given by respondents are summarized in Table 12.

Table 12. Level Students Should be Taught Touch Keyboarding (Percent).

	No. of Respon-dents	Kinder-garten	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	No Response
Elementary	57	4.9	8.6	9.9	8.6	8.6	2.5	3.7	16.0	1.2	2.5	0.0	0.0	0.0	3.7
Jr. High	6	0.0	0.0	0.0	0.0	1.2	2.5	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr. High	18	1.2	1.2	1.2	0.0	1.2	2.5	2.5	8.6	1.2	2.5	0.0	0.0	0.0	0.0
Totals	81	6.1	9.8	11.1	8.6	11.0	7.5	9.9	24.6	2.4	5.0	0.0	0.0	0.0	3.7

One-fourth of the respondents agreed that the students' should be taught keyboarding at the seventh grade level. The second and fourth grades both received 11.0 percent agreement that keyboarding should be taught there. All of the respondents felt that keyboarding should be taught before the tenth, eleventh and twelfth grades.

Question 13 asked: "When should a keyboarding/typing class be scheduled for students." The responses to this question are shown in Table 13 (see page 36).

Over two-thirds (82.7 percent) of the respondents felt that the keyboarding class should be offered during the regular school day. Summer school was the next solution with a 7.4 percent response. The idea to teach it before

school received 3.7 percent of the responses, and 'after school' received 6.1 percent. Evenings was the last choice with only 1.2 percent of the responses.

Table 13. When Should a Keyboarding Class be Scheduled? (Percent).

	No. of Respondents	During Regular School Day	Before School	After School	Evenings	Summer School	Other
Elementary	57	56.8	3.7	4.9	1.2	4.9	0.0
Jr. High	6	7.4	0.0	0.0	0.0	0.0	0.0
Sr. High	18	18.5	0.0	1.2	0.0	2.5	0.0
Totals	81	82.7	3.7	6.1	1.2	7.4	0.0

In response to Question 14 which asked, "In which school building(s) should the keyboarding class be taught?", 81 responses were given. The results are listed in Table 14.

Table 14. Which School Building(s) Should the Keyboarding Class be Taught? (Check All That Apply) (Percent).

	No. of Respondents	Elementary Level	Jr High Level	Sr High Level	No Response
Elementary	57	42.0	37.0	24.7	7.4
Jr. High	6	4.9	4.9	2.5	0.0
Sr. High	18	7.4	13.6	18.5	0.0
Totals	81	54.3	57.5	45.7	7.4

Of the 57 elementary teachers responding to Question 14, 42 percent felt that keyboarding should be taught in the elementary building, 37 percent in the junior high and 24.7 percent in the senior high. The junior high teachers responding to this question brought a 4.9 percent response to keyboarding being taught in the elementary building, 4.9 percent in the junior high building and 2.5 percent in the

senior high. Of the 18 senior high responses 7.4 percent felt that the elementary building should be used and 18.5 percent stated that the senior high building should be utilized.

Question 15 asked: "Would you, your administrator, or another teacher in your building be willing to assist with curriculum development and planning for a course in elementary keyboarding/typing?" The responses are listed in Table 15.

Table 15. Would Someone on Staff Being Willing to Assist With Curriculum Development of an Elementary Keyboarding Class? (Percent).

	No. of Respondents	Percent Yes	Percent No	Percent Maybe	No Response
Elementary	57	25.9	8.6	30.9	4.9
Jr. High	6	2.5	0.0	4.9	0.0
Sr. High	18	12.3	0.0	9.9	0.0
Totals	81	40.7	8.6	45.7	4.9

The respondents were quite positive about assisting with curriculum development of an elementary keyboarding class. Over one-third (40.7 percent) of the respondents indicated 'yes' they were willing and 45.7 percent indicated maybe. The 8.6 percent that indicated 'no' they are not willing to help were all elementary responses. When asked whether or not a keyboarding specialist should be available to the district, the following results prevailed in Table 16.

Table 16. Should a Keyboarding Specialist be Available for the District? (Percent).

	No. of Respondents	Percent Yes	Percent No	Percent Maybe	No Response
Elementary	57	25.9	12.3	28.4	3.7
Jr. High	6	2.5	3.7	1.2	0.0
Sr. High	18	7.4	1.2	13.6	0.0
Totals	81	35.8	17.2	43.2	3.7

Of the 81 respondents, 35.8 percent thought that a keyboarding specialist should be available to the district, 43.2 percent thought that 'maybe' one should be provided and 17.2 percent felt it was not necessary to have a keyboarding specialist available.

The final question on the survey instrument asked respondents about the problems they perceive could happen when implementing a keyboarding class. It read as follows: "If you are planning on introducing a keyboarding/typing class in the future what problems do you anticipate?" Each respondent was asked to check all the reasons that applied to their particular situation. The results are listed in Table 17 (see page 39).

The problem of scheduling the class was the most frequent problem foreseen by all three levels, with 50.6 percent of the elementary responding, 7.4 percent at the junior high level and 16.0 percent at the senior high. Equipment problems seemed to be the next most prevalent problem for the elementary level 33.3 percent, junior high 4.9 percent and 14.8 percent high school. Staffing was listed as a problem by the elementary teachers 28.4 percent

and 7.4 percent by high school teachers. All three levels listed site (facility) problems as an obstacle in the development of a keyboarding class. Faculty problems were the last to be rated by the elementary teachers at 12.4 percent, junior high teachers at 2.5 percent and by high school teachers at 3.7 percent. Two additional reasons were added under 'other'. One respondent stated, "that hand size of the child would be a factor in a keyboarding class," and another respondent replied, "The priority of this class in the curriculum would have to be considered before implementation."

Table 17. When Implementing a Keyboarding Class What Problems do Your Anticipate? (Percent).

	No. of Respondents	Elementary	Jr. High	Sr. High
Staff Problems	81	28.4	0.0	7.4
Site (facility) Problems	81	22.2	2.5	9.9
Faculty Problems	81	12.3	2.5	3.7
Scheduling Problems	81	50.6	7.4	16.0
Equipment Problems	81	33.3	4.9	14.8
Other	81	0.0	2.5	0.0

Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

This reasearch project was undertaken to evaluate and examine horizontal and vertical articulation of keyboarding skills gained by students in Montana's elementary and secondary public schools.

The specific questions to be answered as a result of this study include:

1. Do you have microcomputers in your school? If no, go to question 11.

2. In which grade are students first introduced to the microcomputer?

3. At which level(s) are students using the microcomputer for instructional purposes?

4. What kinds of data and how much data are students inputting?

5. Approximately what percent of your students use the microcomputer for instructional purpose?

6. On the average, how many clock hours do students spend on the microcomputer per week?

7. At which level is touch keyboarding being taught in the school?

8. Who teaches the students touch keyboarding/typing?

9. When the computer is introduced are students shown the correct fingering techniques (touch keyboarding) to use on the keyboard?

10. Who should be teaching touch keyboarding/typing regardless of the level at which it is taught? at?

11. If knowing how to touch keyboard/type would be helpful, at what level should students be taught?

12. When should a keyboarding/typing class be scheduled for students?

13. In which school building(s) should the keyboarding/typing class be taught?

14. Would the teachers and/or administrator be willing to assist with curriculum development and planning for a course in elementary keyboarding/typing?

15. Should a keyboarding/typing specialist be made available for the whole district?

16. What problems would the teachers anticipate if a keyboarding/typing class were introduced in the future.

To achieve this purpose, questionnaires were sent to 150 selected elementary and secondary schools in Montana, from which 81 usable returns were received. This total represented a 54 percent return. The responses were tabulated and analyzed in Chapter 4 of this study.

From the information received, the researcher was able to make the following summary, conclusions, and recommendations.

Summary and Conclusions

A summary of the major findings of the study are listed on the following pages.

1. Eighty-eight percent of the schools surveyed in Montana have at least one microcomputer in their school.
2. A majority of the schools surveyed first introduce students to the microcomputer in kindergarten (38.2 percent) or in the first grade (24.7 percent).
3. Over 50 percent of the respondents indicated students were using the microcomputer for instructional purposes at the third, fourth, and fifth grade levels. Over 40 percent of the students were using the microcomputer for instructional purposes at the first, second, sixth, and eighth grades.
4. The most common type of data input by students was one word responses.
5. In the schools surveyed, the majority of students who use the microcomputer for instructional purposes are at the elementary level. From the

data collected, the use of the microcomputer for instructional purpose is very minimal.

6. One-third (33 percent) of the respondents indicated that their students spend less than one hour on the microcomputer per week.
7. Of the schools in which touch keyboarding was offered, 24.7 percent are teaching it at the elementary level. Twenty percent are teaching it at the junior high and twenty-one percent at the senior high. Twenty-five percent do not even have a class in existence.
8. A majority of the respondents at all levels (elementary, junior high, and senior high) indicated that the business teacher should teach the students touch keyboarding. However, a significant number of the elementary teachers (14.8 percent) thought that the elementary teacher should teach touch keyboarding at the elementary level.
9. Almost half (48 percent) of the teachers indicated that when introducing the microcomputer to students touch keyboarding is not taught.
10. When asked their opinion concerning who should teach touch keyboarding, a majority of the respondents at all levels (elementary, junior high, and senior high) indicated that the business

teacher should teach the student touch keyboarding. However, once again a significant number of the elementary teachers (19.8 percent) thought that the elementary teacher should teach touch keyboarding at the elementary level.

11. The majority of the respondents at the elementary and senior high levels indicated that the seventh grade is where touch keyboarding should be taught. The majority of the respondents at the junior high indicated it should be taught at the sixth grade.
12. Over three-fourths (82 percent) of the respondents felt that a keyboarding class should be scheduled during the regular school day.
13. The majority of the respondents at the elementary level indicated that the elementary building is where the keyboarding class should be taught. The junior high teachers indicated it should be the junior high building, and the senior high teachers indicated either the elementary or senior high building.
14. Eighty-five percent of the respondents felt that they would definitely assist with curriculum development or possibly assist with curriculum development for a keyboarding class.
15. Thirty-five percent of the respondents felt that a keyboarding specialist should be available for the

district and 43 percent indicated that possibly one should be available.

16. The majority of all the respondents indicated that the most critical problem they foresaw when implementing a keyboarding class would be scheduling the class.

General Conclusions

In conclusion the findings suggest:

1. The role of the microcomputer is expanding to include teaching concepts at every level of the public schools.
2. As supported by the review of literature, touch keyboarding continues to be an important component when using a microcomputer.
3. The instructional time on the computer is limited to the number of microcomputers available to students' use.
4. Nearly half (48 percent) of the students that have access to a microcomputer are not taught touch keyboarding.
5. The person who should teach touch keyboarding is the business teacher.
6. The keyboarding class should be taught at either the sixth or seventh grade level.

7. The keyboarding class should be scheduled during the regular school day in the building at the level in which the students are located.
8. There is no vertical or horizontal articulation taking place when touch keyboarding is taught within a school district.

Recommendations

Based on the findings of the study and the review of literature, the writer makes the following recommendations:

1. Schools at all levels should offer a keyboarding class just prior to the time they will apply the skill.
2. Students completing the course should be able to perform the following skills:

   use the `touch' techniques for operating the alpha-numeric keys, the ten-key numerical pad, and the function keys

   achieve a straight-copy speed of 30 words-per-minute with an accuracy level of not more than two errors-per-minute

   learn to proofread completed work with 100 percent accuracy

   demonstrate the ability to follow directions

   transfer the `touch' system of keyboarding skills to any keyboard to which the student has access

3. A keyboarding class should amount to a minimum of 25 hours of instruction with the maximum being 45 hours of instruction.
4. Communication should be encouraged between the teachers who use microcomputers in the classroom and the teachers who teach the keyboarding classes.
5. Guidelines should be established for the schools concerning a keyboarding curriculum for successful skill acquisition.
6. The person who should teach keyboarding is the teacher that is qualified and prepared to deliver instruction using the correct methodology and principles for psychomotor skill development. The only teacher who can perform such a task is the one certified to teach typewriting.
7. Further follow-up and study should be undertaken to identify articulation constraints and limitations that may inhibit student learning and mitigate course quality.

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APPENDICES

APPENDIX A

RANDOM NUMBER PROGRAM

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]LIST

5     REM RANDOM NUMBER GENERATOR
6     REM AND SORTING PROGRAM THAT
7     REM ELIMINATES DUPLICATES AND
8     REM ZERO.  BY CYNTHIA BEYER
10    PRINT "HOW MANY TOTAL POSSIBLE ";: INPUT W
20    PRINT "HOW MANY DO YOU WANT ";: INPUT Y
30    PRINT "YOU WANT "Y" NUMBERS"
40    PRINT "OUT OF "W" POSSIBLE"
50    PRINT "PRESS ANY KEY TO START";: GET 2
60    DIM A(Y)
65    DIM B(Y)
70    FOR I = 1 TO Y
90    LET X = INT ( RND (1) * W + 1)
100   IF X = 0 THEN 90
110   FOR J = 1 TO I
120   IF X = A(J) THEN 90
130   NEXT J
140   LET A(I) = X
150   NEXT I
160   FOR I = 1 TO Y
170   FOR J = 1 TO (Y - 1)
180   IF A(J) < = A(J + 1) THEN 220
190   LET D = A(J)
200   LET A(J) = A(J + 1)
210   LET A(J + 1) = D
220   NEXT J
230   NEXT I
240   FOR I = 1 TO Y
250   PRINT A(I)
260   NEXT I
270   END
```

```
]RUN
]PR#0
]RUN
HOW MANY TOTAL POSSIBLE ?170
HOW MANY DO YOU WANT ?35
YOU WANT 35 NUMBERS
OUT OF 170 POSSIBLE
PRESS ANY KEY TO START1
3
5
8
12
16
20
22
27
29
39
45
49
51
62
64
71
81
84
88
89
95
97
99
105
110
112
115
122
126
143
156
162
168
170
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]RUN
HOW MANY TOTAL POSSIBLE ?579
HOW MANY DO YOU WANT ?115
YOU WANT 115 NUMBERS
OUT OF 579 POSSIBLE
PRESS ANY KEY TO START1
5
6
12
13
19
23
27
33
36
37
43
48
52
68
72
74
90
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APPENDIX B

SURVEY

ARTICULATION STUDY IN KEYBOARDING IN THE MONTANA PUBLIC SCHOOL SYSTEMS

DEFINITION OF TERMS

KEYBOARDING IS THAT ACTIVITY INVOLVING THE MANIPULATION OF THE KEYS AND CONTROLS VIA THE TOUCH METHOD OF A STANDARD TYPEWRITER-LIKE KEYBOARD TO PRODUCE COPY WHICH APPEARS EITHER ON A DISPLAY SCREEN OR IS RECORDED AND STORED FOR LATER ACCESS AND USE.

TOUCH METHOD INVOLVES INPUTTING DATA INTO THE COMPUTER/TYPEWRITER WITHOUT WATCHING THE KEYBOARD.

---

1. PLEASE CHECK THE EDUCATIONAL LEVEL OF YOUR SCHOOL

   ☐ ELEMENTARY (K-6) ☐ JUNIOR HIGH (7-9) ☐ HIGH SCHOOL (10-12)

2. DO YOU HAVE MICROCOMPUTERS IN YOUR SCHOOL? IF NO, GO TO QUESTION 11.

   ☐ YES ☐ NO

3. IN WHICH GRADE ARE STUDENTS FIRST INTRODUCED TO THE MICROCOMPUTER?

   ☐ KINDERGARTEN
   ☐ 1ST GRADE
   ☐ 2ND GRADE
   ☐ 3RD GRADE
   ☐ 4TH GRADE
   ☐ 5TH GRADE
   ☐ 6TH GRADE
   ☐ 7TH GRADE
   ☐ 8TH GRADE
   ☐ 9TH GRADE
   ☐ 10TH GRADE
   ☐ 11TH GRADE
   ☐ 12TH GRADE

4. AT WHICH GRADE LEVEL (S) ARE STUDENTS USING THE MICROCOMPUTER FOR INSTRUCTIONAL PURPOSES? (PLEASE CHECK ALL THAT APPLY)

   ☐ KINDERGARTEN
   ☐ 1ST GRADE
   ☐ 2ND GRADE
   ☐ 3RD GRADE
   ☐ 4TH GRADE
   ☐ 5TH GRADE
   ☐ 6TH GRADE
   ☐ 7TH GRADE
   ☐ 8TH GRADE
   ☐ 9TH GRADE
   ☐ 10TH GRADE
   ☐ 11TH GRADE
   ☐ 12TH GRADE

5. WHAT KINDS OF DATA AND HOW MUCH DATA ARE STUDENTS INPUTTING? (INCLUDE ALL CLASSES TAUGHT)

   ☐ ONE LETTER RESPONSES
   ☐ ONE WORD RESPONSES
   ☐ SENTENCES
   ☐ PARAGRAPHS
   ☐ DOCUMENTS
   ☐ OTHER, PLEASE SEPCIFY_____

   _____

6. APPROXIMATELY WHAT PERCENT OF YOUR STUDENTS USE THE MICROCOMPUTER FOR INSTRUCTIONAL PURPOSE? (INCLUDE ALL CLASSES TAUGHT)

   ☐ 100% ☐ 90% ☐ 80% ☐ 70% ☐ 60% ☐ 50% ☐ 40% ☐ 30%

   ☐ 20% ☐ 10% OR LESS

7. ON THE AVERAGE, HOW MANY CLOCK HOURS DO STUDENTS SPEND ON THE MICROCOMPUTER PER WEEK? (INCLUDE ALL CLASSES TAUGHT)

   ☐ LESS THAN 1 HR ☐ 1 HR ☐ 2 HRS ☐ 3 HRS ☐ 4 HRS ☐ 5 HRS

   ☐ OTHER, PLEASE SPECIFY_____

8. AT WHICH LEVEL IS TOUCH KEYBOARDING BEING TAUGHT IN YOUR SCHOOL? (CHECK ALL THAT APPLY)

   ☐ ELEMENTARY LEVEL
   ☐ JUNIOR HIGH LEVEL
   ☐ SENIOR HIGH LEVEL
   ☐ NO KEYBOARDING CLASS

9. WHO TEACHES THE STUDENTS TOUCH KEYBOARDING/TYPING?

- ☐ ELEMENTARY TEACHER
- ☐ JUNIOR HIGH TEACHER
- ☐ BUSINESS TEACHER
- ☐ MATH TEACHER
- ☐ IS NOT TAUGHT
- ☐ OTHER, PLEASE SPECIFY_____

10. WHEN YOU INTRODUCE THE COMPUTER ARE STUDENTS SHOWN THE CORRECT FINGERING TECHNIQUES (TOUCH KEYBOARDING) TO USE ON THE KEYBOARD?

☐ YES ☐ NO

11. IN YOUR OPINION, WHO SHOULD BE TEACHING TOUCH KEYBOARDING/TYPING REGARDLESS OF WHICH LEVEL IT IS TAUGHT AT?

- ☐ ELEMENTARY TEACHER
- ☐ JUNIOR HIGH TEACHER
- ☐ BUSINESS TEACHER
- ☐ MATH TEACHER
- ☐ OTHER, PLEASE SPECIFY_____

12. IF KNOWING HOW TO TOUCH KEYBOARD/TYPE WOULD BE HELPFUL, AT WHAT LEVEL SHOULD STUDENTS BE TAUGHT?

- ☐ KINDERGARTEN
- ☐ 1ST GRADE
- ☐ 2ND GRADE
- ☐ 3RD GRADE
- ☐ 4TH GRADE
- ☐ 5TH GRADE
- ☐ 6TH GRADE
- ☐ 7TH GRADE
- ☐ 8TH GRADE
- ☐ 9TH GRADE
- ☐ 10TH GRADE
- ☐ 11TH GRADE
- ☐ 12TH GRADE

13. WHEN SHOULD A KEYBOARDING/TYPING CLASS BE SCHEDULED FOR STUDENTS?

- ☐ DURING REGULAR SCHOOL DAY
- ☐ BEFORE SCHOOL (A.M.)
- ☐ AFTER SCHOOL (P.M.)
- ☐ EVENINGS
- ☐ SUMMER SCHOOL
- ☐ OTHER, PLEASE SPECIFY_____

14. IN WHICH SCHOOL BUILDING (S) SHOULD THE KEYBOARDING/TYPING CLASS BE TAUGHT? (CHECK ALL THAT APPLY)

☐ ELEMENTARY ☐ JUNIOR HIGH ☐ SENIOR HIGH

15. WOULD YOU, YOUR ADMINISTRATOR, OR ANOTHER TEACHER IN YOUR BUILDING BE WILLING TO ASSIST WITH CURRICULUM DEVELOPMENT AND PLANNING FOR A COURSE IN ELEMENTARY KEYBOARDING/TYPING?

☐ YES ☐ NO ☐ MAYBE

16. SHOULD THERE BE A KEYBOARDING/TYPING SPECIALIST THAT IS AVAILABLE FOR THE WHOLE DISTRICT?

☐ YES ☐ NO ☐ MAYBE

17. IF YOU ARE PLANNING ON INTRODUCING A KEYBOARDING/TYPING CLASS IN THE FUTURE WHAT PROBLEMS DO YOU ANTICIPATE? (CHECK ALL THAT APPLY)

- ☐ STAFF PROBLEMS
- ☐ SITE (FACILITY) PROBLEMS
- ☐ FACULTY PROBLEMS
- ☐ SCHEDULING PROBLEMS
- ☐ EQUIPMENT PROBLEMS
- ☐ OTHER, PLEASE SPECIFY_____

_____

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APPENDIX C

SURVEY LETTER

May 3, 1984

Dear Educator:

Your School is one of 150 elementary and secondary schools in Montana which has been selected to participate in this study on keyboarding. Will you please take a few minutes of yor time to furnish information about the curriculum within your district?

This survey is being conducted under the supervision of Dr. Floyd Frost, College of Business, Montana State University. The purpose of the study is to examine keyboarding classes in Montana's public schools to determine whether articulation is possible among classes and grade levels and whether some degree of standardization of content is present or desirable.

All of the information collected will be handled with strict confidence. There will be no association of individual names or individual schools with any of the information reported.

Would you please complete the enclosed questionnaire and return it in the envelope provided, by May 20, 1984. Thank you for your cooperation.

Sincerely,

Cynthia Beyer
Graduate Student
Department of Business
Education and Office Systems

Dr. Floyd Frost,
Assistant Professor
Department of Business
Education and Office Systems

Enclosure