

Price Laboratory School, University of Northern Iowa

Keyboarding Camp!

Keyboarding Skills for Fourth Grade Students

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INTRODUCTION

Keyboarding is an essential 21st Century Skill in the fourth grade. Our project investigated the conditions that were most favorable for learning keyboarding. Students participated in a 4-week series of keyboarding lessons. The effects of gender, age, hand size, music and athletic experience on keyboarding capability were measured and analyzed.

PROBLEMS OR QUESTIONS ADDRESSED

Since the inception of the Iowa Core Curriculum (ICC), the 21st Century Skills have 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.)

While the emphasis of technology literacy is about the integration of technology into the classroom, a student interacts with computers primarily through keyboarding. Successful keyboarding skills are the required to enable students to work effectively and efficiently in technology-enriched environments.

Mosely, Schlossberg, & Varas (1999) have stated that “Research has shown that the development of typing skills in young children is linked with improved language arts skills, gains in spelling, vocabulary, and written composition.” Researchers have found that as children improve their keyboarding skills, they improve in their ability to compose (Goldberg, Russell, & Cook, 2003; Owsten and Wideman, 1997; Bangert-Drowns, 1993) and are more strongly motivated to write. (Wetzel, 1985) They also demonstrate improved language arts skills and are prouder of their work because of its professional appearance. (Nieman, 1996)

Keyboarding is defined as “learning the correct manipulation of the keys on the computer/typewriter keyboard and using that keyboard for basic data input “ (Jackson & Berg, 1986, p. 8). While most educators agree that teaching students the lifelong skill of keyboarding, the questions that typically remain include: What age should we start teaching students keyboard instruction? How much time has to be committed to teaching keyboarding skills? Can it fit within the regular classroom curriculum? How can I get my whole classroom to learn keyboarding skills when I only have a couple of computers in my 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 and Braathen, 1993) Other aspects that affect students’ success include hand size, attention span and need for written communication. These also seem to be adequately developed to support keyboarding at this level. (Boyce & Whitman, 1987; McLean, 1994; Russell, 1994).

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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 condition that affect a student’s success can make the learning experience more efficient.

The research questions for this project were:

1. How much can a 4th grader improve his/her keyboarding speed (WPM) over a 4-week period using the *Almena Keyboarding Program*?
2. 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?

DESCRIPTION OF THE RESEARCH PROCESS

Setting

The research was conducted in a fourth grade classroom in a midwestern K-12 school. The student population included 24 fourth grade students who were from diverse multicultural and socio-economic backgrounds.

Preliminary Activities

Most students who are nine and ten years old 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. When the instructors delivered *Keyboarding Camp* t-shirts to the students, the motivation level about learning how to keyboarding sky-rocketed! The students were excited to get started on this new four-week learning adventure.

Prior to starting the program, students received a brief introduction to the 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 were going to receive the keyboarding instruction, but those who returned permission forms had their data analyzed 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.

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 set of ear buds that were specifically assigned to them. 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 3-minute timed test to measure their keyboarding speed and accuracy.

DATA ANALYSIS AND FINDINGS

This action research tested the effectiveness of using the *Almena Typing 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 4-week instructional period (keyboarding speed improvement.)

Student Conditions

The Independent Variables measured included:

Gender - Boy or girl.

Age - Students' ages ranged from 9 - 11 years old.

Hand Size - 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 lesson 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, they were identified as having Athletic Experience.

Keyboarding Speed

Students completed 3-minute timed tests to measure their initial and final keyboarding speeds. Words were defined as groups of 5 characters. Words Per Minute (WPM) was defined as the number of groups of 5 characters keyed in 1 minute. The WPM for a student on a 3-minute timed test was calculated by dividing the total number of words by 3.

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 4-week instructional period (keyboarding speed improvement) was measured as the difference between the 3-minute pre-test A-WPM and the 3-minute post-test 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 pre-test A-WPM.

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

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.

Overall Success

The 17 students engaged in the keyboarding program for four weeks. At the end of the four weeks, they completed a post-test. 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.

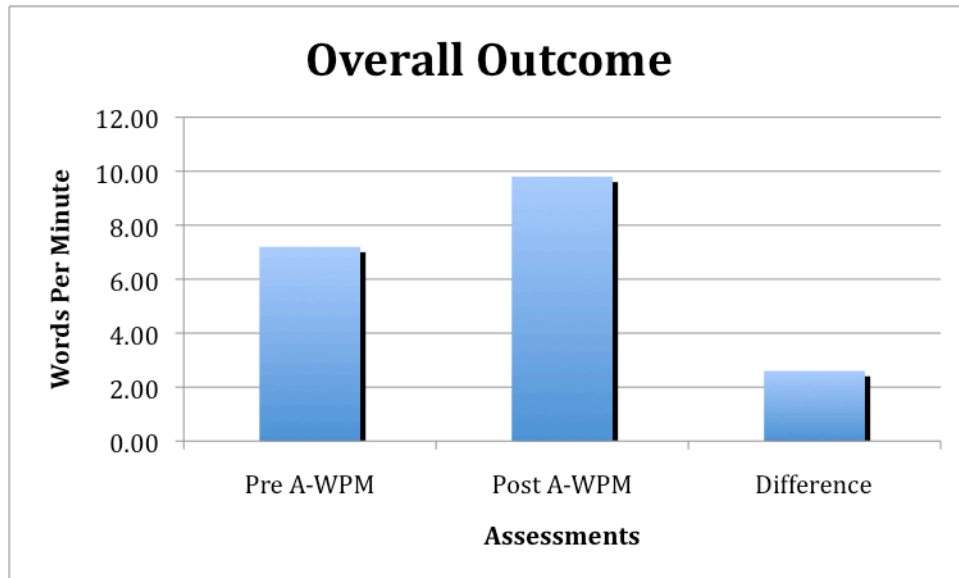


Figure 1: Overall A-WPM Scores

Having identified that it is possible to improve students' A-WPM by 36% using the Almena 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.

Gender

The first and most common distinction between students is by gender. Can girls learn to improve their keyboarding better than boys? Figure 2 shows that 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).

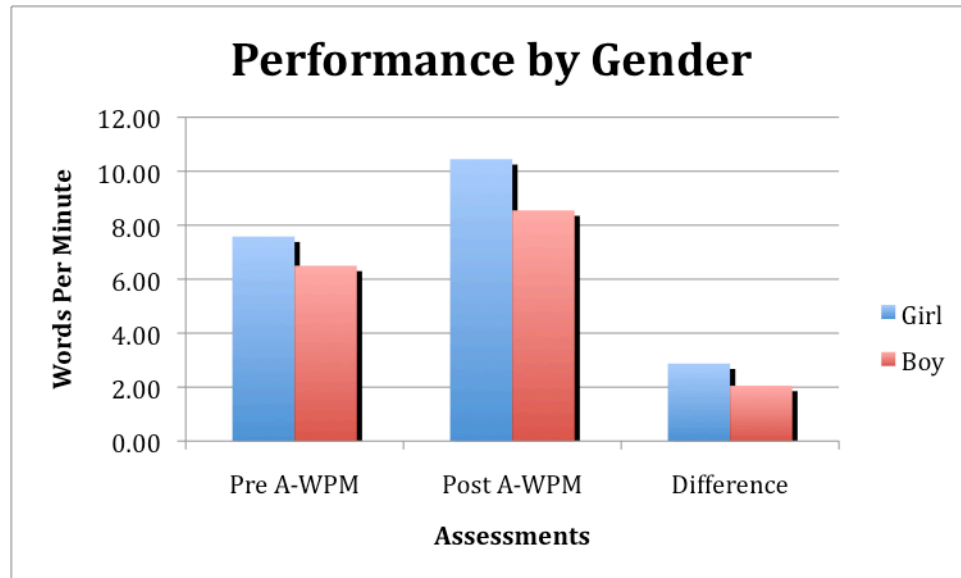


Figure 2: Performance by Gender (A-WPM)

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 – 11 years old. The youngest students tended to be the most effective keyboarders. As seen in Figure 3, the nine-year-olds pretested with an Adjusted WPM of 9 WPM. 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.

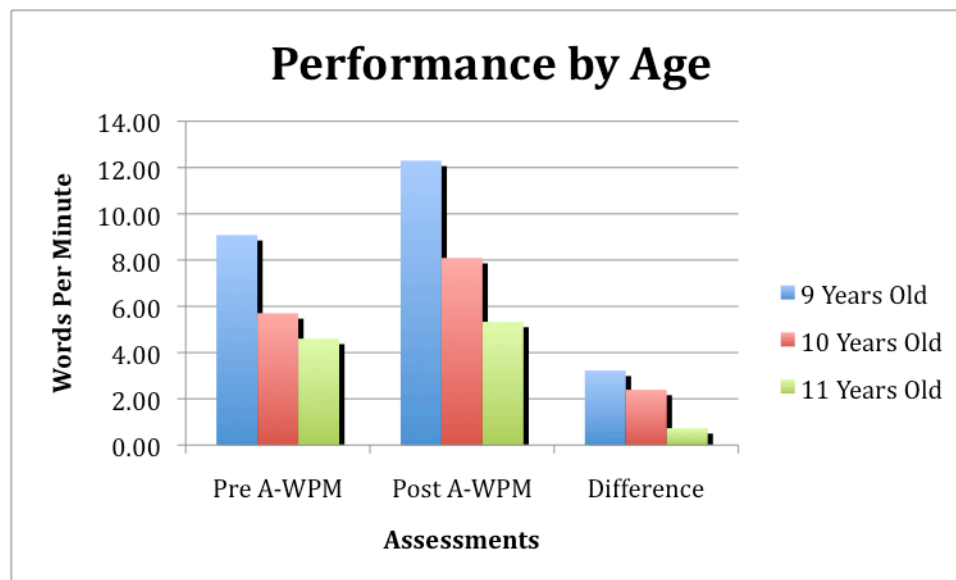


Figure 3: Performance by Age (A-WPM)

Music Experience

The connection between piano playing and keyboarding has been discussed in the literature (Soechting, J., Gordon, A, & Engel, K.,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. As seen in Figure 4, those students 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%). While the researcher found nothing in the keyboarding literature that would explain this disparity, musician's success in keyboarding (Pre A-WPM) and amount of improvement may have something to do with a history of learning manual dexterity through instruction.

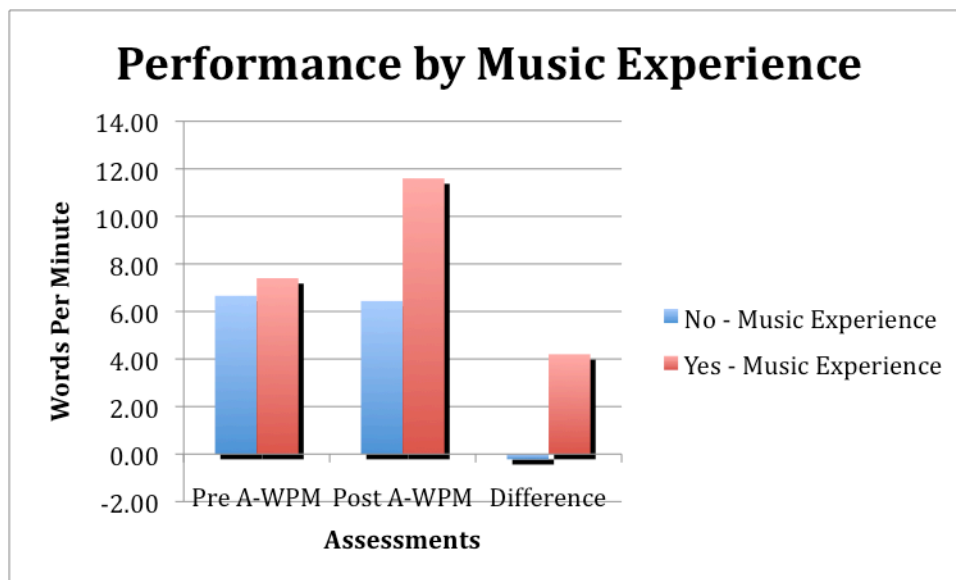


Figure 4: Performance by Music Experience (A-WPM)

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. However, there has been no research 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 pre-test 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 was included along with Figure 5 to demonstrate the vast difference between Diff % for each of the hand sizes.

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 (A-WPM)

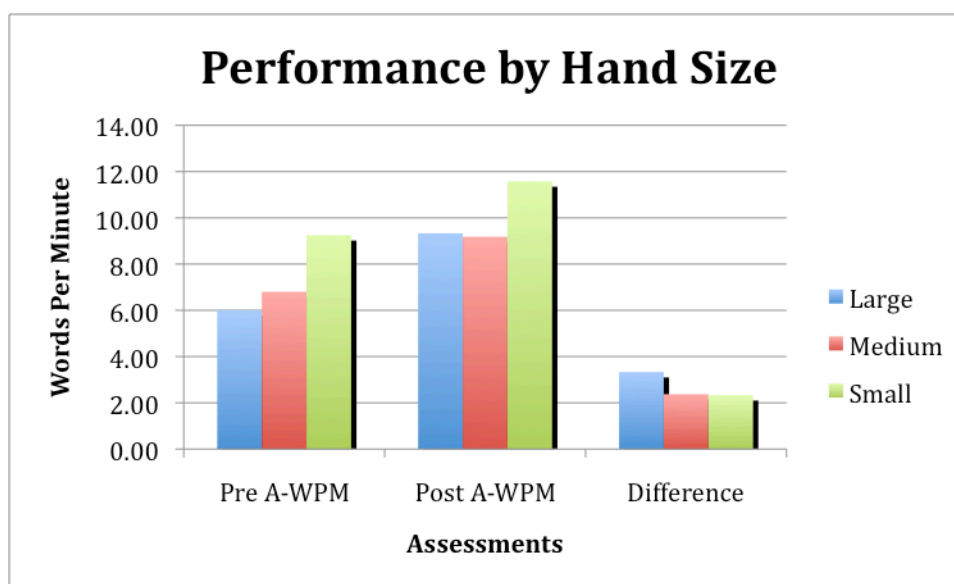


Figure 5: Performance by Hand Size (A-WPM)

Athletic Background

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

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 (A-WPM)

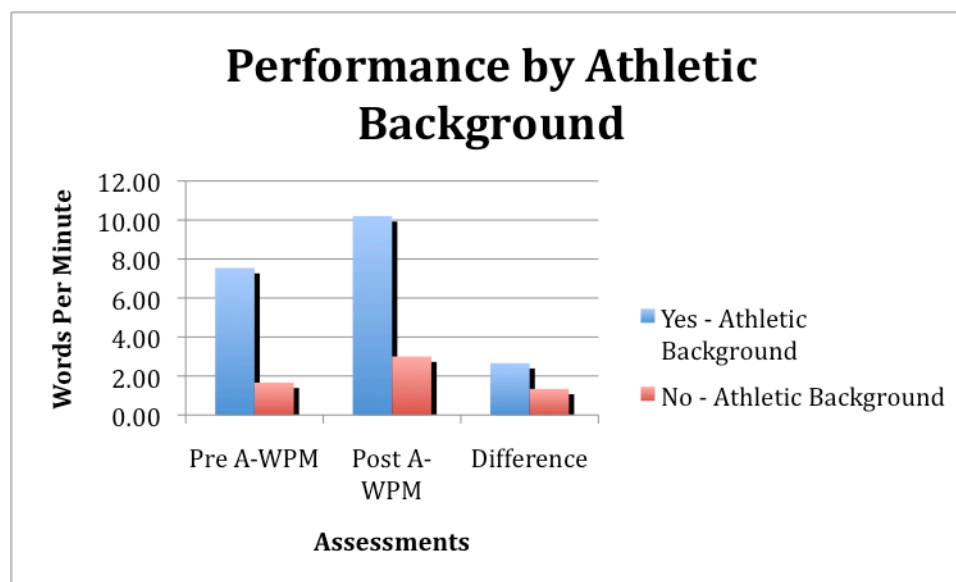


Figure 7: Performance by Athletic Background (A-WPM)

FINDINGS

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 conditions that affect students' keyboarding skill and ability to improve over a 4-week instructional unit using the Almena Method.

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.

The Effect of Student Conditions 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. Those students with organized *Athletics* in their background did well 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.

Effects 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.

Significance/Impact on Your 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 can 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 at 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 find a set aside 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, there were some students who did not have access to computer sat 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.

GRADE LEVEL

The students who were involved in this action research project were in a fourth grade classroom at midwestern K-12 public school.

NEXT STEPS

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 prevelant 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 creating 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 having each student have possession of a computer on a daily basis. Such access will make computers important personal productivity tools. These are the tools that 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 period 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 towards the end of the academic year. Future studies should begin at early in the school year so that student academic success can be measured as a function of keyboarding proficiency.

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