

A STATE-WIDE LONGITUDINAL STUDY OF ELEMENTARY KEYBOARDING INSTRUCTION

INTRODUCTION

Since the invention of the first “practical” typewriter in 1867 by Christopher Lathem Sholes of Wisconsin, extensive studies have been conducted evaluating the typewriter as a learning and writing tool. Research done as early as 1932 found that elementary children who typed their work achieved greater gains in all subjects than those who did not type their work (Hoot, 1986). In 1959, research showed that third and fourth grade students who attended a summer typing program improved in reading and vocabulary scores (Hoot, 1986). In 1971, first graders who participated in a reading/typing program were significantly better in comprehending paragraph meaning and word study skills (Hoot, 1986). Balajthy (1988) reported that there is a long history of research that proves proper keyboarding skills can lead to improved children’s reading, spelling, and writing ability. Keyboarding was also found to be highly motivating and led to more positive attitudes toward spelling (Anderson-Inman, 1990).

As technology advanced over time, the typewriter gave way to the computer. Students of all ages are now using the computer as a vital learning tool in classrooms. According to a study completed by Sormunen (1991) almost every elementary school in the nation had computers available in the classroom. The Kaiser Family Foundation found in a national study that 62% of children had computers at home (HCIL, 2007). In 1988, a questionnaire was sent to 1,000 randomly selected administrators throughout the United States to obtain their opinions about elementary keyboarding. Based on the 519 responses, 74% of the administrators indicated that keyboarding should be required of every student; 78% felt it should be taught at the elementary level; and 50% felt that third grade was not too young to learn keyboarding. An overwhelming 80% felt that touch keyboarding (position the hands on the homerow, using each homerow finger to key specific keys according to the slant of the keyboard) was necessary for efficient operation of a computer and that language arts skills can be increased by using the computer. Sixty-two percent stated that keyboarding was a basic literacy skill (Condon, Hoggatt, & Weston, 1989). In this computerized society, learning to type is at least as important as learning to print (*New York Daily News*, 2005). Today, it is not a question of whether to teach keyboarding, but **when** to teach it! (Education World, 2006).

Traditionally, typewriting skills—now referred to as keyboarding skills—were taught in high schools by business education-licensed teachers who had been trained to teach the psychomotor manipulations of keyboarding. However, with the enormous increase of computers in middle and elementary schools, the introduction of the touch method of keyboarding was occurring in lower grades (Rogers, Laehn, Lang, O’Leary, & Sommers, 2004). With the increased opportunity for children to use the computer as a writing tool, are they learning an efficient inputting skill? As early as 1986, a major concern was expressed: “Children often develop their own hunt-and-peck systems. These systems are inefficient; without keyboarding skills, students take longer at the computer. Keyboarding is now as important as penmanship, yet many students learn the keyboard without guidance, waste limited computer time, and develop habits that may be difficult to change.” (*Type to Learn*, 1986, p.1).

This concern continued as cited in Education World: Technology in the Classroom: “As schools have concentrated on teaching students how to use computers to obtain and produce information, they have paid little attention to teaching them how to type on the keyboard quickly, accurately, and with correct technique” (2003, p.3). In 2007, a fourth grade teacher, Doug Noon, stated that asking students

to use a keyboard to write without training them to use the computer properly limits what they can accomplish in the computer lab (Noon, 2007).

Many studies have documented the value of children learning touch keyboarding (McKay, 1998; Owston & Wildeman, 1997; Hoot, 1986). Rogers (2003, p. 18) listed the following benefits for children who are introduced to the touch method of keyboarding:

1. Improvement in language arts—reading, spelling, and writing ability.
2. Improvement in efficiency in using the computer as a writing, editing, and computing tool, thereby maximizing classroom time.
3. Improvement in attitude toward writing—less frustration in looking for keys rather than entering information.
4. Improvement in proper keyboarding techniques and use of the computer, thereby eliminating the formation of bad keyboarding habits for later word processing and computer applications.
5. Improvement in motivating all students toward doing schoolwork.
6. Improvement in creative thought.
7. Improvement in integrating keyboarding with all subject areas.
8. Improvement in preparing all students for a technological society.

Controversy continues as to who should teach keyboarding, what skills should be taught, at what grade level/age, and for what length of time. In a nationwide research study, Sormunen (1991) found that the majority (57%) stated that no one was teaching the students touch typing; 13% said the elementary teacher was; and only 3% answered the business teacher. With the present trend toward the introduction of keyboarding at the elementary level, are elementary-licensed teachers now teaching these skills? Are they being properly trained to teach the psychomotor skill?

A study conducted in Wisconsin in 1996 reported an increase in the number of elementary classroom teachers that were teaching keyboarding compared to previous years. In 1993, the study found that business education teachers were primarily responsible for teaching elementary keyboarding (70% of respondents), but by 1996, 54% were business education teachers (Rogers, 1997). In 2003 and 2005, classroom teachers made up 51% and 48%, respectively, of teachers teaching elementary keyboarding with business teachers falling to 28% in 2003 and 27% in 2005 (Rogers, 2007).

Sormunen (1991) conducted a study regarding the existence of elementary touch typing instruction. This study found that elementary classroom teachers were teaching keyboarding, but only 12% had any formal preparation in teaching keyboarding. A study conducted in 1989 found that educational administrators felt that in-service training for elementary teachers should be provided to equip them with enough expertise in teaching keyboarding (Condon, Hoggatt, & Weston, 1989). McLean (1994) suggested that instruction can be supplied by elementary teachers who have taken a keyboarding methods course, or a business education teacher who has had elementary learning methods, or a combination of elementary classroom teacher and a business teacher. Consensus of most studies indicate that a “knowledgeable” teacher is needed to help students develop appropriate techniques, as well as provide motivation and reinforcement (Erthal, 1998; Nieman, 1996).

Cengage/South-Western Publishing Company has developed a scope and sequence for computer literacy that includes an early keyboarding introduction of the touch method in kindergarten and continues through fifth grade. By sixth grade, students are expected to have mastered the touch method.

This scope and sequence is based on the curriculum and content area standards NETS for students as recommended by the International Society for Technology in Education (2007). The Wisconsin's Model Academic Standards for Business state that by the end of the fourth grade, students will develop touch keyboarding techniques (2003).

Erickson (1993) addressed the controversy of when keyboarding should be taught and stated that all students, ages 8 and up, can learn keyboarding skills, but the ideal age for effective keyboarding instruction and learning is the upper elementary school levels (ages 10-12). Erthal (1998) stated that the general consensus is about age 8 or 9 or grades 3 or 4 because children at this age possess the necessary fine motor skills, eye-hand coordination, and reading ability to succeed in keyboarding. Lambourne (1992) presented many developmental reasons why fourth grade is the ideal time to teach keyboarding skills.

However, in an article in *Education World*, the author quoted "There is no longer an ideal time for formal (keyboarding) instruction because younger and younger children are imitating older siblings and parents by wanting to work with computers" (2003, p. 3). Numerous studies indicate that keyboard learning should be taught prior to using the computer, especially since students need formal instruction to acquire keyboarding skills using the touch system (Nieman, 1996; Paideia, 2004; PCBEE, 1997; Prigge & Braathen, 1993).

Students should be able to demonstrate the correct touch method of keyboarding after successfully completing 25 to 45 hours of instruction, according to the Policies Commission for Business and Economic Education (1997). The suggested time frame for a basic keyboarding program according to Erickson (1993) is 40 to 45 class periods of approximately 30 to 40 minutes in length. Depending on the grade level and the number of 30-minute class periods, 15 to 35 hours of instruction in Grade 3 or Grade 4 was recommended by Hoggatt, Shank, & Trabel, (2004).

PURPOSE OF STUDY

The purpose of the study was to determine the status of elementary keyboarding in the State of Wisconsin and to compare data from 1993, 1996, 2003, 2005, and 2009 as to the following research questions: 1) At what grade was the "touch" method of keyboarding taught? 2) Who taught keyboarding? 3) How much time was allocated? 4) What software or textbook was used to teach keyboarding? 5) When was keyboarding reinforced? 6) Was keyboarding integrated into academic classes? 7) What computer environment was offered? and 8) Were students assigned a grade for keyboarding instruction?

FINDINGS

To determine the status of elementary keyboarding instruction and to compare the growth of elementary keyboarding over a 16-year period, questionnaires were mailed in 1993, 1996, 2003, 2005, and 2009 to all school administrators or business education teachers in Wisconsin. During the years 2009, 1993 and 1996, the Wisconsin Department of Public Instruction had 428 school districts. By 2003 and also in 2005, two small school districts consolidated, resulting in 426 total school districts. Table 1 shows the response rates.

Table 1. Summary of Responses

Surveys	Districts Represented	Response	Percentage
<i>Surveys received in 1993</i>	428	285	67%
<i>Surveys received in 1996</i>	428	284	66%
<i>Surveys received in 2003</i>	426	256	60%
<i>Surveys received in 2005</i>	426	263	62%
<i>Surveys received in 2009</i>	428	286	67%

Over the 16-year period (1993-2009), more school districts are including keyboarding instruction at the elementary level in grades kindergarten through fifth grade, as shown in Table 2.

Table 2. Elementary Keyboarding Results

Year	Total Responses	YES	%	NO	%
<i>1993 Introduction of Keyboarding</i>	285	153	54%	132	46%
<i>1996 Introduction of Keyboarding</i>	284	207	73%	77	27%
<i>2003 Introduction of Keyboarding</i>	256	218	85%	38	15%
<i>2005 Introduction to Keyboarding</i>	257	218	85%	37	15%
<i>2009 Introduction to Keyboarding</i>	282	250	89%	32	11%

*In 2005, six responding school districts did not have elementary schools.

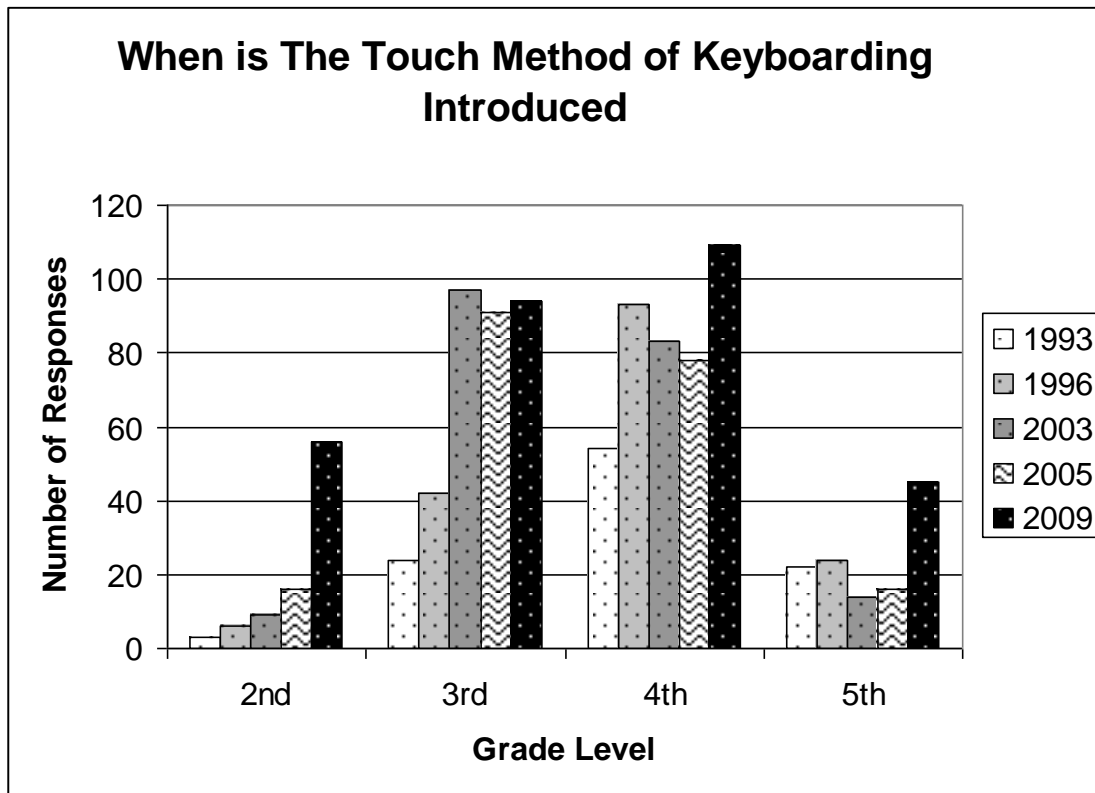
*In 2009, four responding school districts did not have elementary schools.

Keyboarding Introduction

As indicated in Table 3, over the 16-year period the formal introduction of the touch method of keyboarding (positioning the hands on the homerow, using each homerow finger to key specific keys according to the slant of the keyboard) has varied between third grade and fourth grade. In 2009, keyboarding was most often introduced in the fourth grade with 109 responses (43.6%) compared to the third grade with 94 responses (37.6%). Respondents indicated multiple grade levels; for example, several respondents indicated that keyboarding was introduced at the third and fourth grades. In the 2005 and 2003 studies, third grade received the most responses (91 responses, 42% and 97 responses, 45%, respectively), whereas in 1996 and 1993, fourth grade received the most responses (81 responses, 39% and 54 responses, 35%, respectively). Fifth grade received positive responses in 2009 from 45 school districts (18%) of the 250 total responses compared to 2005 with 16 (7.3%) school districts; 14 (6.4%) of the 218 total responses in 2003; 24 (11.6%) of the 207 total responses in 1996; and 22 (14.3%) of the total 153 positive responses in 1993.

There was a substantial increase in keyboarding instruction in second grade in 2009. Second grade received 56 responses (22.4%) compared with 16 responses (7.3%) in 2005; 9 responses (4.2%) in 2003; 6 responses (3%) in 1996; and 3 responses (2%) in 1993.

Table 3. Keyboarding Instruction



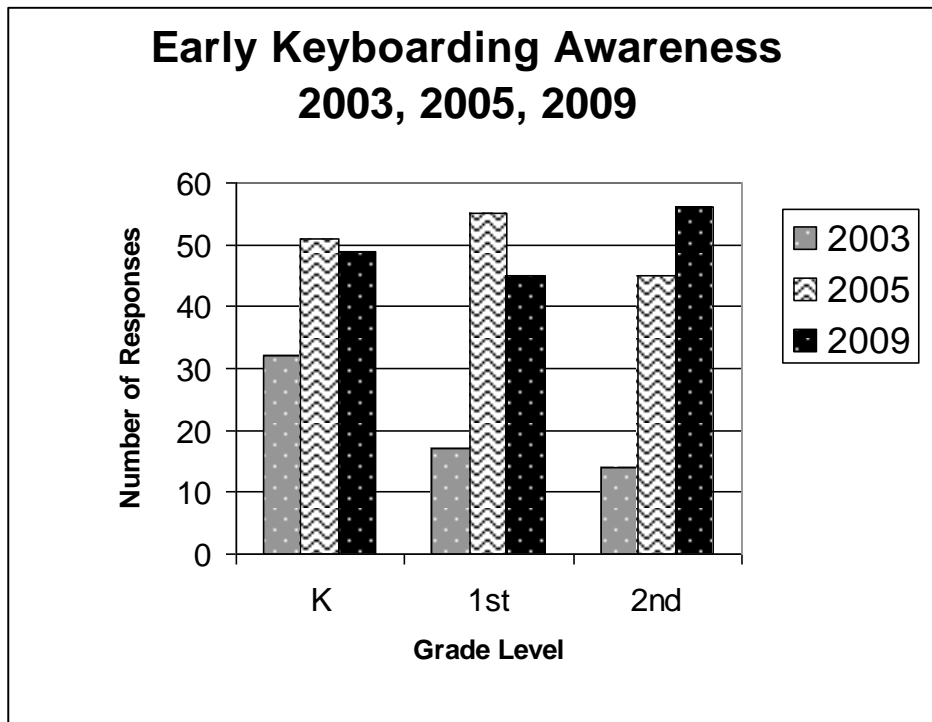
*Total Responses: 1993: N=153; 1996: N=207; 2003: N=218; 2005: N= 218; 2009: N = 250

Early Keyboarding Awareness

Table 4 indicates the response to the question “Does your school district offer any introductory instruction to the keyboard (early keyboarding awareness—in which students were introduced to computer parts and operation, correct computer posture, proper left/right hand placement, and the color-coded system of keyboarding) before any formal instruction (touch method) is given on the keyboard?” Many respondents indicated that this instruction was very informal and occurred in multiple grades. Table 4 indicates the grades where students were given early keyboarding awareness. This question was not asked on the 1996 or 1993 questionnaires.

In 2003, early keyboarding awareness occurred most at the kindergarten level with 32 responses followed by first grade with 17 responses, and second grade with 14 responses. In 2005, early awareness became more prominent at the first grade level rather than the kindergarten level as in 2003, with 55 responses, and kindergarten followed with 51 responses, then second grade with 45 responses. In 2009, second grade received the most responses with 56, followed by kindergarten with 49 responses, and first grade with 45 responses. Some respondents indicated this instruction occurred in multiple grade levels; i.e., kindergarten, first and second grades.

Table 4. Early Keyboarding Awareness 2003, 2005, and 2009



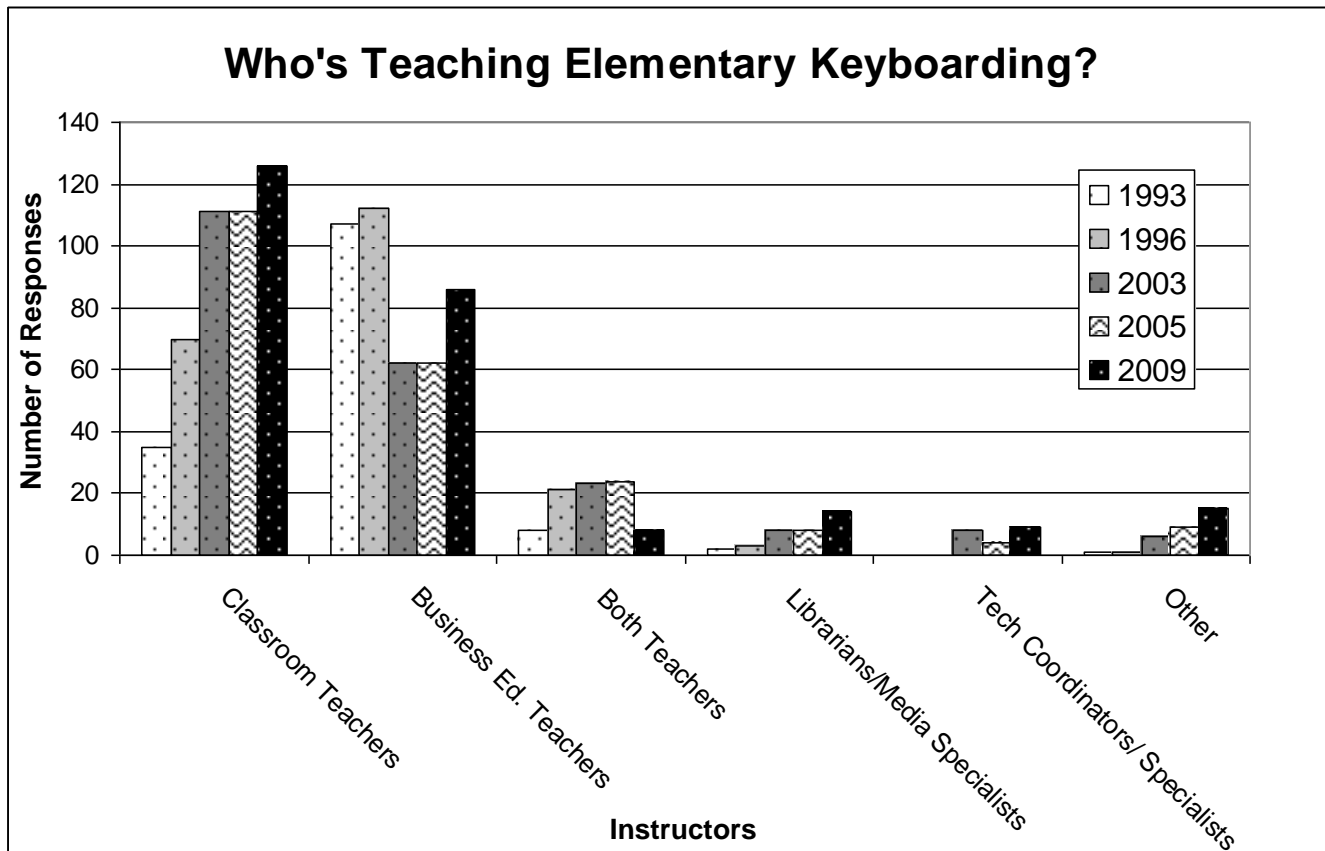
*Responses: 2003 N = 63; 2005: N = 103; 2009: N = 111.

*This question was asked only in 2003, 2005, and 2009.

Keyboarding Instructors

As Table 5 indicates, there has been a dramatic increase in elementary classroom teachers as the primary instructor of keyboarding. In 1993, business education teachers were responsible for teaching elementary keyboarding (70% of 153 total positive responses). By 1996, there was an increase in the number of classroom teachers teaching keyboarding, but the business education teacher still represented more than half of the responses (54% of 207 total positive responses). However, by 2003 and still in 2005, classroom teachers were the primary instructors of keyboarding (2003: 50.9%, 111 responses; 2005: 50.5%, 110 responses). Business education teachers represented only 27% of the 218 total positive responses. In the latest study in 2009, classroom teachers continued to receive the most responses (126, 50.6%), followed by business education-licensed teachers with 86 (34.5%) of the 249 responses. In 2003, 2005, and 2009, schools reported that librarians/media specialists or technology specialists were teaching keyboarding. Fifteen schools in 2009, nine schools in 2005, and six in 2003 reported instructional aides were assisting the classroom teacher in teaching keyboarding.

Table 5. Keyboarding Instructors



Total Responses: 1993: N=153; 1996: N=207; 2003: N=218; 2005: N=229; 2009: N = 249

Instructional Time

The instructional time allocated for teaching the touch method of keyboarding varied greatly from school to school, from teacher to teacher, and with each grade level. The most common instructional time indicated in 1993 and 1996 was 25-45 minutes every day for 6 weeks. In the 2003 survey, most responses indicated once a week for 36 weeks for 30-40 minutes. Again in the 2005 survey, once a week for 36 weeks for 30-45 minutes was the most common response. In the 2009 survey, most responses indicated keyboarding instruction was scheduled once or twice a week, for 36 weeks, for 20 to 30 minutes per session. Another large number of responses indicated instruction was scheduled every day for six to nine weeks. Many schools indicated instruction offered once a week for 30 to 45 minutes throughout the school year. The number of times a week varied with the grade level; i.e., two times a week in third grade with five times a week in fourth grade.

Instructional Software or Textbook

A significant increase occurred in using instructional software packages to teach keyboarding over the 16-year period. Ninety-four percent of responses indicated using keyboarding software for

instruction in 2009, compared to 68% in 1996. In answer to what software was used to teach keyboarding, Table 6 indicates a shift over the 16-year period from *MicroType: The Wonderful World of Paws* to *Type to Learn/Type to Learn, Jr.* New keyboarding software becomes available every year, such as *Bernie's Typing Travels*, which received 13 responses in 2005 and 23 responses in 2009. Two schools reported using a combination of software to teach the various grade levels.

Table 6. Instructional Software

Software	1993		1996		2003		2005		2009	
	Resp.	%	Resp.	%	Resp.	%	Resp.	%	Resp.	%
<i>MicroType: World of Paws</i>	54	35.3	49	23.7	28	12.8	21	9.6	25	10
<i>Ainsworth Keyboard Trainer</i>	4	2.6	11	5.3	5	2.3	4	1.8	8	3.2
<i>Type to Learn/Type to Learn, Jr.</i>	8	5.2	11	5.3	67	30.7	62	28.4	62	24.6
<i>Mavis Beacon Teaches Typing</i>	4	2.6	8	3.9	20	9.2	20	9.2	14	5.5
<i>Ultra Keys</i>	2	1.3	8	3.9	14	6.5	14	6.4	11	4.3
<i>Touch Typing for Beginners</i>	5	3.3	7	3.4	0	--	2	0.9	1	0.4
<i>All the Right Type</i>	6	3.9	7	3.4	13	6	13	6	10	4
<i>CompuKeys</i>	10	6.5	7	3.4	0	--	0	--	--	--
<i>Alphabetic Keyboarding</i>	3	2	7	3.4	0	--	0	--	--	--
<i>Bernie's Typing Travels</i>							13	6	23	9.1
<i>Typing Time</i>									17	6.8
<i>MicroType</i> by South-Western									23	9.2
<i>Microsoft Word</i>									29	11.4
<i>Various other software packages</i>	15	9.8	25	12	55	25.2	54	24.7	13	5.2
<i>Did not use software</i>	42	27.5	67	32.3	16	7.3	15	7	16	6.3

Note: 1993: N=153; 1996: N=207; 2003: N=218; 2005: N=218; 2009: N=250

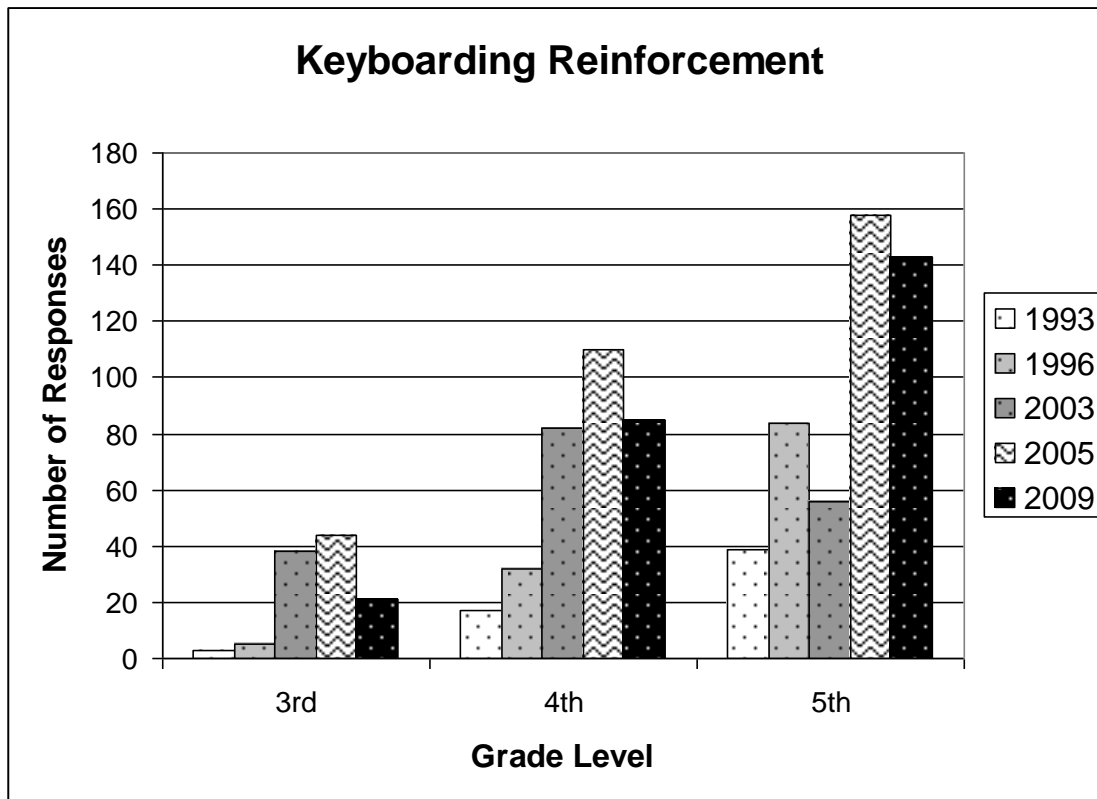
Over the 16-year period, using textbooks to teach keyboarding continued to decrease from 52% in 1993 to 34% in 2009. Most schools preferred to use software for instruction. Respondents were asked to identify what textbook was used in teaching keyboarding. Of the textbooks that were used, “Paws” textbooks (*Paws Presents Computer Keyboarding* or *Computer Keyboarding, An Elementary Course*) received the most responses in all five studies – 25 responses (29%) in 2009, 26 responses (35%) in 2005, 26 (12%) in 2003, 67 (32.4%) in 1996, and 35 (23%) in 1993. A newer textbook that was not in the earlier (1993 through 2003) studies, *Learning to Type with Bernie*, received 13 responses (15%) in 2005 and 23 (9.1%) in 2009. Another popular textbook, *I Can Keyboard*, received 13 responses in 2009 (15%), 12 responses (19%) in 2005; 18 responses (8.3%) in 2003; 33 responses (16%) in 1996; and 25 responses (16%) in 1993.

Keyboarding Reinforcement

Once the touch method of keyboarding was introduced, reinforcement of correct keystroking was reported. Table 7 compares data from 1993, 1996, 2003, 2005, and 2009. In 2009, 214 (86%) reported keyboarding reinforcement at various grades, compared to 193 schools (89%) in 2005, 177 (81%) in 2003, 205 (99%) in 1996, and 105 (68.6%) in 1993. The largest percentage of reinforcement usually occurred in the year following the introduction. In 2009, the fourth grade received the most responses for the introduction of keyboarding; therefore, the most schools (143 or 66.8%) reported reinforcement in Grade 5, followed by 85 responses (39.7%) in the fourth grade.

In 2005, the third grade received the most responses for the introduction of keyboarding; therefore, fourth grade (110 responses, 32.6%) and fifth grade (158 responses, 46.8%) led the way for reinforcement. In 1996 and 1993, fourth grade received the greatest percentage of responses for the introduction of keyboarding; therefore, fifth grade received the most responses for reinforcement. In 2003, third grade received the greatest percentage of responses, with fourth grade receiving the most responses for reinforcement. Many school districts in all five surveys reported that the keyboarding skill was reinforced at every grade level following the introduction.

Table 7. Keyboarding Reinforcement



*Total Responses: 1993: N=153; 1996: N=207; 2003: N=218; 2005: N=193; 2009 N=214

*Reinforcement occurred in multiple grades.

The amount of instructional time allocated for reinforcing keyboarding at the elementary level varied greatly. Responses varied from 2 weeks to 36 weeks. Most respondents indicated that they devoted 36 weeks for reinforcing keyboarding skills, which is consistent throughout all of the studies. In 2009, most respondents indicated reinforcement occurring once or twice a week for 20 to 30 minutes throughout the school year.

When asked what software was used for reinforcement, most respondents indicated that the same software used for the introduction of keyboarding was used for reinforcement. In 2009, *Type to Learn*, *MicroType*, and *Bernie's Typing Travels* received the most responses. *Microsoft Word* was also used for reinforcement. When asked what textbook was used for the refresher class, the various *Paws* texts received the most responses in all five surveys--2009, 2005, 2003, 1996, and 1993. A large number of responses in 2009 (84 responses, 54%) indicated that no textbook was used for reinforcement.

Integration in Academic Classes

Respondents were asked how many days/weeks word processing/formatting was taught and what software was used. In the 2009 survey, 173 school districts responded to this question. The weeks dedicated to teaching word processing and formatting varied from none to 36 weeks. One day a week received the most responses in 2009 and 2005. Microsoft Word dominated the responses with 123 responses (75.9%) in 2009 and 111 responses (87.4%) in 2005 as the software preferred for word processing and formatting.

When asked the curricular areas where keyboarding/word processing was integrated, language arts received the most responses in all five studies. Social Studies and Science also received a large number of responses. Many respondents indicated that keyboarding/word processing was integrated into all classes whenever students were using computers.

Computer Environment

Over the 16-year period, 1993—2009, the type of computer used for elementary keyboarding instruction has changed. In 1993, Apple IIGS, Macintosh, and Apple IIe computers dominated in elementary school buildings, with 73% Apple environments and 27% IBM/PC computers. By 1996, Apple still dominated, but IBM/PC computers gained, representing 48% compared to 52% Apple environment. However, by 2003, PC computers dominated in elementary school buildings with 63%, compared to 23.3 % Apple/Macintosh computers. In 2005, the school environment was still dominated by PC computers with 168 responses (64.8%); far behind was Apple/Macintosh with 61 responses (23.5%). In the latest study (2009), PC computers also dominated with 217 responses (78.1%) compared to 32 responses (13.2%) for Macintosh computers. Gaining in popularity were battery-operated keyboards (AlphaSmart) that received 12 responses (13.9%) of all responses in 2003 and 28 responses (10.8%) in 2005, but only 21 responses (8.7%) in 2009. Several respondents reported using more than one kind of computer or keyboard.

Graded Keyboarding Instruction

In comparing data regarding whether or not a letter grade for keyboarding instruction was included on a report card, an increase was noted on the 2009 survey. One hundred respondents (43.5%) indicated “yes” with 130 respondents (56.5%) indicating “no.” In 2005, 68% indicated that no grade was given for elementary keyboarding with 32% indicating that a letter grade was included on elementary student’s report card. The 2003 findings were consistent with the 2005 data regarding this question. This question was not asked on the 1996 or 1993 questionnaires.

When asked what the maximum expectation for a one-minute timing was at each grade level, responses were similar in 2009 and 2005. Most responses indicated between 5-10 wpm (words per minute) for students in the second grade, 10-15 wpm for third grade, and 15-25 for fourth and fifth graders. Many respondents indicated that speed was not measured or the wpm was not known. These findings are slightly different in 2003 where 10-15 wpm was the norm for grades second through fourth, and 15-20 wpm for fifth-grade students. Respondents indicated that proper technique was more important than speed or accuracy.

CONCLUSIONS

The following conclusions are based on the findings of this study:

1. Over the 16-year period (1993-2009) more elementary schools included keyboarding instruction in the curriculum. The number of schools offering keyboarding instruction in kindergarten through fifth grades has increased.
2. Keyboarding instruction is being included in the elementary curriculum at earlier grades. More kindergarten, first, and second grade students are starting with an early awareness of keyboarding.
3. Fourth grade received the most responses in 2009, with third grade receiving the most responses in 2003 and 2005, regarding when the formal introduction of the touch method of keyboarding was introduced, compared to fourth grade in 1996 and 1993.
4. Elementary classroom teachers are the primary instructors in teaching keyboarding skills (2009, 2005 and 2003). In 1996 and 1993, the business education teacher was responsible mostly for teaching keyboarding. Librarians/media specialists or technology specialists are also teaching keyboarding in some school districts. In the 2009 and 2005 surveys, the number of instructional aids assisting the classroom teacher in teaching keyboarding increased.
5. School districts are using a combination of software and keyboarding materials to teach keyboarding and for reinforcement at multiple grade levels.
6. A keyboarding software package was preferred over using a textbook for keyboarding instruction.
7. The most common instructional time for teaching keyboarding in 2009 was once or twice a week for 20-30 minutes throughout the school year. In 2003 and 2005 most responses indicated 30-45 minutes once a week for 36 weeks. Some schools reported teaching keyboarding every day for 6 to 9 weeks for 30-45 minutes, which was the most common instructional time reported in 1996 and 1993.
8. Reinforcement of keyboarding instruction was considered important once the touch method was introduced. Most school districts indicated subsequent reinforcement at every grade level following the introduction.
9. The software/textbook used for reinforcing keyboarding skills was the same material used for the introduction of keyboarding.
10. Microsoft Word was the most preferred software for word processing/formatting in 2009, 2005 and 2003. AppleWorks and Microsoft Works received the most responses in 1996 and 1993.

11. Keyboarding/word processing was integrated most into Language Arts and Social Studies classes.
12. Over the 16-year period from 1993—2009, the type of computer used for elementary keyboarding instruction changed from Apple computers to PC environments.
13. Battery-operated keyboards (Alpha Smarts) are becoming popular in teaching keyboarding because they are accessible in the elementary classroom when the only computer lab in the elementary school building is being used for academic subjects.
14. In 2009, more educators are assigning a grade for keyboarding instruction than in previous years. However, more than half of the responses indicated that students were not given a specific letter grade for keyboarding instruction.
15. The expectation for a one-minute timing (speed) was between 5-10 wpm (words per minute) for students in the second grade, 10-15 wpm for third grade, and 15-25 for fourth and fifth grade students.

DISCUSSION AND RECOMMENDATIONS

The importance of keyboarding skills for elementary children is being recognized by all educators as more and more children are using computers as a learning tool. Learning an efficient inputting skill is as basic as learning handwriting in today's computerized world. Developing efficient keyboarding skills is not a question of if but when and how should students acquire these skills. As more school districts include elementary keyboarding instruction in the elementary grades, elementary classroom teachers are being asked to teach these skills, compared to previous years when business education-licensed teachers taught keyboarding. It is essential that elementary classroom teachers—or anyone teaching keyboarding—have instruction and direction as to the methodology in developing a psychomotor skill.

School districts need to develop a K-12 computer technology curriculum that includes keyboarding instruction, which will involve addressing the following questions:

- At what grade level will keyboarding instruction occur?
- Who will teach the students keyboarding skills?
- How much instructional time should be given—weeks, days, minutes?
- What instructional materials will be used?
- Where and what equipment will be used for instruction?

The author of this research, Dr. Harriet Rogers, strongly recommends that effective keyboarding instruction must be structured, consistent, and sequential:

“Structured” means that a designated amount of time is scheduled for keyboarding instruction. The recommended amount of time devoted to formal keyboarding instruction is 30-40 minutes every day or several days a week until all the keys have been introduced. The grade level at which formal

keyboard instruction is scheduled varies from school district to school district. The appropriate grade level for the formal introduction of the touch method of keyboarding will depend on when children are inputting sentences frequently to the point that bad habits are being formed. Formal introduction of keyboarding should precede frequent computer use. Whenever children are using the computer, correct computer posture and techniques should be taught and reinforced.

“Consistent” means that every student should receive keyboarding instruction. Children that miss keyboarding instruction because of band or music lessons are at a definite disadvantage because of the additional memorization of key locations that were presented in their absence. These children will have to memorize the keys missed in addition to the new keys being presented in the next lesson.

“Sequential” means that once keyboarding instruction begins, reinforcement continues in succeeding grades. Studies indicate that keyboarding is a skill that progresses through the years. Children should be required to use correct keyboarding techniques whenever using the computer. All classroom teachers, librarians, technology coordinators/specialists, and computer lab aides should require children to use correct keyboarding techniques. Structured reinforcement of keyboarding leads to children attaining a usable skill, thereby reducing frustration and maximizing computer time. Children with a usable keyboarding skill concentrate on what they are keying and not on where the keys are located.

Prior to formal keyboarding instruction, early keyboarding awareness is necessary for children to learn correct computer posture, left/right hand placement, home row location, and correct operation of the enter/return, space bar, and backspace/delete keys. This instruction may start as early as kindergarten when students are learning the letters of the alphabet and primary colors.

Software programs are becoming popular to assist elementary classroom teachers in teaching keyboarding. While software programs have many advantages, the main disadvantage is confirming that children are actually using correct techniques as they complete each lesson. Observation by a knowledgeable instructor is essential in requiring children to use the touch method of inputting.

Once keyboarding instruction begins, the goal for all students is learning proper technique. In the beginning stages of learning, proper technique is more important than speed or accuracy. As consistent keyboarding instruction continues, technique with appropriate speed should be emphasized. Research indicates that a third grader handwrites about 11 wpm and fourth graders write about 14 wpm. Since keyboarding is an alternative to handwriting, students should be able to key faster than they handwrite. Recommended proficiency levels of keyboarding according to current research are: between 5-10 wpm (words per minute) for students in the second grade, 10-15 wpm for third grade, and 15-25 for fourth and fifth graders, with 90% accuracy. By the end of middle school, students should be able to demonstrate a proficiency level of keyboarding between 30 to 40 wpm with 90% accuracy.

Studies indicate a dramatic increase in language arts skills as a result of children inputting words and sentences frequently using a computer. Keyboarding and language arts are a dynamic duo. Students can key in rhyming words, most frequently used words, and nouns, verbs, adjectives, and spelling words. Keyboarding should be integrated with language arts and other subject areas, such as social studies and science, whenever students are using computers. Word processing of projects in academic subjects is easier when children possess a usable keyboarding skill.

In conducting this study, the researchers found that communication among educators within each school district was frequently lacking regarding keyboarding instruction. Teachers thought keyboarding instruction was in the curriculum, but they did not know when, at what grades, who was teaching, and how much instructional time was scheduled. Therefore, it is recommended that a study be conducted to ascertain who is taking ownership of keyboarding instruction—is it school administrators, elementary classroom teachers, Business Education licensed teachers, teacher's aids, media specialists, or other educators? Who is taking the leadership to make sure that keyboarding is included in the curriculum and that this instruction is structured, consistent, and sequential?

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