

**THE EFFECTS OF INFORMAL COMPUTER KEYBOARDING  
ON STRAIGHT COPY SPEED AND ACCURACY**

by

**Janice B. Burke**

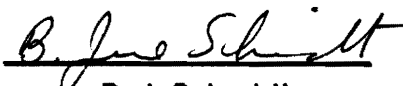
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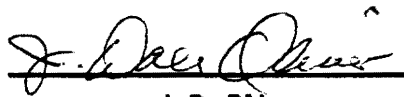
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by

**Janice B. Burke**

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**Business Education**

**(Abstract)**

This was a study of middle school students and informal computer usage before entering a formal keyboarding course. The purposes of the study were (a) to determine the kinds of informal keyboarding experiences middle school students were exposed to before receiving formal training, (b) to determine if there was a difference in straight copy speed and accuracy among students who had three levels of previous informal keyboarding experience, and (c) to determine if there was a difference in straight copy speed and accuracy among students who had home access to personal computers.

The students involved in the study were seventh and eighth graders at Blacksburg Middle School and Christiansburg Middle School enrolled in first semester Keyboarding during the 1987-88 school year. These students answered questionnaires that related to their personal experiences with computers and were placed in one of three groups depending upon the amount of time spent using a keyboard before entering a formal keyboarding course. Each student took timed writings and were given a score for speed and accuracy. A one-way analysis of variance was performed to determine if there was a difference between groups on

straight copy speed and accuracy scores. The analysis of the data indicated that there was no significant difference in speed or accuracy scores between those students who had very little or no previous informal experience and those students who had six months previous informal experience. Those students who had a year or more of previous informal experience had better speed scores than students who had less than a year of previous informal experience.

The data indicated there was no significant difference among any of the groups in accuracy scores. The data also indicated there was a significant difference in speed scores of those students who had access to a home computer and those students who did not.

From the study it was concluded that: (a) students who have previous informal keyboarding experiences of one year or more have significantly higher keyboarding straight copy speed than those students who had less than one year of informal experiences and (b) previous informal keyboarding experience does not influence straight copy accuracy.

## **ACKNOWLEDGMENTS**

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## Chapter 1

### Introduction

During the past five years much discussion has appeared in the literature concerning the advantages and disadvantages of informal computer keyboarding prior to formal training. One of the biggest limitations of computer use is efficiently keyboarding alphabetic and numeric data at the machine. One might expect that computer users who have not had structured keyboarding instruction would have slow typing speed and thus spend many unnecessary hours entering data. Swanson (1988) indicated that students must develop both speed and accuracy at the keyboard if they are to become effective computer terminal users. According to Rigby (1983) many children who have not had formal keyboarding instruction have developed poor techniques and poor habits. Rigby further stated there is growing concern that such habits and techniques may later hinder student performance in a typing or keyboarding class.

#### Need for the Study

Based on studies by Gades (1986), Rhodes (1986), and Stewart and Jones (1983), development of poor keyboarding habits seems to be growing among young people and will continue to become more serious as students have more and earlier access to computers. But the actual effect of informal computer keyboarding on later performance in a formal setting is

not known for young students such as those of middle school age. Such a study is clearly needed to determine the effect of prior informal computer keyboarding on keyboarding speed and accuracy in a formal class.

### Statement of the Problem

Many students develop bad habits during informal use of the computer keyboard, then enter a formal keyboarding course (Erthol, 1985; Rhodes, 1985; Rigby, 1983). This investigation seeks to describe and quantify how previous use of a keyboard influences keyboarding speed and accuracy performance among middle school students.

The study attempts to answer the following research questions:

1. What kinds of informal keyboarding experiences have middle school students been exposed to before receiving formal training?
2. Is there a difference in straight copy speed among students who have had three levels of previous informal keyboarding experience?
3. Is there a difference in straight copy accuracy among students who have had three levels of previous informal keyboarding experience?
4. Is there a difference in straight copy speed and accuracy among students who have and have not had home access to personal computers?

### Importance of the Problem

A course is offered in a number of middle and secondary schools in which the initial keyboarding skill is taught at the computer rather than a typewriter.

The replacement of typewriters with computers has introduced some new problems and concerns into the classroom (Rigby, 1983). According to Prigge (1988), many students have access to microcomputers. In a national study by Robinson (1985), it was reported that 62.4% of all elementary schools are using computers for some elements of instruction. Because of the availability of computers, students are taking computer courses, playing computer games, writing programs, entering data, and using the computer extensively for personal use. This often starts at a very early age when there is a computer in the home that can be used freely by the young person. According to Rigby (1983) a large percentage of students are using the keyboard without having any or very little formal training and therefore are developing poor habits and techniques. Use of incorrect fingers in striking keys, incorrect stroking and spacing, constant keyboard watching, and poor position at the keyboard are some of the poor techniques and habits students have acquired. As found through personal teaching experiences and cited by Rigby (1983) and Stewart and Jones (1983), students who have acquired poor habits are difficult to retrain because they feel their method is the best, easiest, and most comfortable way for them to type when working on a keyboard. Simply put, they are in the habit of using the keyboard in a certain manner and using their own techniques.

### Delimitation of the Study

Participants in this study were delimited to the students enrolled in Keyboarding courses taught at Blacksburg Middle School and Christiansburg

Middle School, Montgomery County, Virginia during the first semester of the 1987-88 school year.

### Definition of Terms

**Ballistic stroking** - a keystroke in which the finger is thrown at the key as opposed to one in which the finger presses the key.

**Formal training** - completion of a typing or keyboarding course which was taught in school by a certified business instructor.

**GWAM (gross words a minute)** - a way in which typing speed is measured.

Five strokes are counted as one word. The total number of words is divided by the number of minutes in the timing to obtain the score.

**Habit** - a learned behavior obtained by frequent use of a keyboard.

**Hunt and peck** - the process of typing whereby the typist looks at the keyboard to find the key to be struck and then strikes that key with any finger (usually one of the two index fingers).

**Informal keyboarding experiences** - operating a keyboard before receiving formal training.

**Keyboarding** - the formal one semester typing course taken by seventh and eighth grade students using microcomputers. Emphasis is placed upon proper techniques, touch method of typing, formatting, and knowledge of handling disks and use of the microcomputer.

**Major errors** - errors that occur due to incorrect format and spacing in a timed writing. See Appendix A.

**Minor errors** - general typographical errors made by a typist in a timed writing. See Appendix A.

**Sight typing** - striking keys with visual guidance.

**Technique** - the method used in typing; this includes body posture, arm and hand position, and keystroking.

**Timed writing** - a test used to measure the speed and accuracy of a typist.

**Touch typing** - striking keys without visual guidance.

**WPE (words per error)** - a method used for scoring errors that occur in timed writings. This method divides the number of errors into the number of 5-stroke words typed on the timing by the student.

## Chapter 2

### Review of Literature

Due to the growth of microcomputers and their extensive usage, the educational community has a new responsibility in teaching keyboarding skills to microcomputer users. Rhodes (1985) stated, "the lack of entry speed greatly reduces the machine's phenomenal capabilities" (p. 2). A study conducted by Behymer and Echternacht (1987) offered conclusive evidence that students at pre-high school levels are also capable of mastering the keyboard. Questions still remain as to the best age or grade level to introduce keyboarding to students. Schmidt (1985) suggested that the best time for students to learn keyboarding is in middle or junior high school because this is when students are likely use the skill on a regular basis and thus retain that skill.

#### Keyboarding Problems at the Elementary Level

Questions still remain about who should be teaching typing and keyboarding, especially at the elementary level. Schmidt (1985) noted that because business teachers know the psychological principles of keyboarding skill development, they should be responsible for teaching the course at all levels. However, observation shows that business teachers are not teaching the keyboarding skills to students, rather students are being allowed to use computers and keyboards with no or very little training. Rauch and Yanke (1982) were concerned about the number of first graders who were "hunting and pecking" their way through

microcomputer programs and consequently learning very little about correct technique. They conducted a survey in six elementary schools to determine what grade levels were using microcomputers, who was doing the instructing and what amount of time students were spending on the computers. The results of the survey showed: (a) every school in the survey had microcomputers, and most had several; (b) students were permitted anywhere from 15 to 75 minutes a week on the computer which equates to a maximum of 45 hours a year, multiplied by nine years--that is about 405 hours of "hunting and pecking" before reaching the ninth grade; (c) kindergarten through third grade students were inputting numbers and one word responses; (d) fourth through sixth grade students were inputting program instructions and complete sentences; (e) those individuals doing the instructing were the elementary school teachers, librarians and resource teachers.

Stewart and Jones (1983) also noted that keyboarding has expanded to elementary school students who will have inadequate habits of operation by the time they reach junior high typing or keyboarding classes. The authors further stated that any typing instructor who had experienced the challenge of retraining a typist under such conditions will readily admit that the task is difficult if not impossible. Erthal (1985) reported that a survey conducted by Delta Pi Epsilon in the St. Louis area in 1984 revealed elementary students were learning simple language programming and "playing games." Students generally ran the software and responded to prompts. There was very little to no instruction available at the elementary level. Students who do not learn to touch type are left to "hunt

and peck" and consequently develop high frustration levels of their own style of typing which is a deterrent to keyboarding skill development.

Behymer and Echtenacht (1987) performed a comprehensive survey and analysis on the use of microcomputers in schools which indicated that elementary children are using computers for instruction in increasing numbers. In 1984-85 microcomputers were used for instruction in 82.2% of the elementary schools in the United States. Again, the question of keyboarding by the touch method rather than the "hunt and peck" method becomes a concern for elementary teachers, parents, and business teachers. The number of strokes made by an elementary student may be unimpressive, but it is still sufficient to begin the development of habits which will need to be unlearned and relearned at a later time in life. Rigby (1983) also noted that even though inputting is minimal at the elementary level, there is concern that poor keyboarding habits are being developed that would be very difficult to correct at a later date. A keyboarding course at any level requires development of a motor skill and correct techniques (Rigby, 1983).

### Concerns of Business Educators

Business educators and elementary teachers are aware and concerned about the poor training elementary school students are receiving on keyboards and the amount of time being spent on computers before any formal keyboarding instruction is acquired (Rauch & Yanke, 1982). These concerns are justified according to West (1969) who stated "skills are made up of habits, but habits stand in the way of skill as well as being the



stuff of which skills are composed. Habits are stereotyped behaviors and can be either good or bad" (p. 32). West (1983) discussed the stages of learning a skill: the first being cognitive whereby there is verbal guidance by the instructor and later the student silently vocalizes the letter, locates the key, selects the correct finger to use and finally moves the finger in the correct direction of the key. West further stated that the retention of motor skills is a well-known phenomenon. The process of keyboarding and typing require movements and once movements are learned, they are more resistant to forgetting. Keystroking tends to be vastly overlearned and overlearning of anything is known to be a powerful safeguard against forgetting. Dewey (1944) agreed that manipulative acts are guided by thought and that a direct relationship exists between the quality of thought and the quality of manipulative performance. Watson (1980) noted that skills are acquired through a three stage process: (a) early cognitive, (b) lengthy practice and (c) final autonomous stage. Fischman (1982) found that continued use or practice is related to improved retention. The concept of repetitive practice is known as overlearning; therefore, a skill could be overlearned incorrectly and retained as such.

### Technique and Keyboard Learning

When school age children first begin using a computer without any correct keyboarding instruction, they will naturally enter responses or data in the easiest way. The child has no concept of correct technique, correct position, or what fingers should be used to strike specific keys.

This is the very beginning of poor learning and the development of poor habits. According to West (1983), "learning is a relatively permanent change in behavior as a result of experience" (p.17). In order for a student to correctly learn how to use a keyboard, West discusses two very important areas: technique learning and keyboard learning. If a student has not taken a formal typing class, most likely correct techniques or keyboard motions were not learned. Technique learning and keyboard learning are the foundation upon which a learner builds upon to become a good typist.

### Technique Learning

According to West (1983), "technique refers to the manner of carrying out the movements that make up the responses of the task, including the features of body posture that provide support for the finer movements at the machine; and keystroking technique refers to the way in which the keystroking motions are made" (p. 58). The crucial technique requirements are sufficient distance from the keyboard, palms off the frame of the machine and natural finger movements. West continues that to ensure the speed of movement that will make the keystroking motion ballistic is for the student to watch the correct finger strike the correct key. In order for correct learning to take place, the student must maintain homerow orientation, decide on the correct finger to use and its direction of movement. There are only 26 key locations for students to find, which is not too difficult for most people to accomplish; however, there are several

hundred different motions involved which are not so easily learned. If correct motions are not learned from the beginning, students have a difficult and frustrating experience in a keyboarding course.

### Keyboard Learning

During the keyboard learning stages the student focuses on speed, not accuracy, and sight typing with assistance in making the transition to touch typing. A watchful eye of the keyboarding instructor is needed to assist students with proper movement and ensure a quiet environment that will enable students to use intense silent vocalization of each letter as the keys are learned (West, 1983).

### Teaching Methods

Nichols (1987) questioned whether or not teaching strategies should change when teaching with microcomputers rather than typewriters. Nichols further noted that the basic teaching methods practiced in teaching typing are still applicable to microcomputers. These methods include technique, ballistic stroking, and development of touch typing. It was noted that technique is just as necessary today and it was when students were using manual typewriters and that most students work best with correct body position at the keyboard. Ballistic stroking increased in its importance with the introduction of microcomputers due to the new sensitivity of the keyboard. If ballistic stroking is not practiced, students will find a string of characters on the screen. Nichols indicated that if a

student continues to have the eyes constantly on the keys, either that student has not had enough positive feedback in typing character strings, or that student has developed a bad habit.

Previous learning often affects present learning, in either a positive or a negative way. Poor techniques interfere with the growth of typewriter speed and also decreases the potential for accuracy. Furthermore, poor technique patterns are not easily unlearned; they increase the tendency of students to make errors and dramatically reduce the speed that might otherwise have been achieved by students. As students learn the keyboard, initial emphasis on proper keystroking technique will substantially reduce errors made by students once they have developed control of technique (Robinson, 1979). Gades (1986) was also concerned, like many other business teachers, with the amount of time students of all ages were spending on a computer before having a typing course. Gades conducted a study to determine the effects of computer use on keyboarding techniques and skill. The population was 103 beginning keyboarding students at postsecondary institutions. A technique evaluation instrument was developed, a pretest administered, and the final test for the study was administered at the end of the semester. Gades found that working with a computer prior to taking a keyboarding course has no adverse effect on keyboarding technique of postsecondary students in a beginning keyboarding course nor does working on a keyboard prior to taking a keyboarding course have an effect on the speed and accuracy development of postsecondary students who take a keyboarding course. Gades recommended that this study be replicated with a population of

elementary students who have worked on computers and then take keyboarding in junior high school and also with junior high computer students who take keyboarding in high school. In his study, Gades did not take into account the length of time students in groups actually worked on computers prior to the keyboarding class.

Chiri (1987) and Swanson (1988) both noted that good techniques are the foundation of good typewriting and are mandatory for maximum typing proficiency which include speed and accuracy.

### Summary of the Literature

The review of literature indicated that a large number of students in early elementary school grades through high school are using microcomputers without first having any formal keyboarding instruction. These students may have had some experience keyboarding on microcomputers or typewriters at home, at school in lower grades, or have had no keyboarding experience at all. Several writers believe that these students are developing poor keyboarding habits and habits which become very difficult if not impossible to break.

References cited in this chapter suggest that students lack self-discipline and will type around weak fingers or type in the manner that is easiest for them, not best. Rhodes (1986) stated that students who lack effective keyboarding skill develop frustrations from their inability to interact with computer programs, they fall behind in class assignments, and they use more than their fair share of computer time.

On the other hand, one researcher (Gades, 1986) found that prior keyboarding experience was related to significantly higher speed among post-secondary typing students than students without keyboarding experience.

## Chapter 3

### Methodology

The purpose of this study was to determine if prior use of a keyboard had any effect on skill development of students who were enrolled in a one semester keyboarding course.

#### Population and Sample

The population in the study consisted of all seventh and eighth grade students enrolled at Blacksburg Middle School and Christiansburg Middle School during the 1987-88 school year. The study sample was seventh and eighth grade students enrolled in a one semester course of Keyboarding. The study sample was heterogeneous and contained students with varying learning levels; therefore, this school would be representative of other middle schools. According to guidance personnel in the sample schools, 85% of the total student body completed one semester of keyboarding prior to going on to high school. The sample consisted of the 158 students enrolled in the course Keyboarding taught first semester of the 1987-88 school year at Blacksburg and Christiansburg Middle Schools.

#### Instrumentation

A questionnaire was devised by the researcher and given to a panel of experts in business education to review for clarity, readability and structure. Experts made suggestions and the researcher made refinements and administered the questionnaire to a pilot-test group.

Final refinement was made to the questionnaire before administering it to students in the present study.

Recommendations from West (1969) were used in scoring the timed writings. Each student received a score for speed which was calculated as gross words a minute (GWAM). The five-minute scales that were provided with the timed writings were used for scoring GWAM. Each student also received a score for accuracy on both timed writings. The Words Per Error (WPE) method was used in determining the error score for each test of each student. To calculate WPE, the instructor divided the number of errors into the number of gross words a minute typed. An error classification sheet, Appendix A, was used for tallying the minor and major errors of each student (King, 1983). A weight of one was assigned for minor errors that occurred in the timed writings and a weight of two was assigned for major errors that occurred in the timings.

### Data Collection

Eight keyboarding classes were used in the study and students were assigned to three different groups according to keyboard usage time prior to taking the one semester course. To insure standardization between test schools, oral as well as written instructions were given to the test teachers on administering the questionnaire and the timed writings. The day prior to testing students completed the researcher-prepared questionnaire, Appendix B, on which they indicated how much time they spent using a keyboard and in what capacity the keyboard was used. Questionnaires were presented to all keyboarding classes and instructions



were given by the teachers on how to complete the form. Each completed questionnaire was examined by the teacher for possible incorrect responses. The student was contacted to verify a response if any questionnaire was in error.

One day was required to administer the two timed writing tests which would measure straight copy speed and accuracy. Two different five-minute timed writings were administered to the students. To maximize reliability both timings were used to compute speed and accuracy scores. The average speed score and accuracy score on the two timed writings were used in the statistical analysis. Content validity of the tests was established by using recommended procedures from West (1969). The difficulty level in timed writings is important and should be held constant for all straight copy testing. Difficulty level is determined by syllable intensity and stroke intensity (West, 1969). To ensure reliability and validity, both testing instruments used in the study had a syllable intensity of 1.4 and a stroke intensity of 5.3 which are at the average level of difficulty for timed writings.

On the day the timed writings were administered, all students were given the same instructions and the same two timed writings. Students were instructed to complete the timed writings in a specified paragraph format. While error correction was possible by using the delete key, students were instructed not to correct errors made and strive for gross words a minute scores. Students were also notified that there would be a score for both speed and accuracy on the tests. The instructor started and stopped all typing by use of a timed writing clock which had previously

been calibrated for accuracy in keeping time. The instructor made certain there were no interruptions during testing and that students were kept on task during the testing period. At the end of the testing period, students were instructed to print both timed writings and turn them in for scoring by the instructor.

Students were placed in one of three groups based upon previous keyboarding experience. Group 1 consisted of those students who had used a keyboard informally with no formal instruction from zero time to 5 months prior to entering the present keyboarding course. Group 2 consisted of those students who had used a keyboard informally with no formal instruction for approximately six months to a year before entering the present keyboarding course. Group 3 consisted of those students who had used a keyboard informally with no previous formal instruction for more than a year before entering the present keyboarding course. Students who had some formal keyboarding instruction before entering the present keyboarding course were eliminated from the study.

### Statistical Analysis

After eliminating data for those students who had formal instruction and losing some data due to absences, there were 151 students whose scores were used in the study. The data collected were analyzed using a one-way analysis of variance to determine if there were any significant differences among the three groups in the study in terms of straight copy speed and accuracy. An alpha level of .05 was set for determining significance between the groups.

Data were analyzed using the statistical program entitled "Statistics With Finesse" (Bolding, 1984).

## Chapter 4

### Findings and Analysis of Data

Data were collected from 151 seventh and eighth grade students who were enrolled in four Keyboarding classes at Blacksburg Middle School and four Keyboarding classes at Christiansburg Middle School. The study was conducted to determine if previous informal use of a keyboard influences keyboarding skill development.

The first question to be answered in the study was, "What kinds of informal keyboarding experiences are students being exposed to before receiving formal training"? A description of the data showing the different types of experiences and amount of time exposed to the keyboard by students is presented in Table 1.

The second question to be answered in the study was, "Is there a difference in straight copy speed among students who have had three levels of previous informal keyboarding experience"? A one-way ANOVA was used to determine if there was any significant difference between groups. The data indicates a significant difference in the mean speed scores among the groups as indicated in Table 2. To determine where the difference between the groups was, Scheffe's matrix of probabilities was performed. Table 3 indicates that the difference in speed lies between Group 1 (students with no or little previous experience) and Group 3 (students with a year or more previous experience) and also between Group 2 (students with six months previous experience) and Group 3. Table 3

clearly shows that those students with a year or more of previous informal keyboarding experience had higher speed scores than students who had less than a year of informal keyboarding experience. According to Hinkle, Jurs and Wiersma (1979), Scheffe's method should be used when the group sample sizes are unequal.

Table 1

*Descriptive information on students and experiences using keyboards before entering a formal keyboarding course*

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<u>Characteristics</u>	<u>N</u>
<b>Sex</b>	
Males	74
Females	77
<b>Grade Level</b>	
7th	65
8th	86
<b>Experience on Keyboard</b>	
None to a few months	58
6 months to 1 year	31
One year or more	62
<b>Home Computers</b>	
Yes	103
No	48

---

Note. Information based on 151 responses

The third question to be answered in the study was, "Is there a difference in straight copy accuracy among students who have had three levels of previous informal keyboarding experience"? A one-way ANOVA was first used to determine if there was any significant difference among the groups. The data indicate there was no significant difference in the mean accuracy speed scores among the three groups as shown in Table 4.

The fourth research question to be answered was, "Is there a difference in straight copy speed and accuracy among students who have and have not had home access to personal computers"?

A one-way ANOVA was used to first determine if there was any difference in straight copy speed scores between Group A (those students with computers in their home) and Group B (those students who did not have a computer in the home). As Table 5 indicates, there is a significant difference in the mean speed scores of the two groups. A one-way ANOVA was also used to determine if there was any difference in straight copy accuracy scores between Group A and Group B. As Table 6 indicates, there was no significant difference between the mean accuracy scores of the two groups.

Table 2

*One-way analysis of variance results for straight copy speed*

Group	N	Mean	Std. Dev.
No experience	58	22.034	6.396
6 months experience	31	21.306	6.142
1 year experience	62	25.169	5.978

Source	SS	DF	Var. Est.
Among	430.28	2	215.14
Within	5643.74	148	38.13
Total	6074.02	150	

F-Ratio	5.64
Significance	0.0047



Table 3

*Scheffe's multiple comparisons on  
straight copy speed between groups*

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Groups	1	2	3
1	1.000	0.869	0.023
2	0.869	1.000	0.019
3	0.023	0.019	1.000

---

Table 4

*One-way analysis of variance results  
for straight copy accuracy (words per error)*

Group	N	Mean Words Per Error	Std. Dev.
No experience	58	7.733	6.154
6 months experience	31	6.468	5.636
1 year experience	62	5.855	5.718

Source	SS	DF	Var. Est.
Among	107.82	2	53.91
Within	5106.27	148	34.50
Total	5214.09		

F-Ratio	1.56
Significance	0.2113

Table 5

*One-way analysis of variance results for straight copy speed between students with computers in the home and students without computers in the home*

Group	N	Mean	Std. Dev.
Home computer	103	24.010	6.233
No home computer	48	21.281	6.323

Source	SS	DF	Var. Est.
Among	243.01	1	243.01
Within	5802.44	149	39.21
Total	6045.45	150	

F-Ratio	6.20
Significance	0.0133

Table 6

*One-way analysis of variance results for straight copy accuracy between students with computers in the home and students without computers in the home*

Group	N	Mean	Std. Dev.
Home computer	103	6.398	5.823
No home computer	48	7.385	6.056

Source	SS	DF	Var. Est.
Among	31.92	1	31.92
Within	5182.30	149	34.78
Total	5214.22	150	

F-Ratio	0.91
Significance	0.3570

## Chapter 5

### Conclusions and Recommendations

This study was conducted to determine if there were any differences in straight copy speed and accuracy among students who have had three levels of previous informal keyboarding experience. The study was also conducted to determine if there were any differences in straight copy speed and accuracy among students who had computers in the home and those who did not.

#### Conclusions

Based on the results of this investigation and for the study population, the following conclusions were made:

1. Students who have previous informal keyboarding experiences of one year or more have significantly higher keyboarding speed than those students who have had less than one year of previous informal keyboarding experiences.
2. Previous informal keyboarding experience does not influence straight copy accuracy in completion of a keyboarding course.
3. Having a computer in the home appears to enhance the development of speed for students enrolled in a keyboarding course. Having a computer in the home does not appear to enhance the development of straight copy accuracy for students enrolled in a keyboarding course.

### Recommendations

1. It is recommended that this study be replicated using a random sample of students with similar learning abilities and grouped according to levels of learning.
2. It is recommended that this study be replicated using a random sample of students and grouped according to similar personal characteristics such as school attendance and socio-economic status.
3. It is recommended that this study be replicated with a population of high school students who have taken computer classes and then entered a keyboarding course.
4. It is recommended that this study be replicated at the end of a year of keyboarding instruction as opposed to a semester of instruction since students would be at a higher level of skill acquisition. Most middle school students would be at the associative level of skill acquisition whereas high school students would be at the autonomous level of skill.
5. It is recommended that this study be replicated using production work as a means of measuring speed and accuracy.

### Discussion

The findings of this study indicate that a year or more of informal keyboarding experiences had a positive effect on middle school student's speed performance in a formal keyboarding class. This group of students achieved significantly higher speed scores than did students who used the keyboard informally for six months or less. There has been much concern that students who used the keyboard informally before having a

keyboarding course developed poor techniques and poor habits. If bad habits and techniques were developed by these students, possibly these habits were overcome and unlearned in the formal keyboarding class. Students who used the keyboard informally for a year or more also were more familiar with the keyboard, had a better awareness of key locations, and possibly had more confidence at the keyboard than did those students who had little or no informal experience before entering the class.

Based on the findings of this study, previous informal keyboarding experience has no effect on accuracy for middle school students who complete a formal keyboarding course. Because middle school students who have completed a one semester keyboarding course have not yet reached the autonomous level of skill, are not yet typing at a high rate of speed, and are still at the stage of using a lot of sight typing, accuracy scores would likely be similar for the majority of students. Most students who are learning are concerned about making errors and will correct mistakes when they are aware of making them even when instructed not to do so.

The data revealed that those students who had access to a computer at home achieved significantly higher speed scores than did the students who did not have a computer at home. Fifty-five percent of these students were also in the original Group 3 of the study (students with one year or more of previous informal keyboarding experience). Because 55% of the students were in the group with one year or more of previous informal keyboarding experience, this may have contributed to Group 3 achieving significantly higher mean speed scores than either Group 1 or Group 2.

The findings of this study were similar to the findings of a study conducted by Gades (1986) in which he found a significant difference in speed scores of post-secondary students who had previous keyboarding experiences but no difference in accuracy scores among those students with previous keyboarding and no keyboarding experience.



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**APPENDIX A**  
**ERROR CLASSIFICATION SHEET FOR**  
**MINOR AND MAJOR ERRORS**

## **Appendix A**

### **Error Classification Sheet for Minor and Major Errors**

#### **MINOR ERRORS:**

- Extra space within words
- Extra space between words
- Omission of space between words
- One space after period at end of sentence
- No spacing after period in abbreviations or initials
- Two spaces after comma or semicolon
- Failure to capitalize when necessary
- Capitalizing when not necessary
- Incorrect letter, word or symbol
- Transposed letters or words
- Omitted punctuation

**\*Minor errors had a point value of one for each error made.**

#### **MAJOR ERRORS:**

- Word, phrase, or line omitted
- Word, phrase, or line repeated
- Incorrect paragraph format
- Not double-spacing paragraphs
- Not indenting new paragraphs
- Caps lock key down

**\*Major errors had a point value of two for each error made.**

**APPENDIX B**  
**STUDENT QUESTIONNAIRE ON**  
**KEYBOARDING EXPERIENCES**

Appendix B

**STUDENT QUESTIONNAIRE ON KEYBOARDING EXPERIENCES**

Please answer the following questions by putting a circle around the answer that most nearly answers the question as it pertains to your experiences on typewriters or microcomputers.

1. Before taking the course, Keyboarding, have you used a microcomputer or a typewriter?

**YES                      NO**

2. If the answer to the above question is YES, where have you used such a keyboard?

**Home**

**School (Not a typing class)**

**School (Formal typing or keyboarding class)**

**Other (Please list)\_\_\_\_\_**

3. What is the approximate time you used a keyboard BEFORE entering this class?

**one year or more**

**6 months to a year**

**only a few months**

4. How regularly did you use the keyboard before taking this class?

**Daily**

**Twice a Week**

**Once a Week**

5. Have you ever had piano lessons?    **Yes    No**

This is my **FIRST, SECOND, THIRD, FOURTH** year of taking piano lessons. (Circle your answer).

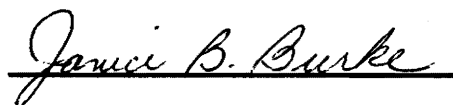
6. **NAME**\_\_\_\_\_ **AGE**\_\_\_\_\_

**SEX**\_\_\_\_\_ **GRADE**\_\_\_\_\_

## VITA

Janice B. Burke was born in Suffern, Rockland County, New York on December 28, 1947. She attended public schools in New York until moving to Radford, Virginia where she completed her public school education. In 1968 she earned an Associate Medical Secretarial Degree from National Business College in Roanoke, Virginia. After holding several secretarial positions, she later attended Radford University, received the honor of "Outstanding Business Student" in 1979, and in 1980 earned a B.A. degree in Business Education with emphasis in accounting and data processing. She then held an accounting position with a firm in Wooster, Ohio for four years. In 1985 she began teaching Keyboarding and Business Explorations at Blacksburg Middle School. In 1986 she began the master of science in education degree at Virginia Polytechnic and State University in the field of business education.

She has a husband, Stanley R. Burke, and two children, Amy L. Burke and James A. Burke.

A handwritten signature in cursive script that reads "Janice B. Burke". The signature is written in dark ink and is positioned above a solid horizontal line.

Janice B. Burke