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Keyboarding Camp!: Identifying the Effects of 4th-Grader Characteristics on Keyboarding Proficiency

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Abstract

This study evaluated the effectiveness of using the Almena Method keyboarding program to teach keyboarding to 4th grade students. Student characteristics were evaluated to measure their effect upon keyboarding success. Seventeen Midwestern fourth grade students of a mixed sex, ethnic, and racial orientation were involved. Students participated in daily 30-minute keyboarding lessons for four weeks. Students tended to increase their keyboarding speed by 33%. Age affected success inversely. Younger students improved more than older students. Music Experience had a positive effect. Larger-handed students improved the most. Gender and athletic background didn't have any effect upon keyboarding improvement. The specific student characteristics can make a significant difference in student success.

1. Introduction

Keyboarding is an essential 21st century skill. It has evolved from a transcription secretarial typing skill to the primary means for writers to enter their original ideas into the dynamic world of word processing, emails, and tweets. This skill allows them to mold their writings into finished products rather than handwriting version after version on paper. The burgeoning growth of 1-to-1 schools where each student has a personal laptop to use throughout the school day makes skillful keyboarding even more important.

Over the past decade, keyboarding has assumed a standard position in grade 3–4 curriculum. It is generally thought that this is the optimal time to teach keyboarding because the students' hands are large enough to accommodate the standard-sized keyboard and they have an attention span that will handle the 20–30 minutes needed for a typical lesson (McLean, 1994; Russell, 1994) Another factor in successful keyboarding programs is that student language use is sufficiently sophisticated to make digital writing productive (Zeitz, 2008)

Although many authors have made commentary about the effects of student characteristics and demographics, these researchers have been unable to find any research studies that measure these variables. This study researched the effects of a collection of variables on students' ability to improve their keyboarding skills using a commercial software program over a period of four weeks. The effects of gender, age, hand size, music, and athletic experience on keyboarding capability were measured and analyzed. Understanding the effects of these variables on keyboarding speed can be valuable because it will provide insight into a teacher's expectations of student keyboarding success.

The four-week instructional program was based on the Almena Method (King, 2000). This method is different than most typical keyboarding programs. Teaching the homerow before moving to the other alphabet letters is typical. The Almena Method, however, uses a series of mnemonic jingles for each finger's keys. These jingles consist of three-word phrases that allowed the students to learn the keys' locations. The phrase, "Quiet Aunt Zelda," was used to remember the left little finger keys; Q, A, and Z. The phrase, "Over Longer Periods," was used for the right ring finger keys; O, L, and P. Each student worked at his/her own rate. Since the program had an auditory component, each student was provided with a personal set of ear buds. When students completed a lesson and met the activity's mastery level, they were able to progress to the following level. This continued until all of the students completed the series of lessons. At the end of the four-week lesson, the students repeated the three-minute timed test to measure their keyboarding speed and accuracy.

The overall goals of this camp/research study were to see if a four-week keyboarding course had an impact on the students' abilities to increase their word-per-minute (WPM) rate and if different student characteristics such as hand size and athletic/musical involvement played a role in that rate.

2. Review

Since the inception of the Iowa Core Curriculum (ICC), the 21st Century Skills component has emphasized the importance of technology integration in the Iowa classroom. As stated in the Iowa Core Curriculum, “Technology is changing the way we think about and do our work. It has changed our relationships with information and given us access to resources, economic and professional, that were unimaginable just a few years ago” (Iowa Core Curriculum, n.d.).

Keyboarding is an integral part of using technology in the classroom. Masterful keyboarding skills will allow a student to effortlessly input ideas and concentrate on thoughts instead of key location. While most educators agree that teaching students the lifelong skill of keyboarding is important, the questions that typically remain include: What age should we start teaching students keyboard instruction? How much time should be committed to teaching keyboarding skills? Can it fit within the regular classroom curriculum? How can a teacher get the whole classroom to learn keyboarding skills when there are only a couple of computers in the classroom? These are important questions to consider as teachers evaluate what is best for their students.

Educators generally agree that keyboarding instruction should begin in the third or fourth grade. Students’ dexterity and eye-hand coordination have developed to an appropriate level for effective keyboarding at that age (Prigge & Braathen, 1993). Other aspects that affect students’ success in keyboarding include hand size, attention span, and need for written communication. These factors also seem to be adequately developed to support keyboarding at this level (Boyce & Whitman, 1987; McLean, 1994; Russell, 1994). Researchers have found that as children improve their keyboarding skills, there are dramatic improvements in other academic areas as well. Young keyboardists improve in their ability to compose stories (Goldberg, Russell, & Cook, 2003; Owsten & Wideman, 1997; Bangert-Drowns, 1993) and are more strongly motivated to write (Wetzel, 1985). Students also demonstrate improved language arts skills and are prouder of their work because of its professional appearance (Nieman, 1996).

3. Purpose

The researchers for this project set out to explore keyboarding and the many aspects that affect a student’s success in learning to touch type (keyboard). Due to the minimal amount of time in a school day that can be spent learning how to keyboard, identifying the student conditions that affect a student’s success can make the learning experience more efficient.

The research questions for this project were:

- How much can a 4th grader improve his/her keyboarding speed (WPM) over a 4-week period using the *Almena Method* keyboarding program?
- Is there a correlation between student characteristics (gender, age, hand size, athletic involvement, musical engagement, and Internet activity) and a student’s success in keyboarding?

4. Method

4.1 Setting

The research was conducted in a fourth grade classroom in a Mid-western K-12 school.

4.2 Participants

The student population included 24 fourth grade students who were from diverse multicultural and socio-economic backgrounds. Seventeen of the 24 students were included in the data analysis. There were 11 girls and 6 boys who ranged from ages 9 to 11.

4.3 Procedures

Most nine- and ten-year-old students would look forward to any opportunity to go to camp. The instructors capitalized on this theme by introducing a 4-week keyboarding camp during the school year where students would spend an hour each school day learning and practicing keyboarding.

Prior to starting the program, students received a brief introduction to the planned keyboarding program. Information was sent to their parents about the keyboarding camp and accompanying research. The students were invited to participate in the research project. They could choose to participate by having parent(s) sign the permission letter that was then returned to the school’s principal. Their responses were not shared with the instructors until after the keyboarding activities were complete. Since the *Keyboarding Camp* was part of the regular curriculum, all of the students would receive the keyboarding instruction, but only those students whose parents gave permission for them to be part of the research pool had their data included at the end of the project. All 24 students in the class returned their permission forms signed to participate, but due to absences and some data complications, only 17 students’ data could be included.

Students had a limited amount of keyboarding instruction prior to the start of this project. When students were asked to tell the co-investigators about what they knew about keyboarding, many of the students had referred to their typing skills as “chicken pecking” since they would hunt and peck keys individually. They all wanted to improve their skills as keyboarders.

On the first day of *Keyboarding Camp*, the students were introduced to the “homerow.” This was not an official part of the keyboarding instruction software program, but it provided a context for discussing appropriate technique including body, arm, and hand position; key stroking; and ergonomics. As students began the process of learning their homerow keys, the co-investigators used a projection screen to show the students the correct fingering on the keyboard by placing their fingers on the homerow.

Before beginning the instructional software, the students were given a three-minute timed test. The material was from a page in *Sarah, Plain and Tall* (MacLachlan, 2004) which was a novel they had just finished reading in literature class. This source was selected because it was at their reading level. This pretest was designed to measure their keyboarding speeds and accuracy at the outset of this project so that improvement could be measured in comparison with post-test at the end of the 4-week lesson. Another page from *Sarah, Plain and Tall* was used for the post-test as well.

4.4 Criterion Measures

This action research tested the effectiveness of using the Almena Method with fourth graders to increase their keyboarding efficiency and effectiveness. The research also provided an opportunity to measure the effects of various student conditions (independent variables) on keyboarding speed and ability to improve keyboarding speed over the four-week instructional period (keyboarding speed improvement.)

4.4.1 Student Characteristics

The Independent variables measured included:

- *Gender*
- *Age*
- *Handsize*: Students’ hand sizes ranged from 5.0 to 6.75 inches in length from wrist to the tip of the middle finger. This variable was classified into three groups for analysis.
- *Music Experience*: Students were questioned about their musical experience. If they had taken lessons for playing a musical instrument, they were identified as having Musical Experience.
- *Athletic Experience*: Students were questioned about their athletic experience. If they had been involved in an organized athletic activity in the past year they were identified as having Athletic Experience.

4.4.2 Keyboarding Speed

Students completed three-minute timed tests to measure their initial and final keyboarding speeds. Words were defined as groups of five characters. *Words Per Minute* (WPM) was defined as the number of groups of five

characters keyed in one minute. The WPM for a student on a three-minute timed test was calculated by dividing the total number of words by three.

Accuracy was deemed to be important for this research as well as the WPM. One way to adjust the WPM for accuracy is to subtract the *Errors Per Minute* (EPM) from the Words Per Minute to yield the *Adjusted Words Per Minute* (A-WPM). The A-WPM on the three-minute test was determined by first calculating the one-minute WPM as well as determining the one-minute EPM. The one-minute EPM was subtracted from the one-minute WPM to yield the one-minute A-WPM.

Students’ ability to improve keyboarding speed and accuracy over the four-week instructional period (keyboarding speed improvement) was measured as the difference between the 3-minute pretest A-WPM and the three-minute posttest A-WPM. This independent variable was identified as *Diff*. Due to the variance between students’ skill in keyboarding, the percentage of change (*Diff %*) was also determined by dividing the Diff by the pretest A-WPM.

In summary, the dependent variables included Pretest A-WPM, Posttest A-WPM, Difference between the pre and post A-WPM (Diff), and the percentage of difference based upon the Pretest A-WPM.

5. Results

The results for this study begin with the overall success of the 4th grade students in improving their keyboarding skills using the Almena Method for four weeks. These results are then narrowed based upon the dependent variables measured as described in the previous section. Each of the dependent variables will be evaluated in relation to the independent variables: gender, age, musical experience, athletic experience and hand size. Due to the small number of students (n=17) the data was analyzed using descriptive statistics rather than looking for correlations or causal relationships.

5.1 Overall Performance Success

The 17 students engaged in the keyboarding program for four weeks. At the end of the four weeks, they completed a posttest. As shown in Figure 1, on average students increased their keyboarding fluency an average of 2.6 words per minute. Considering that the mean for the Pre A-WPM was 7.2, this indicates a 36% increase in keyboarding fluency (Figure 1).

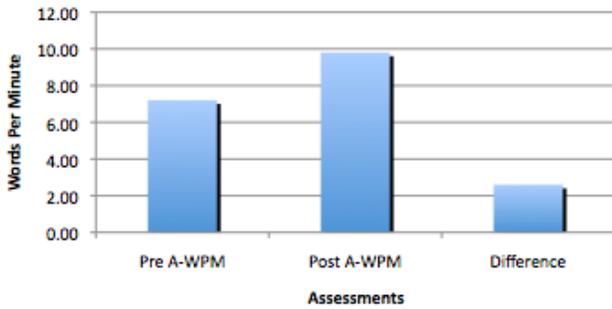


Figure 1. Overall Performance Success

Having identified that it is possible to improve students' A-WPM by 36% using the Almerna Method over 4 weeks, it will be useful to identify which subgroups of students are most likely to achieve in improving keyboarding skills. Those students in groups that tend not to achieve using this keyboarding instruction may need scaffolded instruction or longer instructional time to enable them to improve at levels equal to their classmates.

5.2 Gender

The first and most common distinction between students is by gender. Can girls learn to improve their keyboarding better than boys? When the results were disaggregated by gender, there wasn't much of a difference found between girls (+38%, n=11) and boys (+32%, n=6) (Figure 2).

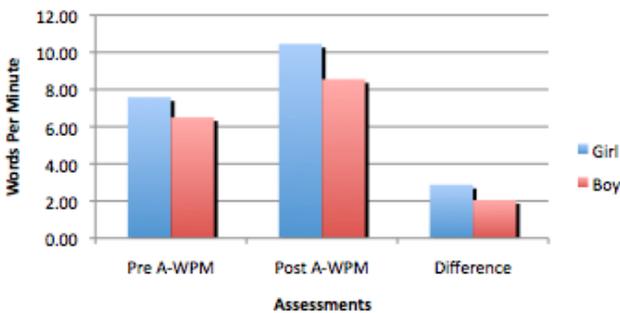


Figure 2. Performance by Gender

5.3 Age

Another rather obvious variable is age. The research talks about students needing to be old enough to keyboard effectively, but rarely show any research that identifies which age is most ideal for keyboarding. It is considered that as students grow older, their coordination and hand size will improve their ability to keyboard.

Students' ages in this class ranged from 9 to 11 years old. The youngest students tended to be the most effective keyboarders. As seen in the figure, the nine-year-olds pretested with an Adjusted WPM of 9 WPM (Figure 3). After 4 weeks of keyboarding instruction, they increased

their speed by 35%. The ten-year-olds began with a Pre A-WPM much below the 9-year-olds but they achieved a greater amount of improvement. There were only two 11-year-olds so their data doesn't really hold any relative statistical significance.

It appears that with this population of students that student success in keyboarding is contrary to the assumed reality of the literature.

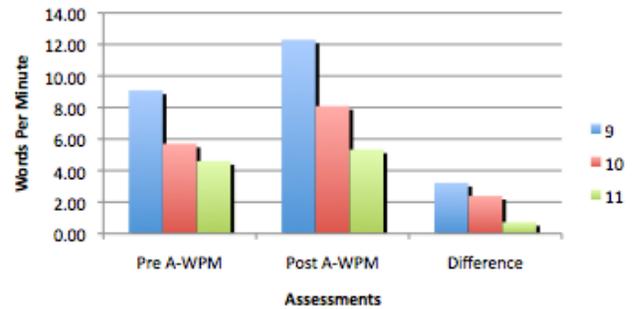


Figure 3. Performance by Age

5.4 Music Experience

The connection between piano playing and keyboarding has been discussed in the literature (Soechting, Gordon, & Engel, 1966). This study did not limit the connection to piano, but asked students if they had ANY form of formal music lessons. Almost 2/3 of the students had some form of music playing background. Those with music background had a higher mean for the pretest and then increased their speed over 57%. Those without formal music background (n=6) began at a lower Pre A-WPM and actually experienced a mean decrease in improvement over the 4 weeks (-0.03%) (Figure 4). While the researchers found nothing in the keyboarding literature that would explain this disparity, musician's success in keyboarding (Pre A-WPM) and the amount of improvement may have something to do with a history of learning manual dexterity through instruction.

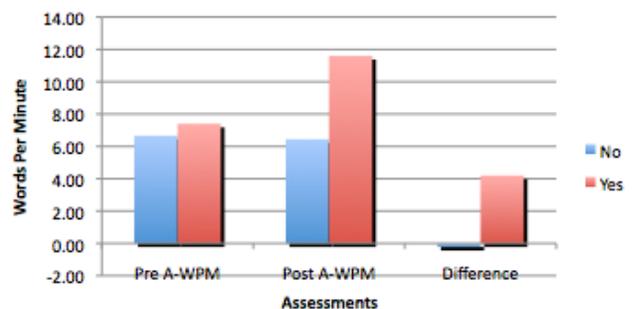


Figure 4. Performance by Music Experience

5.5 Hand Size

The literature is replete with references to teaching keyboarding in the upper elementary grades so that the students' hands would be large enough to keyboard effectively. There has been no research, however, that specifically connects hand size with keyboarding efficiency.

The students in this 4th grade class had hand sizes ranging from 5.0 to 6.75 inches. Hands were measured from the wrist to the tip of the middle finger. These sizes were classified into three categories to facilitate analysis: Small=5–5.50"; Medium=5.75–6.00"; Large=6.25–6.75"

Interestingly enough, the students with smaller hands demonstrated a greater skill in keyboarding in the pretest than the other groups, but they had the smallest level of improvement over the four weeks. The large-handed students began at the lowest Pre A-WPM, but increased their adjusted keyboarding speed by over 50% during the keyboarding program. (Table 1) (Figure 5).

Hand Size	n	Pre A-WPM	Post A-WPM	Difference	% Diff
Large	4	6.00	9.33	3.33	56%
Medium	9	6.80	9.18	2.37	35%
Small	4	9.25	11.58	2.33	25%

Table 1. Performance by Hand Size



Figure 5. Performance by Hand Size

5.6 Athletic Background

If hand size makes a difference, then athletic ability might have an effect upon students' abilities to keyboard. Connecting the physical training of keyboarding with athletic ability makes sense, but such experimentation does not appear in the research literature. The results of the present research demonstrate a substantial difference between those who participated and the student who didn't. All of the students except one, however, had participated in athletics programs. This does not provide enough non-athletes to make valid comparisons. (Table 2) (Figure 6).

Athletics	n	Pre A-WPM	Post A-WPM	Difference	% Diff
Yes	16	7.54	10.20	2.66	35%
No	1	1.66	3.00	1.34	81%

Table 2. Performance by Athletic Background

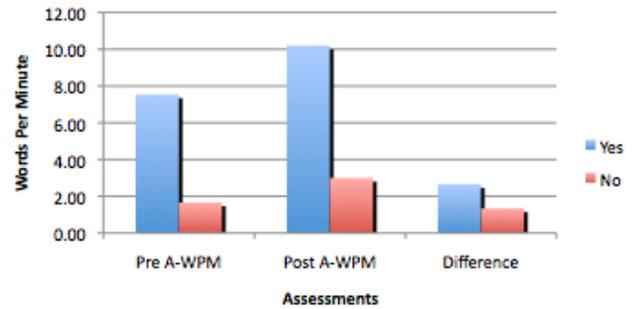


Figure 6. Performance by Athletic Background

6. Discussion

In answering the research questions posed at the beginning of this study, it appears that keyboarding instruction can be beneficial (increase by about 1/3 in A-WPM) and there appear to be student characteristics that affect students' keyboarding skill and ability to improve over a 4-week instructional unit using the Almena Method.

6.1 Overall Keyboarding Improvement

Students demonstrated that they could increase their A-WPM from 7.2 A-WPM to 9.8 WPM that is a 36% improvement. This is the first known experimental research done using the Almena Method and it appears to be able to make a difference in students' keyboarding skills.

6.2 The Effect of Student Characteristics on Keyboarding Speed and Improvement

The results of this study have demonstrated that some student conditions have a definite effect upon student keyboarding success while others do not.

- *Gender* did not appear to affect student success in keyboarding.
- *Age* appeared to have an inverse effect on keyboarding success with 9-year-olds being more successful than their counterparts in overall keyboarding success and improvement.
- *Music Experience* had a dramatic effect on student keyboarding success. It was especially evident in the amount of improvement musical students had over the four weeks of instruction.
- *Hand size* was a factor in that the large-handed students improved the greatest amount over the instruction period.

- *Athletic Background* positively affected them in their Pre A-WPM and Post A-WPM, but their improvement was similar to the overall keyboarding improvement for the whole class. Actually, there was only one student who didn't have organized athletics in his/her background, so no comparisons could be made.

6.3 The Effect of Time Spent Practicing on Students' Level of Improvement

Unfortunately, due to technical problems with the Almena Method keyboarding software, it was not possible to monitor how much time students spent using the software outside of class. This meant that there was no way to look for connections between time spent practicing and levels of improvement.

6.4 The Significance/Impact on the Classroom

The findings of this study will have an impact on the writing instruction for these students. Since fourth grade students don't appear to have any physical limitations to hinder their keyboarding success, keyboarding should become a curricular staple in the fourth grade classroom. This lifelong skill will ultimately give them the opportunity to express more in the written language since ultimately they will be able to type faster than they can handwrite.

The challenge of keyboarding within the regular classroom is twofold. First, locating a computer lab that is open during our open blocks of instructional time can be somewhat challenging in a K-12 facility. Second, while keyboarding is one of the important 21st century skills for elementary aged students, it will be critical to set aside a specific amount of time each day/week to practice this skill. This cannot be a four-week mini unit with the hopes that students will do it on their own time away from school. While that would be idealistic, some students did not have access to computers at home. Keyboarding is a skill that should be used on a daily basis when doing regular schoolwork.

Identifying the student characteristics that support more effective keyboarding will be useful because it will assist in identifying which students may need more time and assistance in perfecting their keyboarding skills. This assistance can be given in the form of more keyboarding time and perhaps personal coaching.

7. Recommendations and Conclusion

The students did show improvement in their keyboarding skills from the start of the project. Since this study was implemented, teaching keyboarding at this school has become more prevalent at the elementary level. Students are given approximately 15-20 minutes each day to work directly on their keyboarding skills. The students have enjoyed learning the fundamentals of keyboarding and have

shown progress in their speed and their desire to type stories and other assignments on the computer. Since they are typing more WPM, they are finding it faster to type than to write. Therefore, keyboarding is an effective and efficient way for them to create written documents for assignments.

Still, shared computers do not provide the facilities necessary to enable students to use technology as an integral tool in their learning. It is a goal for this school to become a one-to-one school by giving each student possession of a computer on a daily basis. Such access will make computers important personal productivity tools. These tools will prepare these students for their future workplaces. Such preparation requires keyboarding on a more frequent basis throughout the school year rather than a short four-week typing camp.

Keyboarding will be an integral skill in the learning process. Students were successful in increasing their keyboarding effectiveness while using the Almena Method, but further study needs to be done on alternate keyboarding programs such as *Ultra Key* and *Type to Learn 4*.

The first time this project was implemented was toward the end of the academic year. Future studies should begin early in the school year so that student academic success can be measured as a function of keyboarding proficiency.

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