



Learning to keyboard: does the use of keyboard covers make a difference?

Author: Lois Nichols, University of Maryland, USA

Abstract

Third and fourth grade students (N=84) were randomly assigned by class to either covered or uncovered keyboards. All students received 30 minutes of keyboarding instruction for four weeks. Analysis revealed significant differences in speed but not in accuracy between the two main treatment groups.

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The debate concerning whether or not students should learn to keyboard in their early years is over. The verdict is in, all students need to learn the skill of keyboarding, and they need to learn it in elementary school (Erthal, 1998, Klopping, 1993). Keyboarding has even been referred to as a 'basic lifelong skill' (Olinzock, 1998). Students as young as preschool spend time on computers and thus use the keyboard, and children in grade school spend an ever-increasing amount of time on computers (Hoggatt, 1998). Many of these students are word processing or entering relevant data into a database or a spreadsheet. Children need to learn the proper 'touch' fingering technique when using the keyboard to prevent bad habits, such as the 'hunt and peck' approach, from developing (McClurg & Kercher, 1989; Prigge & Braathen, 1993; Waner, Behymer, & McCrary, 1992). In order to maximize students' time while on the computer, all students need to know proper keyboarding technique so they can keyboard with proficient speed and accuracy.

There is not enough time in the day to accomplish all that is required of our teachers. They have national, state, and local educational standards that they must help our students attain. Teachers must monitor not only the cognitive well-being of their students, but also the students' social and emotional well-being. Schools are having extreme difficulty finding the time for everything that must be covered (Olinzock, 1998). If keyboarding is an important skill to be taught to our students, then it is imperative to find the best and most efficient method for teaching this skill.

Who should teach keyboarding and what teaching method or approach is best? How much time should be set aside for students to learn to keyboard? Should students have keyboarding class once a week or should they have classes daily? Should we cover the keyboard to prevent students from looking at their fingers? Should we follow a tutorial or a teacher-intensive instructional approach? These are all important questions to be answered when planning to teach keyboarding.

Keyboarding is best taught by a teacher who knows how to keyboard her- or himself, and who is knowledgeable in proper keyboarding methods and techniques (Nieman, 1996; Olinzock, 1998). There are two main approaches used in the teaching of keyboarding (Nichols, 1995). One method is teacher intensive. With this method, the teacher is the primary conveyor of instruction. The teacher, in this case, has developed his or her own keyboarding unit based on research of the best keyboarding techniques and practices, or is using an appropriate unit developed by others. Another approach is to use a software tutorial program that is pedagogically sound (Ober, 1993; Olinzock, 1998). These tutorial programs guide students through lessons and the program monitors each student's progress. Students are presented with a visual image of a keyboard and shown proper fingering techniques throughout the lessons. The program makes automatic adjustments depending on how the individual student is doing. If a student is having trouble, more practice is automatically given. Students are shown their progress in the lesson as well as their speed in words-per-minute and percent accuracy. Positive reinforcement is given to students who meet their goals. Teachers can easily individualize lessons to meet the needs of each of their students.

Allocating the time for students to learn to keyboard is difficult. Exactly how much time is enough time for elementary students to become proficient in keyboarding? Elementary children learning to keyboard for the first time need a minimum of 4 to 6 weeks of 20-30 minute daily instruction (10-12 hours of instruction) (Sormunen, 1991). In this time frame students should be able to learn the keyboard locations of the letters, punctuation marks and quotation marks, but not, most likely, the top row of numbers and all of the symbols.

Another concern of those teaching 'touch' keyboarding in the elementary school is how to prevent students from looking at their fingers while keyboarding. Students are told to keep their eyes on the monitor, but many new learners are quick to let their eyes wander to their fingers. Proper keyboarding technique requires that the learner's eyes be fixed on the screen, which shows the results of her/his keying (Nieman, 1996; Schade, 1999). It is generally believed that keyboarders who look at their fingers while keyboarding will eventually be slower and not as accurate as their counterparts who do not look at their fingers.

To prevent students from looking at their fingers while keyboarding, educators have developed various methods to encourage students to keep their eyes where they should be. One approach is to continually walk around the room reminding students to keep their eyes on the screen. Another approach is to cover the keys in some way so that students are unable to read the letters on the keys. This method has been achieved by either painting the letters on every key or purchasing specially made opaque, plastic keyboard 'skins' that slip easily over the keyboards, preventing students from seeing the letters on the keys, but providing 'touch-sensitive' home row indicators.

Frequently, the computer lab is shared by many grades in an elementary school. If the key covers are on when a class of kindergarten, first, or second graders come in to use the lab, then these students cannot locate the keys as they move through whatever software program they are using, or the teachers must take the effort to remove and collect the keyboard covers. There is also a cost involved in purchasing the covers and replenishing the supply when they are lost or damaged. The question is then asked; do the keyboard covers make a difference? Although the above costs of covers are clear, the benefits to learning have not been quantified or even qualitatively demonstrated.

One company that makes keyboard 'skins' touts their product as being 'invaluable for any class or individual that is serious about improving typing speed and accuracy' (Pro-tecT Computer Products, 2002). Another company states that 'students can now learn to touch type faster and easier with the 'typing mask' (Viziflex Seels, Inc., 1998). Finally, Sunburst Communications, a major producer of keyboarding software, proclaims that their SpeedSkin will 'improve speed, accuracy and touch-typing ...' Are all these claims true? The objective of this study is to answer this basic question.

The researcher's a priori hypothesis is that the claims are true. Specifically, it is predicted that students who learn to touch keyboard with covers over their keys will keyboard faster and with greater accuracy than students who learn to keyboard without covers. It is also predicted that the 4th-grade students should have greater keyboarding speed and

accuracy than the 3rd-graders, since the 4th-grade students are older and have had some keyboarding experience. From the results of previous research (Nichols, 1995), it is believed that females will type with greater overall speed than males, however, with respect to percent accuracy, no difference will be found between the sexes.

METHOD

Participants

The participants in this study were third and fourth grade students who attended a private elementary school on the east coast. The achievement level of the school population was average to above average. There were a total of 84 students in the study. Forty-eight students were in the fourth grade (18 boys and 30 girls), and 36 students were in the third grade (22 boys and 14 girls). The population was fairly diverse with 64% white, 24% blacks, and 11% other. Most of the students were from middle to upper middle class neighborhoods.

Materials

The study took place in the school's computer lab. In the lab were 20, networked iMacs. The software program, Type to Learn (Sunburst Communications, 2002), was used to teach keyboarding to all the research participants. The preferences in the program had been set to record each student's goals for speed and percent accuracy. The speed goal for 3rd-graders was set to 15 words-per-minute, and for 4th-graders it was set for 20 words-per-minute. Percent accuracy was set to 80% for both grades. Modifications were made to accompany students' needs as they progressed through their lessons.

Ten opaque, plastic, keyboard covers, often referred to as 'skins,' were used on half of the computers in the lab. These 'skins' mold to the keyboard, and they fit snugly over each key. There were indicators on certain homerow keys, so the students could easily locate the homerow.

Procedure

Students in both the third and fourth grades were randomly assigned within their classes to one of the two study groups. In one group, the students learned keyboarding with no covers on their keyboards. In the other group the students had keyboard covers ('skins') placed over their keyboards during keyboarding classes. Every day, for 4 weeks, the students came to the computer lab for a 30-minute keyboarding class (a total of 10 hours of instruction per student). All missed classes were made up at the end of the four-week session. Time for keyboarding instruction was allocated from different subjects by different teachers. For example, one teacher took the time from her language arts block, while another teacher used time allocated to health education.

The students were familiar with their keyboarding instructors as they were their regular computer teachers. The instructors introduced the keyboard set-up to the students (i.e., that some of them would be using covers and some would not). At first there was high interest in the 'skin' (covers), but as the lessons progressed they quickly became a nonissue. The tutorial, software program, Type to Learn (Sunburst, 2002) was introduced to the students. They were shown the proper keyboarding posture and finger position (i.e., home-row keys). Everyday, the students would enter the computer lab, locate their computer, open the Type to Learn program, and continue with their lessons. The lessons were individualized, so all students were at different places in the tutorial program. During class, the instructors would circulate around the room and encourage students to maintain proper body posture and finger position. Students were reminded numerous times, each class, to keep eyes on the screen and not on their keyboards.

The keyboarding program, Type to Learn, displayed a labeled keyboard on the screen with superimposed hands on the keys. If the student did not strike the correct key within the appropriate time limit, the hand would demonstrate to the students which 'finger' to use to strike the designated key. Of course, those students who struck the correct key before the tutorial 'hand' showed which key should be struck, moved faster through the lesson. An 'empty' bar was pictured on the right side of the screen that filled up 'thermometer style' as the student progressed through the lesson. The faster the bar filled, the sooner the student finished the lesson. At the completion of each lesson, the student was shown his/her speed and accuracy rate (the speed in words-per-minute was not shown until the

7th lesson). All students, whether at the covered or uncovered keyboards, progressed through the lessons in the same way, and received the same comments and assistance from the instructors.

When the students had completed lesson 14, they were given a timed test using a Type to Learn activity called 'Speed Up.' The 'Speed Up' test covered all the letters and punctuation the students had learned during their lessons. All the tests were given on an uncovered keyboard, since that is the type of keyboard they will encounter in the 'real world.' Upon completing the 'Speed Up' activity the students were scored for number of words-per-minute and percent accuracy. These scores were used in the analysis.

Statistical Analysis

The two response variables, keyboarding speed (expressed in words-per-minute) and keyboarding accuracy (expressed as % accuracy), were analyzed separately. In each analysis, inferences were based on a three-factor Analysis of Variance (ANOVA; e.g., Steel & Torrie, 1960). The treatment factor had two levels, covered and uncovered. The classification factors were grade (third and fourth) and sex (female and male). Thus, the entire analysis can be characterized as a 2x2x2 factorial ANOVA, indicating two levels for each of the three factors. The % accuracy data were transformed using the usual angular transformation for percentage and proportional data to stabilize variances $\arcsin[\text{square root of } 0.01(\% \text{ accuracy})]$; e.g., Steel & Torrie, 1960). The keyboarding speed data were analyzed without transformation. Both analyses were conducted using the Generalized Linear Models (GLM) procedure of Statistical Analysis System (SAS), and inferences were based on the Type III sums of squares using a full model with all interaction terms.

RESULTS

A total of 84 students participated in this study. Forty students who had learned to keyboard with uncovered keyboards, and 44 students who had learned to keyboard with covered keyboards took the final test.

Means and standard errors for each of the eight groups defined by the three factors are presented for both keyboarding speed (Table 1) and accuracy (Table 2). Mean words-per-minute was higher for students with covered keyboards than for those with uncovered keyboards for all grade-sex combinations (Table 1). There was no such consistency for accuracy, however, as means were similar for the two treatments and were greater for the covered keyboard treatment in some groups and for the uncovered treatment for other groups.

In the analysis of keyboarding speed, there were no interaction terms that approached significance (all $P > 0.35$), permitting straightforward interpretation of the main effects associated with the three factors. The effect of the treatment factor was highly significant ($[F_{sub.1,76}] = 6.92$, $P < 0.02$), with students using covered keyboards keying with greater speed (Table 1). Overall mean speed for all students using covers was about 4.1 words-per-minute faster than students without covers.

Evidence of the effects of the other two factors on keyboarding speed was weaker. There was some evidence of greater speed among fourth graders ($[F_{sub.1,76}] = 3.44$, $P < 0.07$), with the overall mean speed for fourth graders about 3.7 words-per-minute faster than that for third graders. Similarly, there was weak evidence that girls showed greater keyboarding speed than boys ($[F_{sub.1,76}] = 2.81$, $P < 0.10$), with a difference in overall means of about 2.8 words-per-minute.

The analysis of keyboarding accuracy again showed no significant interaction terms ($P > 0.16$), permitting straightforward interpretation of the main effects. There was no evidence of a difference in accuracy associated with the treatment factor ($[F_{sub.1,76}] = 0.07$, $P > 0.78$), and overall mean accuracy for students with covered and uncovered keyboards was nearly identical. There was strong evidence that the classification factor 'sex' did influence accuracy ($[F_{sub.1,76}] = 6.16$, $P < 0.02$), with females more accurate than males. However, grade did not appear to influence accuracy ($[F_{sub.1,76}] = 0.14$, $P > 0.70$).

DISCUSSION

In this study, students in both 3rd and 4th grade who used key covers when completing their lessons had significantly higher word-per-minute test scores than students who did not use key covers for their lessons. The outcome was what had been hypothesized. Having worked with this age group in the teaching of keyboarding in previous years, the instructor/researcher knew that convincing the students of the importance of not looking at their fingers as they keyboard would be a difficult task. Although the students would make an effort not to peek at their fingers, with the keyboard open to them they frequently looked. The use of key covers seemed to make intuitive sense. The significant results of this study appear to confirm both the a priori hypothesis and the claims of keyboard cover manufacturers.

Students in the 4th grade tended to have higher mean word-per-minute scores than students in the 3rd grade. This finding was expected, since the 4th-grade students were slightly more mature, being a year older, and had had some prior keyboarding experience. Also, there was some pressure imposed on the 4th-graders, by themselves, to have higher scores than the 3rd-graders. The researcher suspects that it was a combination of all three possible reasons, which led to the 4th-grade students out-performing the 3rd-grade students in mean keyboarding speed.

Females tended to have higher words-per-minute scores than the males regardless of the type of keyboard, covered or uncovered, they used for their keyboarding lessons. At these ages, 7 to 10 years, females appear to be more mature with respect to fine motor coordination. They also appear to be able to focus longer on repetitive skills. In a previous study, Nichols (1995) found that girls in the elementary school tended to keyboard faster than boys.

The mean percent accuracy scores for the two main treatment groups, covered and uncovered, did not reveal significant differences. The final keyboarding test was given to all students using an uncovered keyboard. This was done because after the students finished learning to keyboard, all their keyboarding would be done on an uncovered keyboard (as in the 'real world'). All students in the uncovered keyboard group were accustomed to having the ability to look at their fingers if they were not sure where a certain key was located. These students possibly were accustomed to taking more time to make sure that their fingers were on the proper key before actually striking it. Their counterparts, those in the covered group, did not have this luxury. They had to rely on what they had learned about key location. Perhaps, taking the time to ensure that the proper key was struck caused these students in the uncovered-key group to lose precious time, especially on a ! timed keyboarding test. The covered-key students were used to relying on what they had learned about key location and perhaps were concentrating harder. If these students saw that they had made a mistake while taking the test, they had the option of quickly correcting their error or moving on. The results tend to indicate that they chose the later.

In the research to date on keyboarding technique, it is believed that once students learn the location of the keys and build up speed, accuracy will follow (Schade, 1999). Accuracy is said to be reached by keyboarding at a speed that is slightly below a student's highest speed level (Olinzock, 1998; Schade, 1999). If this is the case, then eventually the students in the covered-key group would have an even higher accuracy rate.

With respect to grade level and accuracy, no significant difference was found. Third grade students had a percent accuracy mean score that showed little difference from that of 4th grade students. There was, however, a significant difference in accuracy with regard to sex. Females tended to make fewer mistakes in their keyboarding than the males. Similar results have been found by Nichols (1995). Girls tend to be more mature than boys at this age, and to have more developed fine motor coordination. Maybe this combination enables them to focus more easily on their accuracy when striking the keys.

In summary, the claims made by manufacturers of the keyboarding covers ('skins') that their products will increase keyboarding speed and accuracy seemed plausible, but there was no hard evidence to back up these claims. This study showed that the covers do work in increasing the speed in words-per-minute of students in the elementary school. Although no significant results were shown in accuracy between the treatment groups, the fact that the covered-key students are keyboarding faster means that they will accomplish

their assignments sooner than the students without the covers with no loss in accuracy. Additional studies need to be done to investigate whether, over time, the percent accuracy between the two groups changes.

IMPLICATIONS

Students need to learn how to keyboard and they best time to learn this skill is during their elementary school years (Erthal, 1998; Klopping, 1993; Olinzock, 1998). The average classroom teacher today is overburdened with a full curriculum to teach, standards to address, and state and national tests to prepare students to take. Finding the time to ensure that her/his students learn the skill of keyboarding may appear to be a daunting task. Teachers know, though, that if left on their own devices, students will pick up the 'hunt and peck' technique of keyboarding, which is difficult to unlearn. What then is the best alternative that teaches students how to keyboard with the greatest speed and accuracy in the shortest amount of time?

From past research on keyboarding we know that an intense keyboarding program of four to six weeks of daily instruction of around 30 minutes is best (Sormunen, 1991). Allocating this time at the very start of the school year from a subject area agreed upon by the classroom teacher appears to be best. Through creative scheduling, different subjects could be shortened throughout the week. Once the classes have been scheduled teachers may choose from a variety of educationally-sound tutorials to assist with the teaching and record keeping. Type to Learn by Sunburst was used in this study, but there are other excellent ones on the educational software market.

The research presented here suggests that the use of keyboards covers could be a beneficial aid in development of speed, which is crucial to keyboarding success. If students never develop keyboarding speed that is greater than what they could achieve by pen, pencil, or the 'hunt-and-peck' method, then they have no incentive to stick with a keyboarding program. According to the findings presented here, students could keyboard at a significantly faster word-per-minute rate using keyboard covers than without using them. If these findings are extrapolated, then students who learn to keyboard with covers, keyboard faster, and thereby accomplish their writing assignments sooner than students who do not use keyboard covers. Research shows that speed should be the focus of the instruction, because accuracy will eventually follow (Schade, 1999). With this in mind, it appears that the use of keyboard covers for instruction would be in the best interests of teachers! and their students learning to keyboard.

LOIS NICHOLS, University of Maryland, USA. lnichils@umd5.umd.edu

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Table 1
Mean Keyboarding Speed (Standard Error) Expressed as Words-Per-Minute by Grade, Sex, and Cover Treatment

Grade	Female		Males	
	Covered	Uncovered	Covered	Uncovered
3	12.9(2.1)	9.8(2.3)	10.9(0.7)	8.4(1.2)
4	18.4(2.6)	12.1(2.0)	14.0(2.0)	9.2(1.6)

Table 2
Mean Keyboarding Accuracy (Standard Error) Expressed as Percent by Grade, Sex, and Cover Treatment

Grade	Female		Males	
	Covered	Uncovered	Covered	Uncovered
3	91.1(3.5)	94.2(4.1)	86.3(2.8)	87.3(3.8)
4	94.9(2.2)	91.0(3.6)	89.9(3.1)	76.0(12.8)