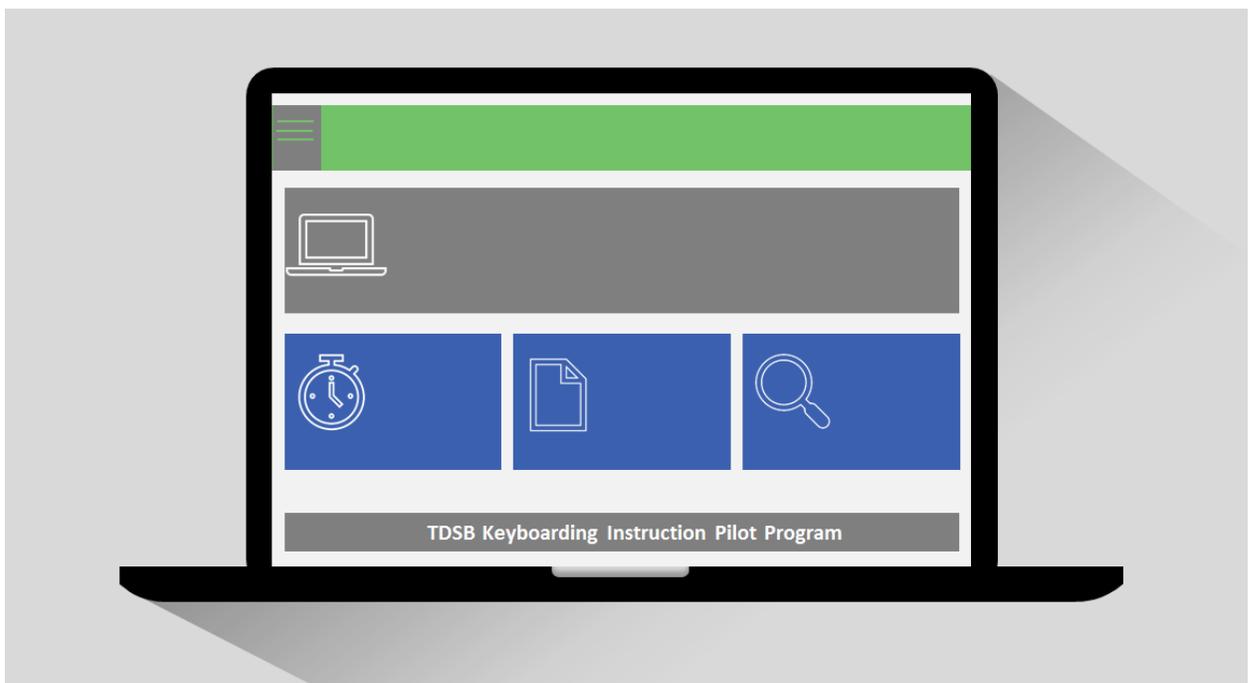




KEYBOARDING INSTRUCTION AT THE TORONTO DISTRICT SCHOOL BOARD PILOT STUDY 2016-17: RECOMMENDATIONS FOR POLICY AND PRACTICE



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Executive Summary

Following a Board motion in May 2016 regarding keyboarding instruction, the Toronto District School Board (TDSB) implemented the Keyboarding Pilot Program that included a research component. This report describes the results from the evaluation of the pilot program in 2016-17. The purpose of the evaluation was to inform decisions regarding the integration of keyboarding instruction into the TDSB curriculum.

In the fall of 2016-17, a Steering Committee was created to oversee the planning of the Keyboarding Pilot Program. Twelve (12) elementary schools, three from each Learning Centre, were randomly selected to participate in the program.

The study involved a quasi-experimental, mixed methods research design, with before and after online surveys completed by students, administrators, and teachers as the primary data collection methods. In addition, data were collected from students' online keyboarding lessons (i.e., Typing.com). The data included the duration, accuracy, and average speed (words per minute) in typing for each lesson completed by students.

Key Findings

In total, 11 schools and 21 classes participated in the Keyboarding Pilot Program.

Student Surveys

- There were 226 and 256 students who responded to the surveys administered before and after the completion of the Keyboarding Pilot Program, respectively.
- There were statistically significant improvements from before to after the pilot program in regards to students' perceptions of their keyboarding knowledge as it applies to the home row, enter, shift, and tab keys.
- Statistically significant improvements were also found in students' perceptions of their keyboarding technique and practices in relation to curving their fingers over the home row, using both hands and the home row, and fewer students using the hunt and peck method.
- Additionally, the findings indicated statistically significant improvements after the pilot program in students' perceptions of their typing speed and accuracy.
- While learning how to type was not easy for most students, they enjoyed the typing class, found it interesting, attributed typing improvements to it, and were interested in continuing the typing class.

Students' Keyboarding Performance

- The amount of time spent on Typing.com lessons did not statistically differ before or after the pilot program. However, students' accuracy rate significantly increased and their words per minute significantly decreased. In other words, students were typing somewhat slower but with greater accuracy, that is, with fewer errors.

Administrator/Educator Surveys

- There were 23 and 25 staff members who responded to the surveys administered prior to and after the completion of the Keyboarding Pilot Program, respectively.
- Staff members had more favourable perceptions and beliefs about keyboarding after participating in the pilot program. However, their position on whether keyboarding instruction should be part of the Ontario school curriculum was unchanged from before to after their involvement in the pilot program, with over three-quarters of educators believing that it should be included in the curriculum.
- Interestingly, after the pilot program, fewer staff members believed that keyboarding should be taught separately, while more respondents were unsure.
- Most educators believed that students should begin receiving keyboarding instruction in the primary grades.
- Before the Keyboarding Pilot Program, less than half of staff members believed that keyboarding would be very useful in the future due to the advances in new technologies, such as smartphones and touch screen technologies. After the pilot program, nearly two thirds of staff members felt this way.
- After the pilot program, more teachers felt that their students reached an intermediate level of typing abilities.
- With the exception of online support, most educators were satisfied with the typing curriculum platform, with 80% of educators definitely recommending it.

Recommendations and Next Steps for Further Research

This study indicates statistically significant improvements in students' keyboarding knowledge and practices and accuracy from before to after the Keyboarding Pilot Program. Further research is needed to examine the long-term benefits of keyboarding instruction and the relationship between students' keyboarding knowledge and practices and their achievement.

In terms of recommendations, it is suggested that keyboarding be integrated with existing subjects rather than taught as a separate class. Educators suggested incorporating keyboarding instruction in the following subject areas: social studies, language, media literacy, and science. However, when integrating keyboarding within existing subjects, it is essential that students are provided opportunities to build the fundamental and foundational skills that are necessary in keyboarding so that they can be proficient in typing. It is also recommended that keyboarding instruction be part of ICT standards and digital fluency improvements.

Figure A: Executive Summary Graphic of Keyboarding Pilot Program

K E Y B O A R D I N G

Following a Board motion in May 2016 regarding keyboarding instruction, the Toronto District School Board (TDSB) implemented the **Keyboarding Pilot Program** in 12 elementary schools during 2016-2017. Below is a summary of the program and its research findings.

Background

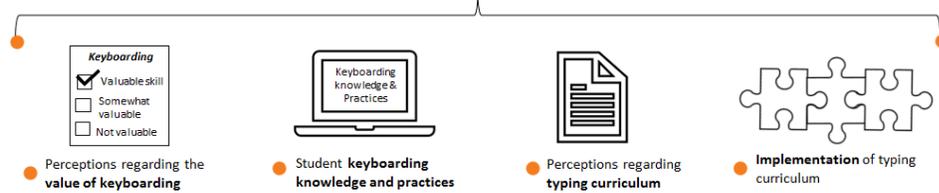


- The Toronto District School Board (TDSB) recognizes the importance of keyboarding skills as a basic, necessary life skill, and that students should receive comprehensive keyboarding instruction from Grades 3 through 6. However **keyboarding is not part of the provincial education curriculum** in Ontario, and as such could be taught ad-hoc.
- The TDSB created the **Keyboarding Pilot Program** as a way to **inform decisions** regarding the integration of keyboarding instructions into the TDSB curriculum.

Study Goals

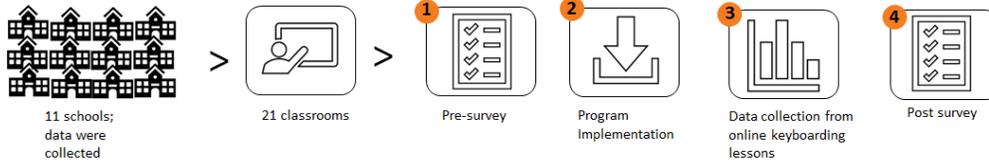


The **Keyboarding Pilot Program** examined the following:

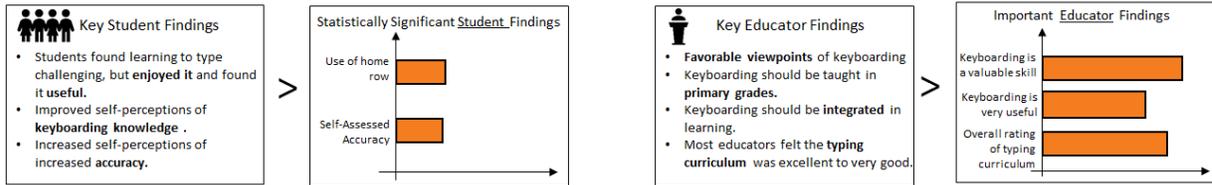


Methodology

The study involved a mixed methods research design, with before and after online surveys completed by students, administrators, and teachers. In addition, data were collected from students' online keyboarding lessons (i.e., Typing.com).



Key Findings



Next Steps

- Integrate keyboarding **within existing subjects**
- Include keyboarding as part of **ICT standards and digital fluency improvements**
- Further **research** on long-term benefits of keyboarding instruction

> K E Y B O A R D I N G <

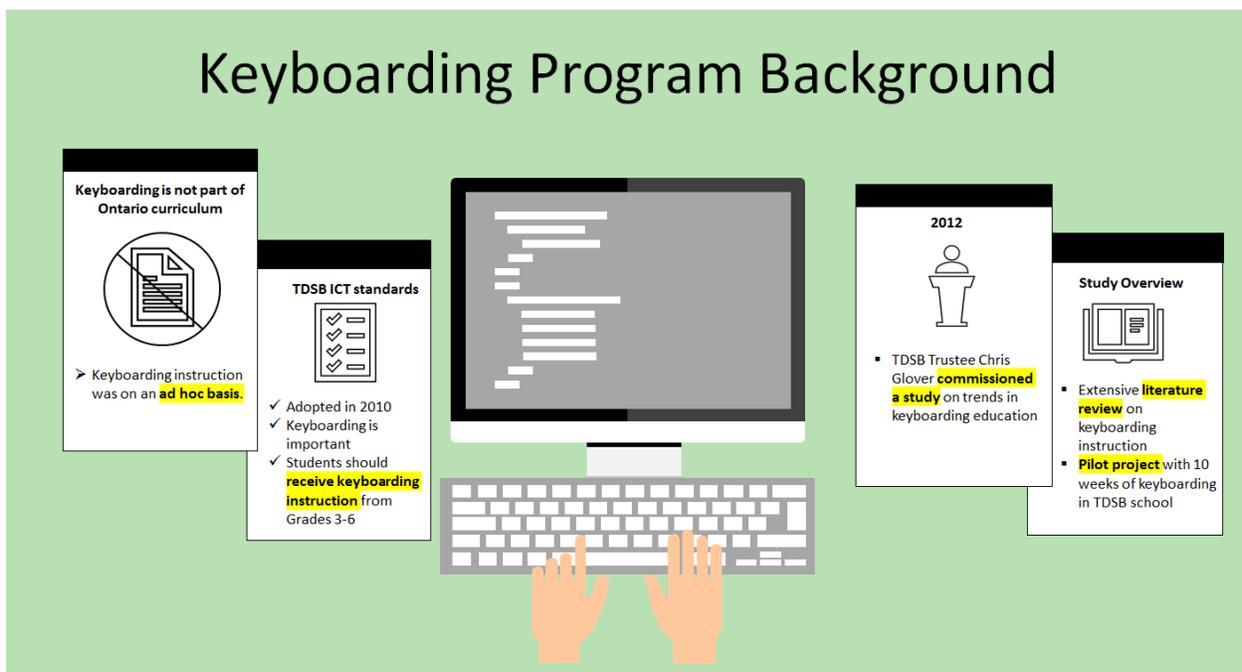
Background

The Toronto District School Board's (TDSB) Standards for Information Communication and Technology (ICT) Kindergarten to Grade 12 (2010) recognize the importance of keyboarding skills as a basic, necessary life skill. The ICT stated that students should receive comprehensive keyboarding instruction from Grades 3 through 6, which was undertaken on an ad hoc basis. Keyboarding education is not part of the provincial education curriculum in Ontario, and until the adoption of the ICT in 2010, it was primarily limited to Grade 9 and 10 Business courses (Glover, Sinay, Presley, & Yashkina, 2013).

In 2012, TDSB Trustee Chris Glover commissioned a study on trends in keyboarding education with two primary components (Glover et al., 2013):

- An extensive literature review on the most current research on keyboarding instruction with the primary research question, "Should keyboarding be better integrated into Ontario curriculum?"
- A pilot project involving 10 weeks of keyboarding instruction to 27 Grade 2 TDSB students at Parkfield Junior Public School to test the effects of keyboarding instruction software on students' keyboarding skills and perceptions about keyboarding.

Figure B: Keyboarding Program Background



The rationale for starting keyboarding education at the elementary school level is well established in the literature. Developing keyboarding skills is associated with many educational benefits for students, including improvements in literacy and writing, motivation and enjoyment, and more efficient use of time and proficient use of computers. Beyond the immediate impact on students' schooling, a strong case for keyboarding is made in the literature as an essential life skill, an important component of technological literacy (Glover et al., 2013).

The study also involved scanning the literature for recommendations on the best practices for providing more effective keyboarding education to students (Glover et al., 2013). The recommendations are summarized in the following areas:

- **When** should keyboarding instruction begin? A considerable number of experts recommend getting an early start on keyboarding instruction in elementary school, most commonly recommending Grades 3 and 4 as a starting point (Craig, 2006). Some authors advocate for an even earlier start, teaching foundational keyboarding skills and concepts in Kindergarten to Grade 2 (Hopkins, 1998; Zeitz, 2008).
- **What** needs to be taught? Students need to be taught to touch type with ergonomically proper posture and hand position. Typing speed should be focused on first, followed by improving accuracy.
- **How** keyboarding skills should be taught? Keyboarding skills should be taught sequentially so that new skills are built upon prior foundations. Early instruction should focus on foundational concepts and skills, followed by practice activities that are engaging and demonstrate varied applications.
- **Who** should teach keyboarding instruction? Research recommends that keyboarding instruction be primarily carried out by qualified classroom teachers (having competencies in keyboarding and related pedagogy, selecting appropriate software and teaching materials, integrating keyboarding into curricula, keyboarding assessment, special needs (Erthal, 2003; Indiana Department of Education, 2004), in combination with keyboarding education software.
- **How long** should lessons be? General guidelines indicate a total of 30 hours of keyboarding instruction, for several weekly sessions from 30 to 40 minutes in length.

Figure C: Literature Based Practices on Keyboarding Education

Literature Based Best Practices on Keyboarding Education

Glover et al. (2013) conducted a comprehensive literature review on best practices for providing effective keyboarding education to students. Key findings are as follows:

When	Who
 <p>When should keyboarding instruction begin?</p> <ul style="list-style-type: none"> • As early as Kindergarten • Most experts recommend Grades 3&4 	 <p>Who should teach keyboarding?</p> <ul style="list-style-type: none"> • Qualified classroom teachers
What	How long
 <p>What needs to be taught?</p> <ul style="list-style-type: none"> • Proper posture • Proper hand position • Focus on typing speed 	 <p>How long should lessons be?</p> <ul style="list-style-type: none"> • 30 minutes several times a week
How	Why
 <p>How should keyboarding skills be taught?</p> <ul style="list-style-type: none"> • Sequentially • Focus on foundations • Engaging practice activities 	 <p>Why is keyboarding important?</p> <ul style="list-style-type: none"> • Improvements in literacy and writing • More efficient use of time with computers

TDSB Keyboarding Instruction Pilot Study

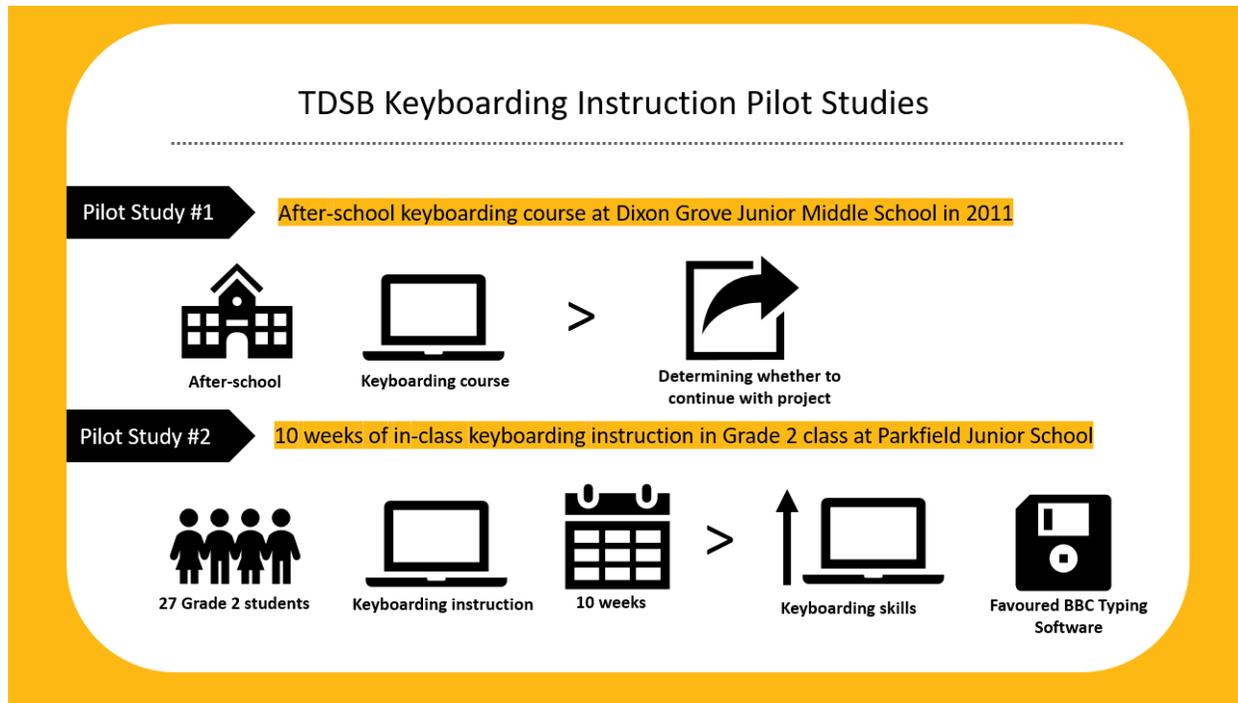
In addition to the review of existing research, Trustee Glover’s initiative also included two pilot studies. The goals of these pilots were to evaluate keyboarding software on TDSB infrastructure and evaluate the time it takes for students to type letters on the keyboard (Glover et al., 2013).

The first pilot was an after-school keyboarding course at Dixon Grove Junior Middle School in 2011. In 2012, the second keyboarding instruction pilot project was undertaken, also under the leadership of Trustee Glover, and involved 27 Grade 2 students at Parkfield Junior School. The students received 10 weeks of keyboarding instruction in March and May of 2012. The goal of the program was to have “all students who participated be able to touch type all letters on the keyboard by the end of the program” (Glover et al., 2013, p. 28), while the two research questions were to determine the effect of keyboarding software available within the TDSB (BBC Typing and Ultrakey) on Grade 2 students’ (1) perceptions of keyboarding and (2) keyboarding skills. Students completed a pre and post questionnaire on the first and last days of instruction, respectively (Glover et al., 2013).

In the second pilot study, it was found that by the end of the keyboarding instruction, students’ “keyboarding skills and positive perceptions of keyboarding” had both improved. Likewise, increases in students’ self-perceived typing ability, ability to learn how to type, and affinity for using computers were also demonstrated (Glover et al., 2013, p. 30). Students reported that they favoured the BBC Typing software over other programs. The study also involved classroom observations performed by teachers, who were given a check-list of proper keyboarding

techniques. Teachers observed that students improved in typing posture, hand positioning, and typing rhythm. In focus group interviews, teachers made positive comments about the progress of their students' typing skills.

Figure D: TDSB Keyboarding Instruction Pilot Studies



Recommendations

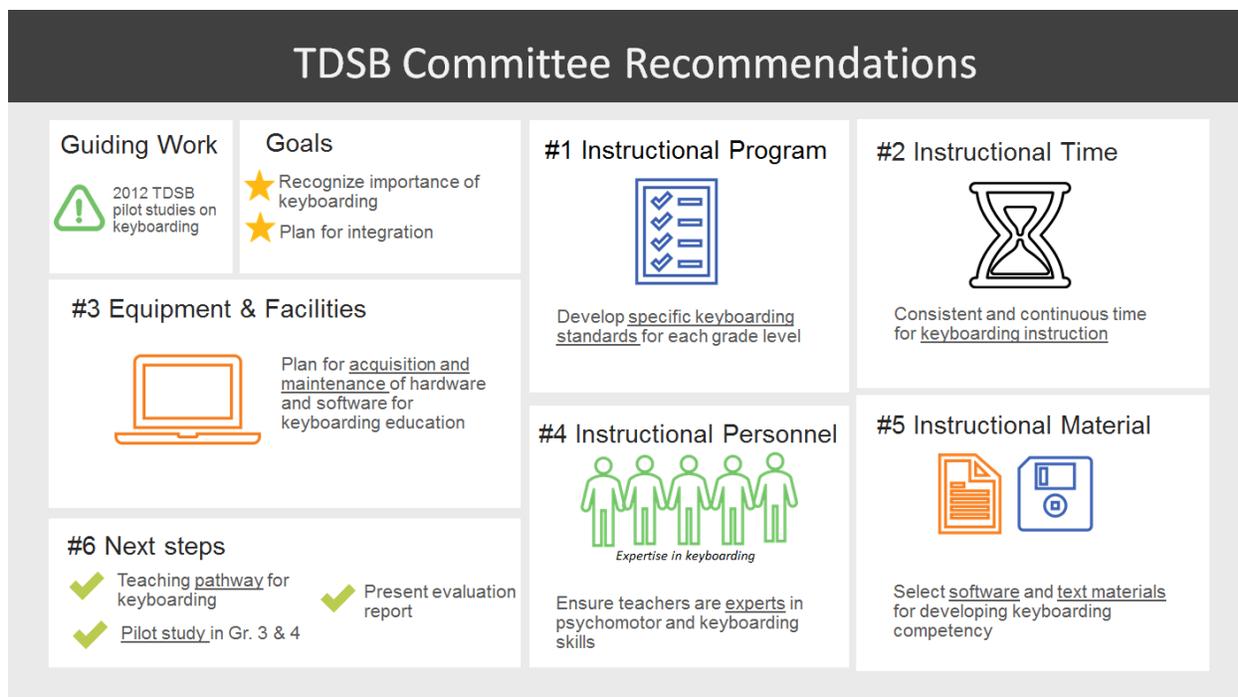
Trustee Glover's study concluded that it is necessary for the TDSB to "recognize the importance of keyboarding skills" and "develop a vision and plan to integrate them into the curriculum" (Glover et al., 2013, p. 39). Furthermore, the authors concluded with a recommendation that the TDSB form a committee to develop a strategy for keyboarding instruction. Inspired by the Indiana Department of Education's guidelines for keyboarding education, a series of recommendations were made in the following areas:

1. Instructional program – "The committee should develop keyboarding standards for students" that "should specify the goals for each grade level"
2. Instructional time – "The TDSB should encourage consistent and continuous time for keyboarding instruction"
3. Instructional equipment and facilities – "The TDSB needs to plan for the acquisition and maintenance of adequate hardware and software to support keyboarding education"
4. Instructional personnel – "The TDSB should ensure that teachers providing keyboarding instruction are experts in psychomotor and keyboarding skills"
5. Instructional materials – "The committee should select software and text materials for developing keyboarding competency" (Glover et al., 2013, pp. 41-43).

At the Board Meeting on May 25, 2016¹, the Board made a motion resolving that the Director of Education:

- (i) prepare a pathway for teaching students proper technique and posture when using a keyboard;
- (ii) find volunteer Grade 3 and 4 teachers willing to run a pilot with an evaluation component in families of schools in the fall of 2016;
- (iii) present an evaluation report to Program and School Services Committee in March 2017 with recommendations for next steps.

Figure E: TDSB Committee Recommendations



¹ Toronto District School Board (2016, May 25). *Regular Meeting*. Retrieved from <http://www.tdsb.on.ca/leadership/boardroom/agendaminutes.aspx?type=m&year=2016&filename=160525.pdf>

Purpose of the Evaluation and Research Questions

Purpose of the Evaluation

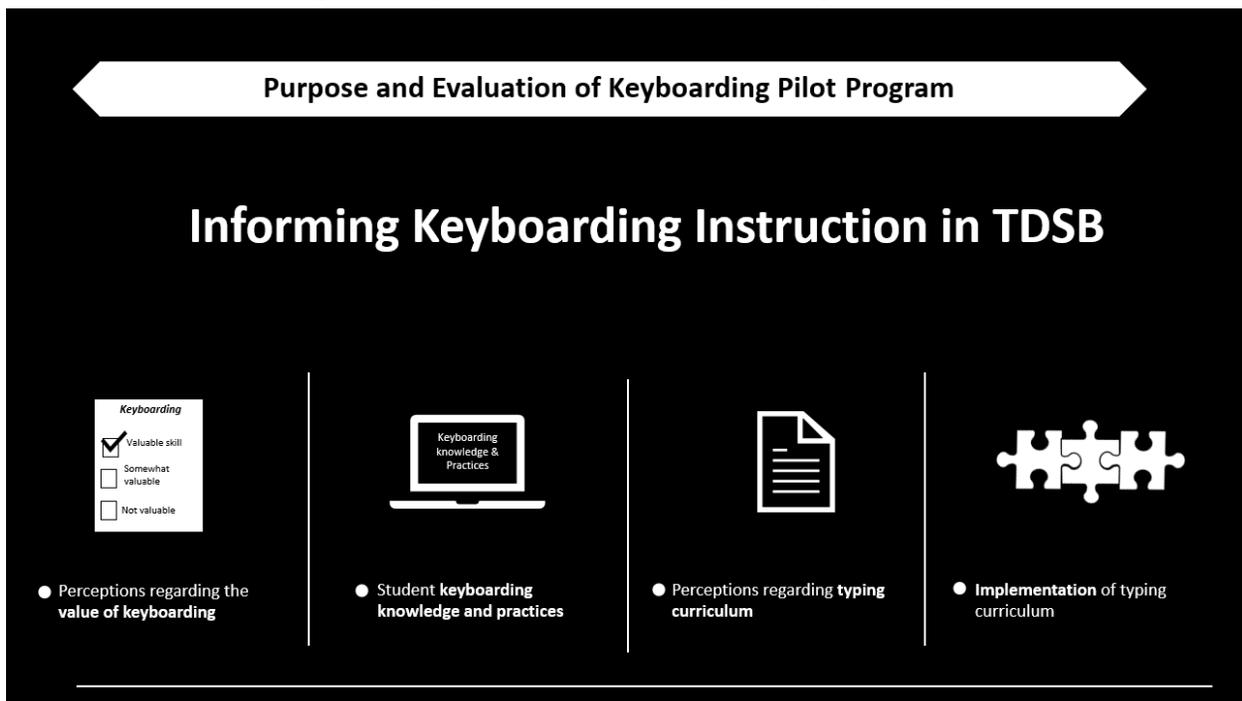
Following the Board motion in May 2016, the TDSB prepared to implement a Keyboarding Pilot Program with a research component in the 2016-17 school year. The purpose of the evaluation was to inform decisions regarding the integration of keyboarding instruction into the TDSB curriculum.

Research Questions

This evaluation is intended to answer the following research questions:

1. What are the perceptions of students, administrators, and teachers regarding the value of keyboarding, and how do their perceptions differ before and after the typing curriculum? Should keyboarding be part of the curriculum?
2. What effects does the typing curriculum have on students' keyboarding knowledge and practices?
3. What are the perceptions of students, administrators, and teachers regarding the typing curriculum?
4. How do teachers implement the typing curriculum? Are there any issues with the implementation?

Figure F: Purpose and Evaluation of Keyboarding Pilot Study



Methodology

In the fall of 2016-17, a Steering Committee was created to oversee the planning of the Keyboarding Pilot Program. The committee, which comprised of representatives of Senior Team, Central Coordinating Principals, a school administrator and teacher, and research department staff, met to discuss and establish expectations for the program. The committee also observed students at a school that volunteered to do a trial run of the typing curriculum and share their experiences with the program.

Following the Steering Committee meetings, an invitation was sent out in October 2016 to TDSB elementary schools to participate in the pilot program. After several discussions, the Executive Superintendent with responsibility for the pilot program randomly selected three elementary schools in each of the four Learning Centres, for a total of 12 schools. The schools are as follows:

- Albion Heights Junior Middle School
- Alexander Muir/Gladstone Ave Junior and Senior Public School
- Bowmore Road Junior and Senior Public School
- Briarcrest Junior School
- Brookmill Boulevard Junior Public School
- CD Farquharson Junior Public School
- Finch Public School
- Stanley Public School
- Wedgewood Junior School
- Wellesworth Junior School
- Wexford Public School
- Willow Park Junior Public School

All of the schools received information on the expectations for the program and the research requirements for their involvement. Teachers were expected to make a commitment of 30 minutes, minimum, per week for the program and to use the free online version of the typing curriculum used for the program, www.typing.com.

Teachers were also informed that students could login to Typing.com with their TDSB Google Apps for Education account (email address and network password). It was suggested that teachers set up a class on the site and have students self-enroll to enable monitoring of student progress. This was available using the free version of the site.

The requested timeline for the keyboarding instruction and research activities was January 27 to April 28, 2017. However, the intervention had a rolling start date, with a number of schools starting keyboarding instruction in October and November 2016.

As part of the research requirements, schools were asked to take part in data collection activities, which are described in the following section.

The study of the Keyboarding Pilot Program used a quasi-experimental, mixed methods research design in which data were collected before and after implementation of the program. A control group was not used in this research design. The primary methods for collecting data in the study were online pre and post surveys completed by three groups of stakeholders - students, administrators, and teachers. In addition, data were retrieved on students' progress with keyboarding from the typing curriculum website, www.typing.com.

To ensure confidentiality of the data in this study, results are not reported at a school, classroom, or student level, but at an aggregate level by combining the results for all schools.

Online Surveys

The *Administrator/Teacher* survey was designed to collect administrator and teacher perceptions of the value and benefits of acquiring keyboarding skills before and after the program. The survey also asked schools about their use of the typing curriculum and their feedback on the curriculum. Additionally, information was gathered on staff members' characteristics.

The *Student Survey* was designed to gather information on students' keyboarding knowledge and practices, and their perceptions of the value and benefits of keyboarding. The survey also gathered students' perceptions of the typing curriculum, along with information on student characteristics.

Typing Reports

As part of the research requirements, teachers were asked to export a report from Typing.com on their students' progress with keyboarding. Information in this report included the duration, accuracy, and average speed (words per minute) in typing for each student for each lesson they completed. Three quarters (75%) of classes returned their typing reports at the time of this report.

Prior to data collection, an information and consent form was distributed to students' parents/guardians/caregivers. In the consent form, parents/guardians could indicate if they did not want their child to participate in the research component.

Data Analysis

Survey data were analysed using both quantitative and qualitative data analysis methods. For the quantitative data analysis, including data retrieved from the typing reports, we used the Statistical Package for the Social Sciences (SPSS) Version 19. Data were analysed descriptively with frequencies and percentages. Paired sample t-tests were conducted on the student sample where survey data for the same respondent were available before and after the program. To examine temporal changes in keyboarding performance, duration, accuracy, and average speed from the least (i.e., before the pilot program) and most challenging (i.e., after the pilot program) Typing.com lessons were compared using paired samples t-tests. Statistically

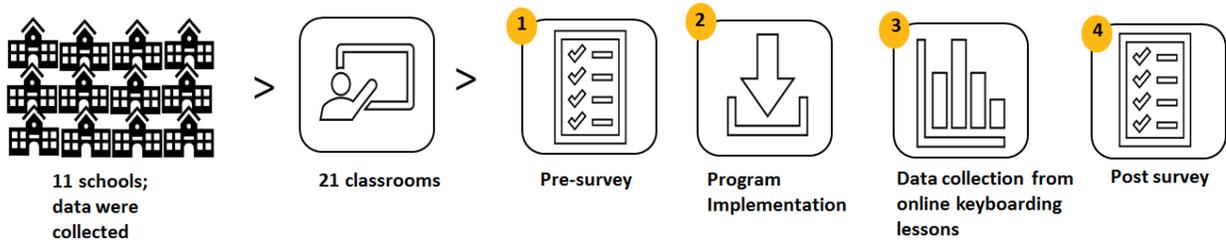
significant differences were reported where the p-level was less than .001 and .05 levels of significance. Open-ended comments on the surveys were coded and grouped into themes.

Figure G: Overview of Methodology

Methodology

>the details

>This study involved a mixed methods research design, with before and after online surveys completed by students, administrators and teachers. In addition, data was collected from students' online keyboarding lessons (i.e., Typing.com).



Results

In total, 11 schools and 21 classes participated in the Keyboarding Pilot Program. One school did not fully implement the Keyboarding Pilot Program and online surveys were incomplete due to staff availability.

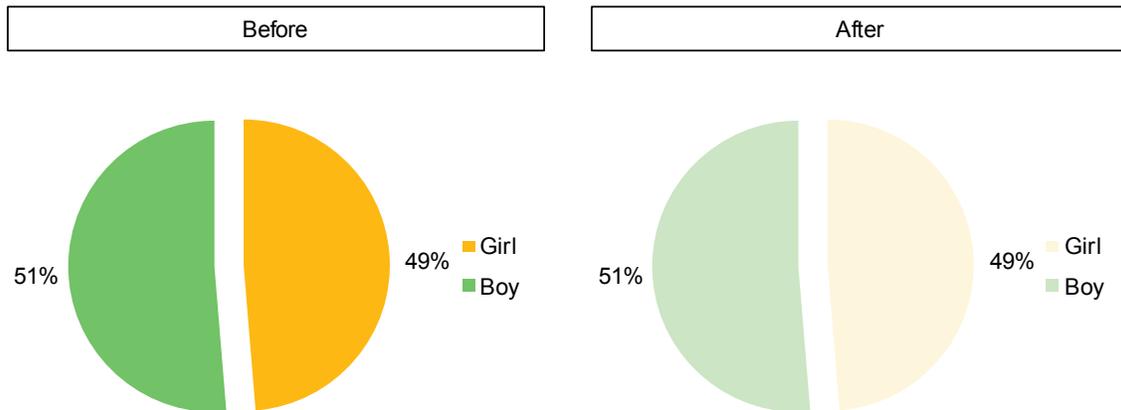
Student Findings

Student Characteristics

There were 226 and 256 students who responded to the surveys administered prior to and after the completion of the Keyboarding Pilot Program, respectively.

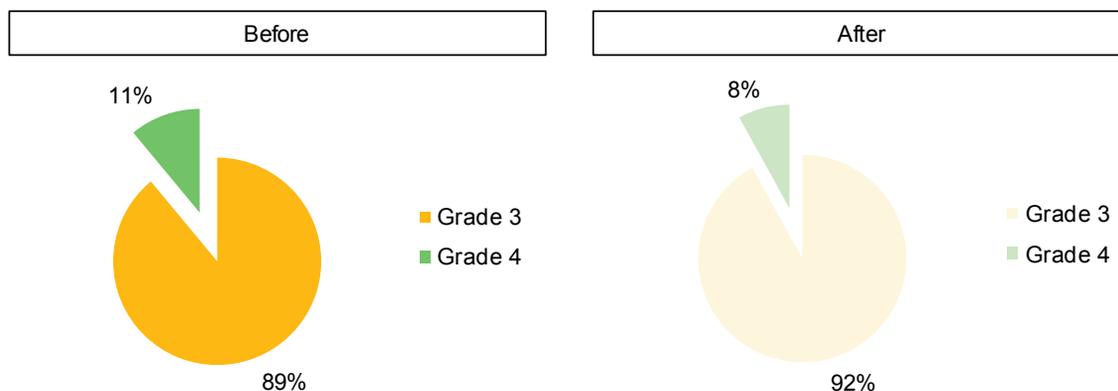
There was a nearly equal representation of male and female students participating in the Keyboarding Pilot Program. This representation remained constant over time (see Figure 1).

Figure 1: Student Gender Before and After the Keyboarding Pilot Program



Most students who were surveyed indicated that they were in Grade 3 before and after the program.

Figure 2: Student Grade Level Before and After the Keyboarding Pilot Program



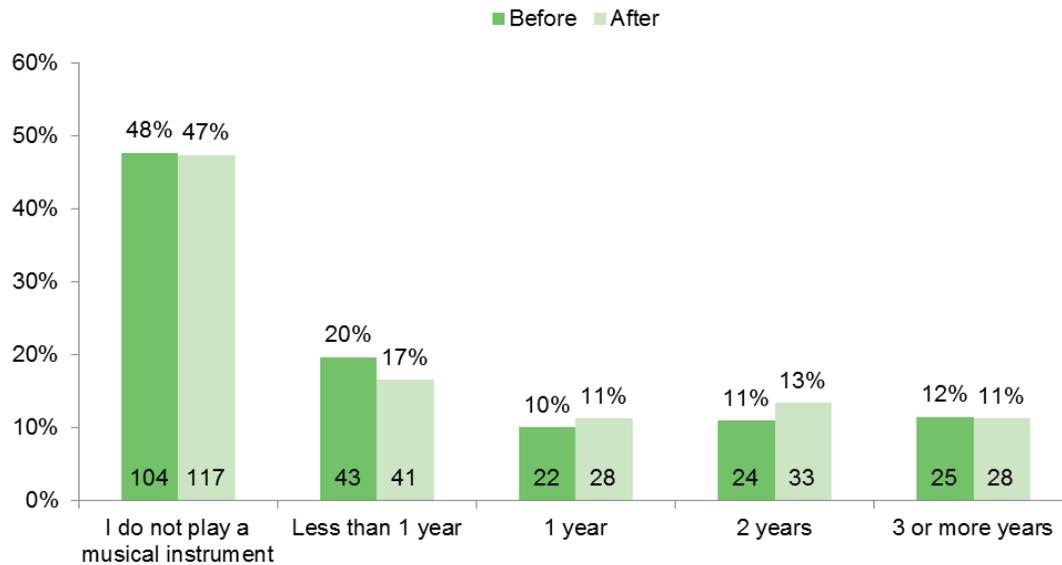
Students were asked to share their experience with musical instruments. The leading instruments played by students before and after the pilot program were the piano, guitar, and recorder. However, the majority of students revealed that they did not play any musical instrument (see Table 1).

Table 1: Instruments Played by Students Before and After the Keyboarding Pilot Program

Instrument	Before	After
Accordion	2	2
Bass	0	1
Cello	0	1
Drums	13	12
Flute	6	8
Guitar	19	26
Harmonica	4	4
Piano	68	76
Recorder	23	23
Saxophone	5	2
Trumpet	2	0
Tuba	0	3
Ukulele	0	1
Violin	4	6
Xylophone	1	0
I do not play any musical instruments	106	114

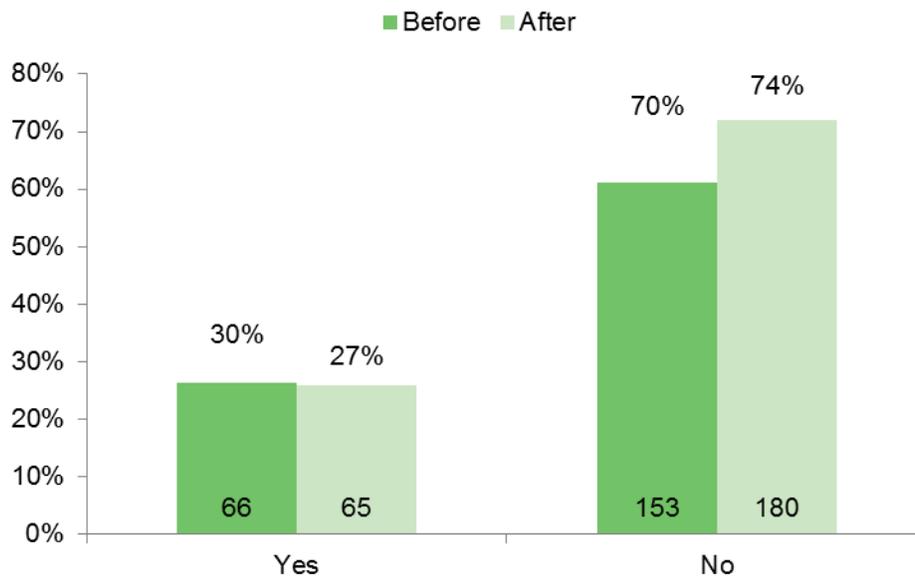
For those students with experience playing a musical instrument, most have been doing so for more than one year (see Figure 3).

Figure 3: Duration of Playing a Musical Instrument Before and After the Keyboarding Pilot Program



Approximately one third of students participated in music lessons before and after the program (see Figure 4).

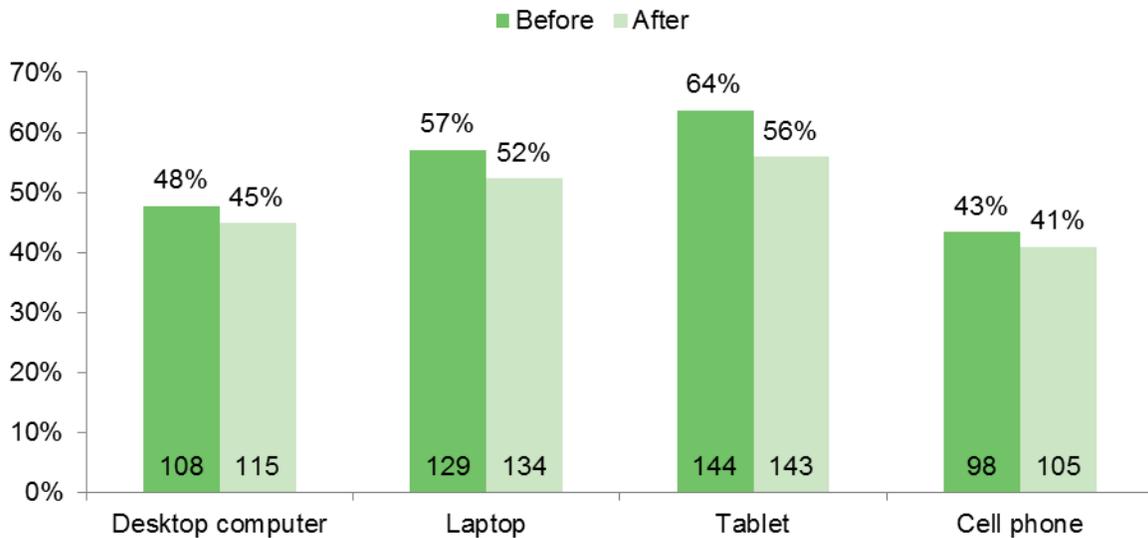
Figure 4: Music Lesson Participation Before and After the Keyboarding Pilot Program



Access to Technology and Internet

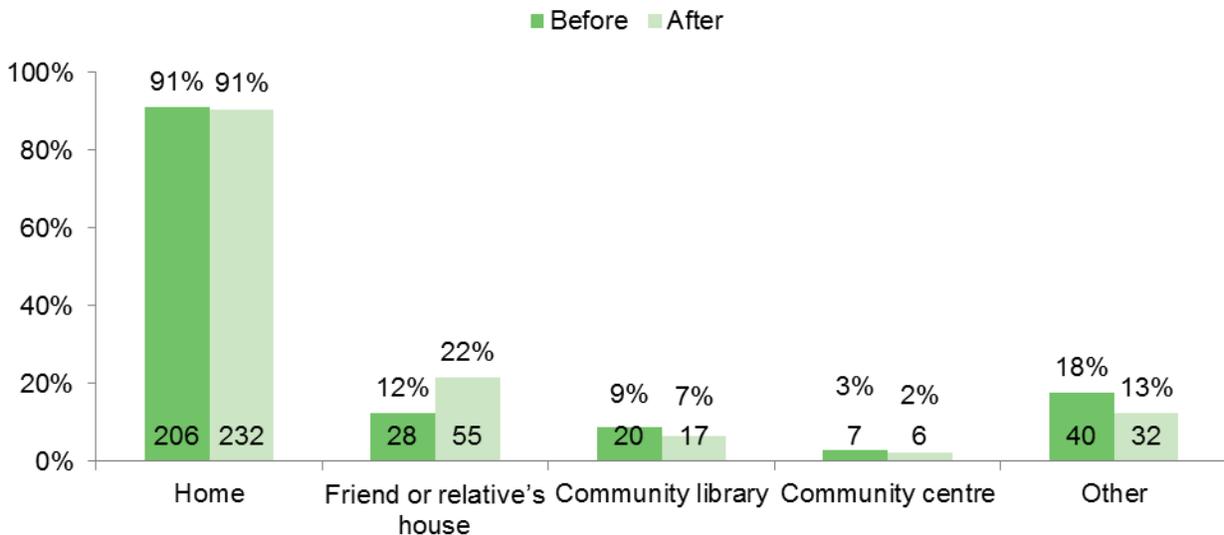
Half of students involved with this pilot program had access to a desktop computer, laptop, tablet or cell phone, which remained stable over time (see Figure 5).

Figure 5: Student Access to Modes of Technology Before and After the Keyboarding Pilot Program



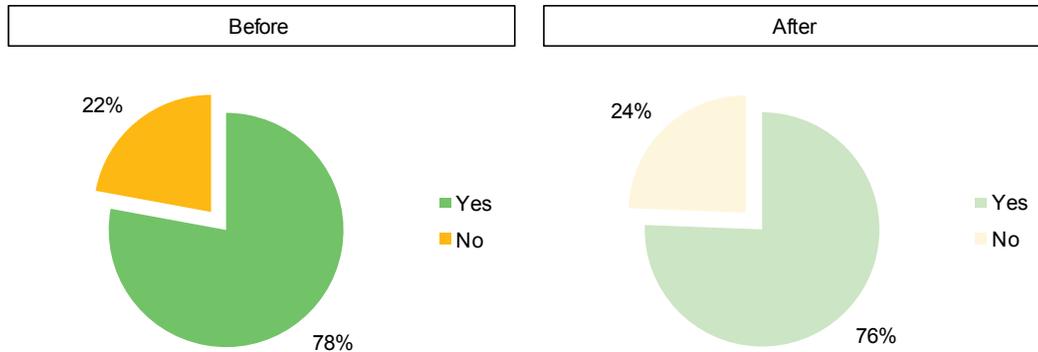
Students revealed that they accessed the aforementioned devices primarily at home, which was unchanged from before and after the pilot program, but there was a slight increase in accessing such devices at a friend's or relative's house (see Figure 6).

Figure 6: Student Access to Technology Before and After the Keyboarding Pilot Program



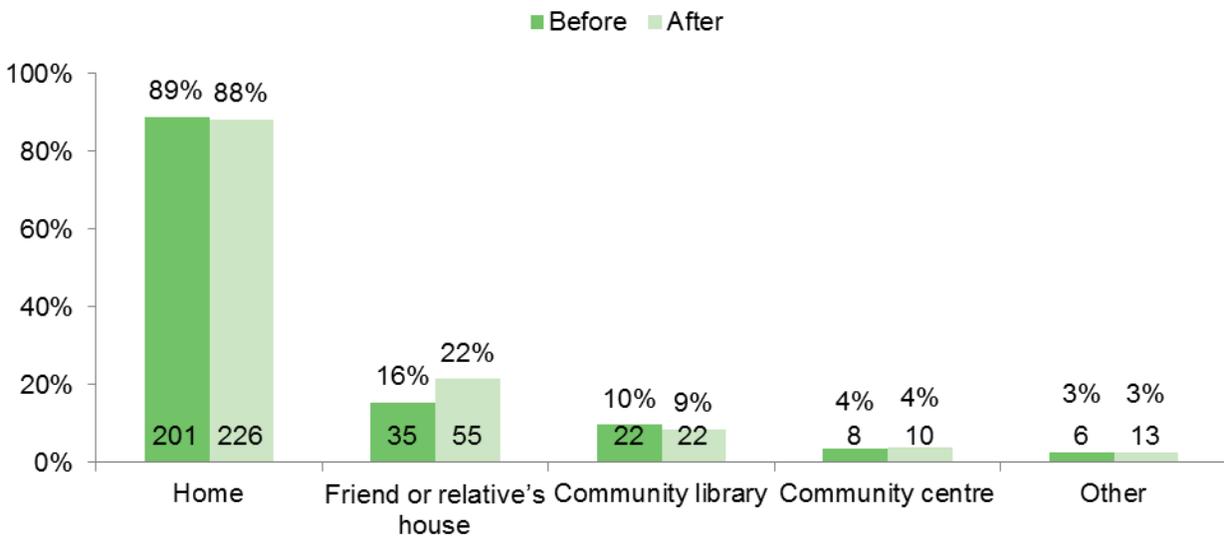
Over three quarters of students have access to the Internet outside of school which was unchanged over time (see Figure 7).

Figure 7: Student Access to Internet Outside of School Before and After the Keyboarding Pilot Program



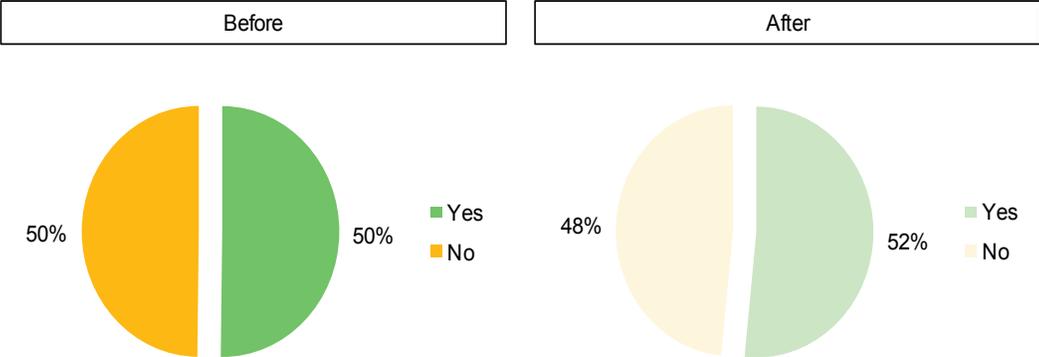
Outside of school, students who were surveyed access the Internet primarily at home, followed by at a friend’s or relative’s house or community library (see Figure 8).

Figure 8: Places of Internet Access Outside of School Before and After the Keyboarding Pilot Program



Finally, half of students use a computer for typing purposes outside of school. This finding was similar for before and after the pilot program.

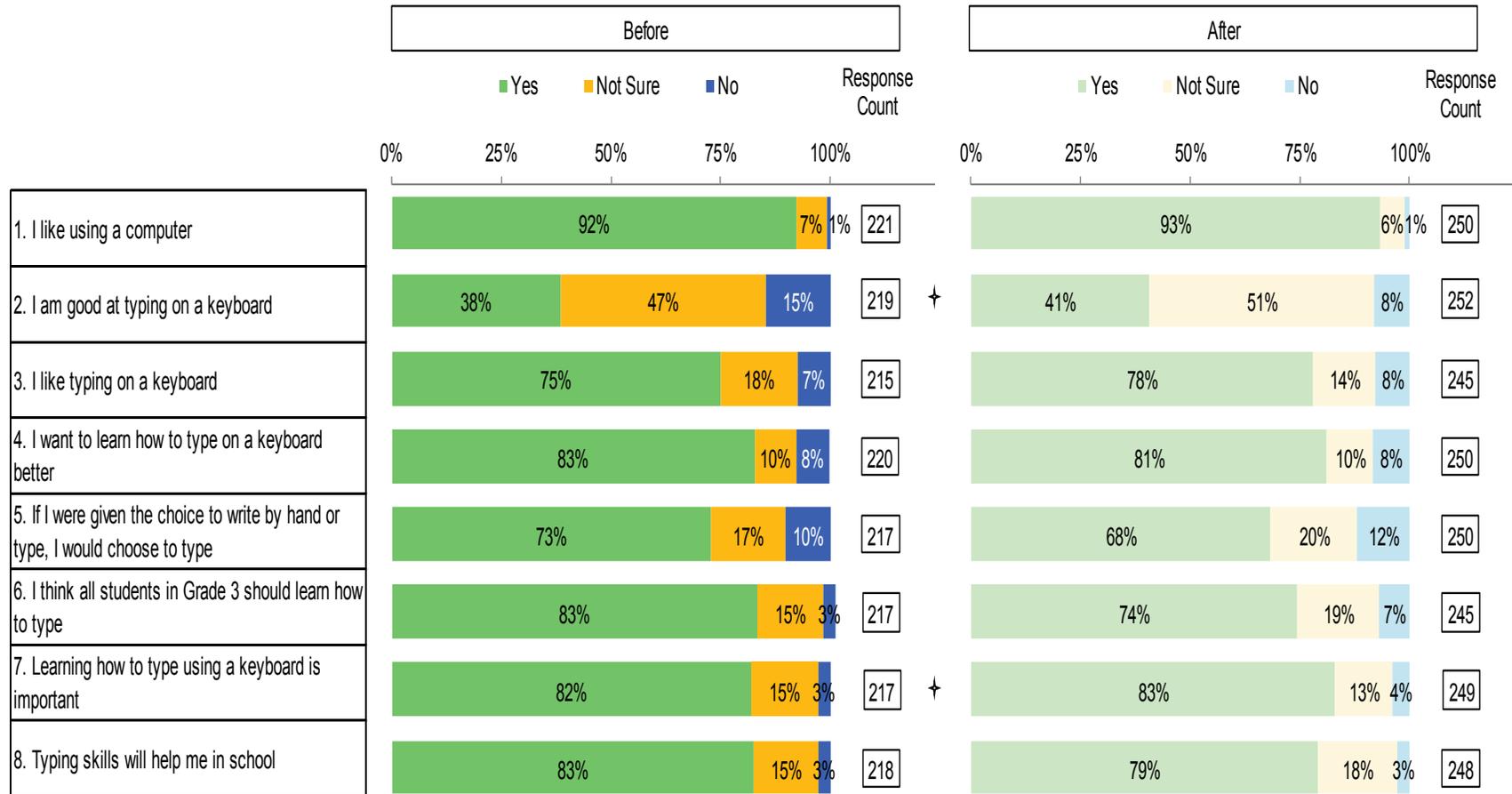
Figure 9: Student Computer Use for Typing Outside of School Before and After the Keyboarding Pilot Program



Attitudes and Perceptions Regarding Technology and Keyboarding

Survey questions explored students’ attitudes and perceptions regarding technology and keyboarding (see Figure 10). Before the Keyboarding Pilot Program, most students reported that they liked using a computer and typing on a keyboard as well as expressed an interest in learning how to type on a keyboard better, and would prefer to type than write by hand. The majority of surveyed students also believed that students in Grade 3 should learn how to type, learning how to type using a keyboard is important, and that typing skills will help them in school. Interestingly, approximately a third of students felt that they were good at typing on a keyboard. These patterns remained consistent after the pilot program with a few exceptions. First, paired samples t-tests demonstrate that keyboarding self-efficacy significantly increased from before to after the pilot program. Second, paired samples t-tests show a significant difference between before and after scores for the importance of learning how to type using a keyboard.

Figure 10: Students' Attitudes and Perceptions regarding Technology and Keyboarding Before and After the Keyboarding Pilot Program

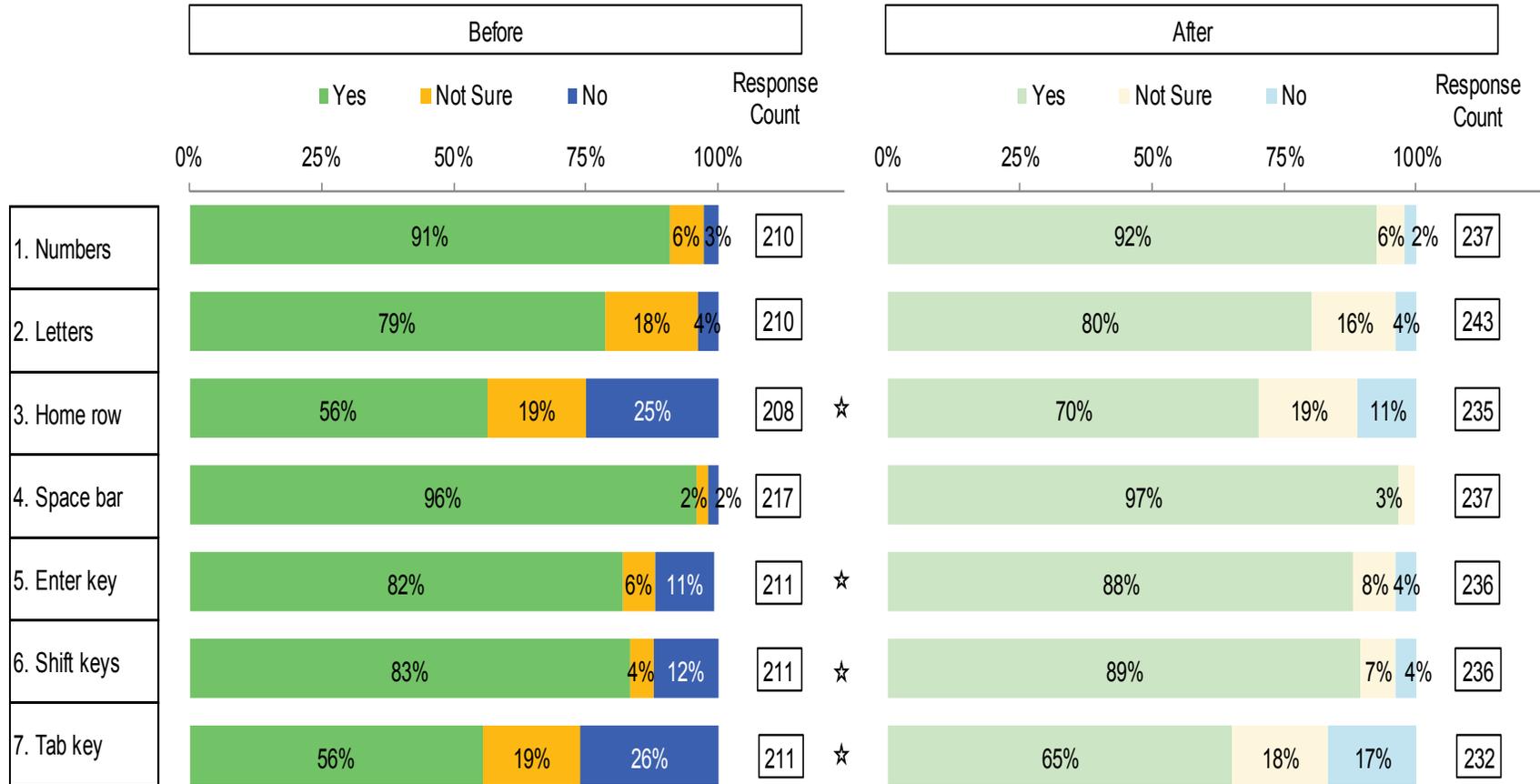


Significant difference over time ☆ (P < 0.001) † (P < 0.05)

Keyboarding Knowledge

Students' knowledge of keyboarding keys was also assessed (see Figure 11). Before the Keyboarding Pilot Program, almost all students indicated that they knew where the number, space bar, enter, and shift keys were on the keyboard. Only half of students knew where the home row and tab keys were. Following the pilot program, paired samples t-tests showed significant increases in students' knowledge of the home row, enter, shift and tab keys.

Figure 11: Students' Keyboarding Knowledge Before and After the Keyboarding Pilot Program

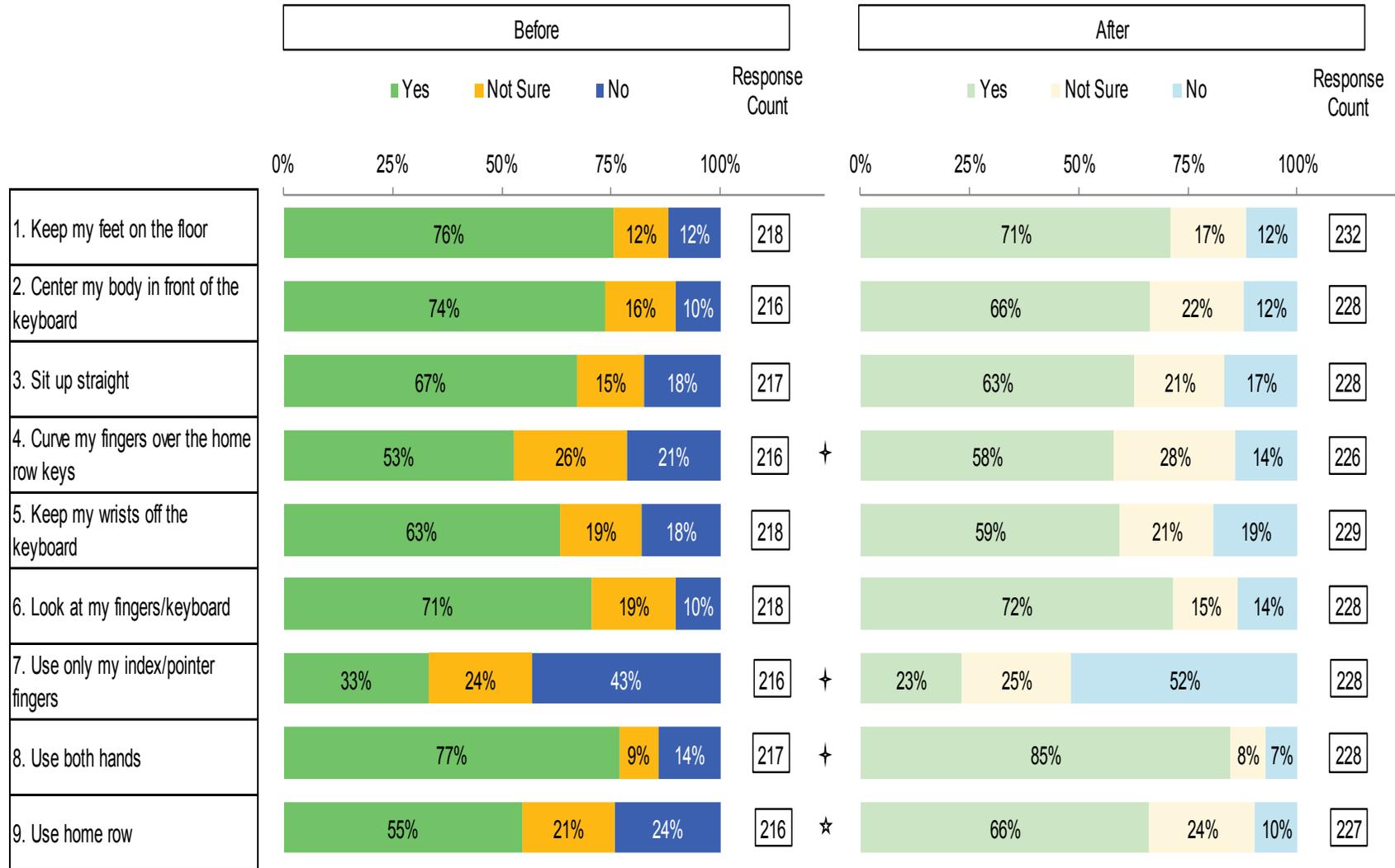


Significant difference over time ☆ (P < 0.001) † (P < 0.05)

Keyboarding Technique and Practices

Students self-assessed their keyboarding technique before and after the pilot program (see Figure 12). Before the pilot program, three quarters of respondents indicated that they kept their feet placed on the floor, centered their body in front of the keyboard, looked at their fingers/keyboard, and used both hands. Two thirds of students stated that they typically sat up straight and kept their wrists off the keyboard when typing. Half of students curved their fingers over the home row keys and used the home row, while one third of students used the hunt and peck method of typing. These patterns were partially supported after the pilot program. Paired samples t-tests revealed that more students curved their fingers over the home row, used both hands and used the home row as well as fewer students used the hunt and peck method after participating in the Keyboarding Pilot Program.

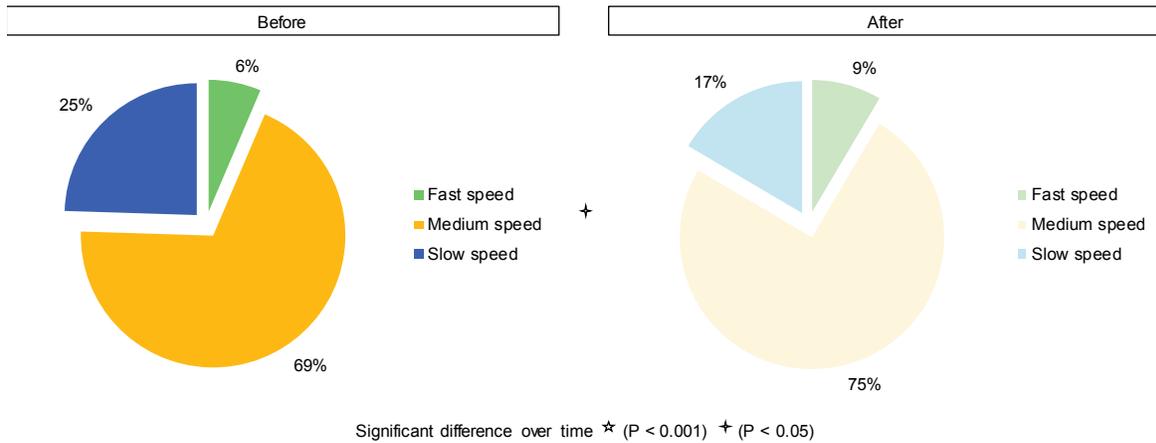
Figure 12: Keyboarding Technique of Students Before and After the Keyboarding Pilot Program



Significant difference over time ☆ (P < 0.001) † (P < 0.05)

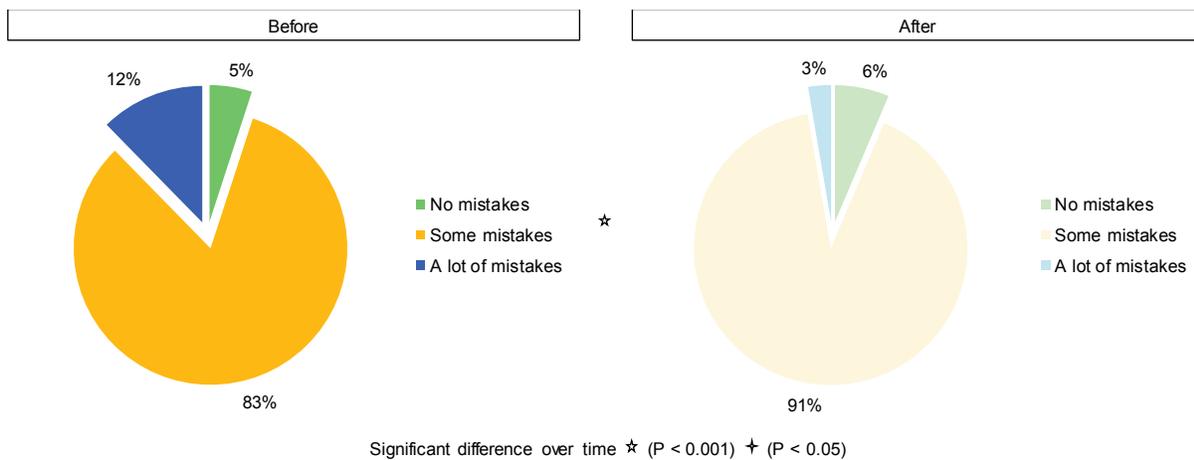
In addition, students self-assessed their typing speed and accuracy (see Figures 13 and 14). Before the pilot program, 69%, 25%, and 6% of students believed that they typed at a medium, slow, and fast speed, respectively. Paired samples t-tests found statistically significant improvements following the pilot program as 75%, 17%, and 9% of students stated that they typed at a medium, slow, and fast speed, respectively.

Figure 13: Students' Self-Assessment of Typing Speed Before and After the Keyboarding Pilot Program



Similarly, the majority of students felt they made some mistakes with 12% and 5% indicating a lot and no mistakes, respectively, prior to commencing the pilot program. Paired samples t-tests also found statistically significant improvements following the pilot program as 91%, 3%, and 6% of students stated that they made some, a lot, and no mistakes when typing, respectively.

Figure 14: Students' Self-Assessment of Accuracy Before and After the Keyboarding Pilot Program



Perceptions of the Keyboarding Pilot Program

To better understand the aforementioned findings, students' experiences with and perceptions of the Keyboarding Pilot Program should be considered.

First, three quarters of students (N = 166) indicated that their teacher asked them to practice typing in class during the 2016-17 school year (see Figure 15). This means that most students already had some exposure to typing prior to completing the survey administered before the pilot program. Almost half of these students had six keyboarding sessions before the pilot program formally began (see Figure 16).

Figure 15: Students' Exposure to Typing in Class Before the Keyboarding Pilot Program

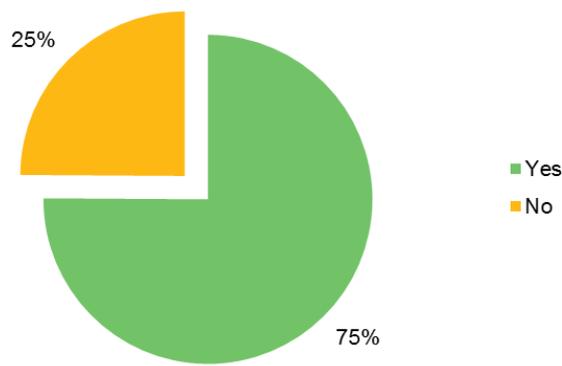
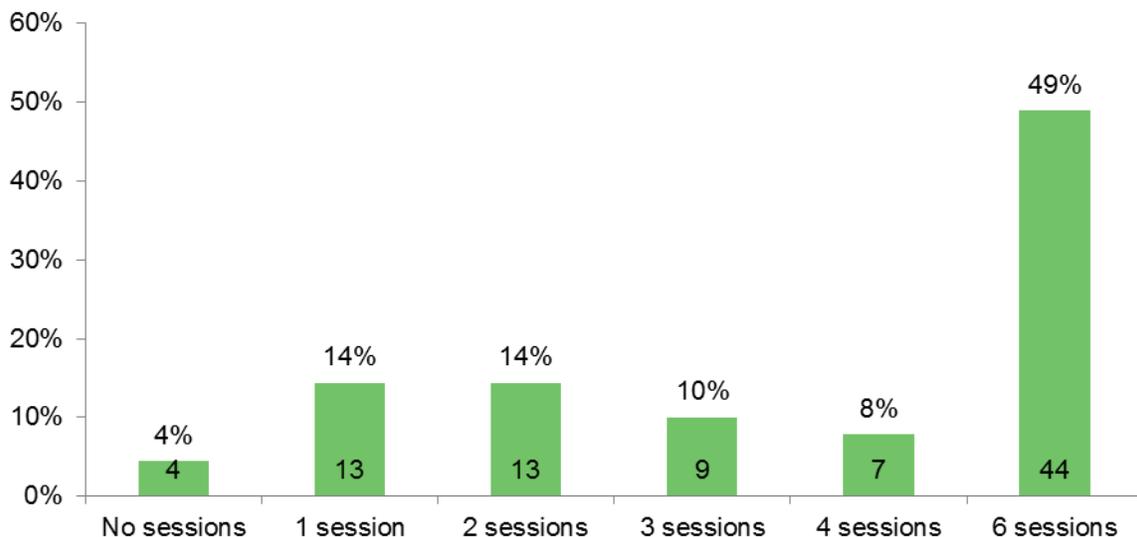


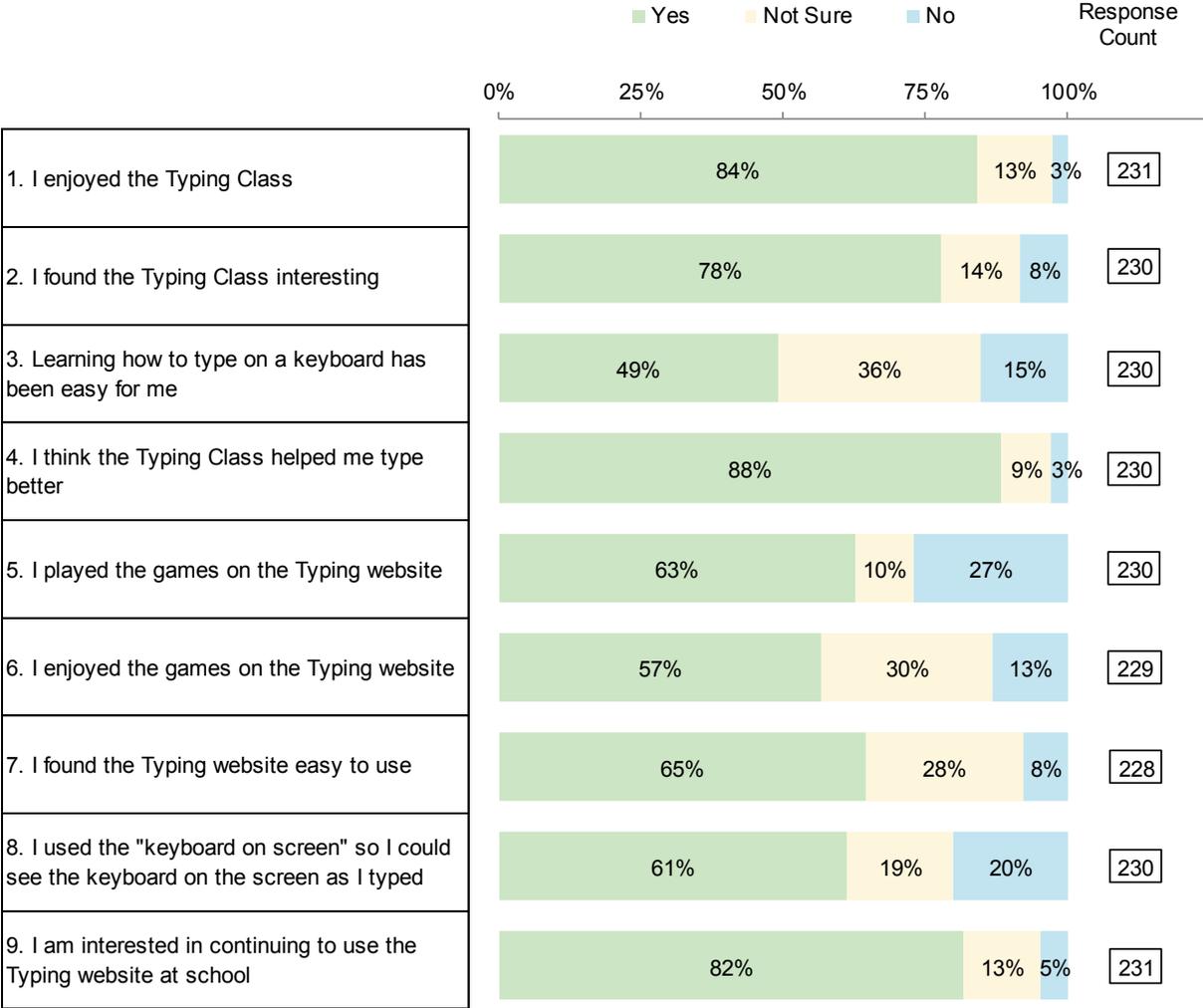
Figure 16: Number of Keyboarding Sessions in Class Before the Keyboarding Pilot Program



Following their involvement in the Keyboarding Pilot Program, students were asked to share their thoughts and experiences in closed-ended (see Figure 17) and open-ended formats, which are further explored in the following section.

Most students shared that they enjoyed the typing class, found it interesting and believed it improved their typing abilities, so much so that students expressed an interest in continuing their involvement. Half of students surveyed admitted that learning how to type on a keyboard was an easy feat. A slight majority of students played the games on the typing website and found it enjoyable, found the typing website user-friendly and used the “keyboard on screen” feature.

Figure 17: Students’ Perceptions of the Keyboarding Pilot Program



The final component of the survey administered after the pilot program was for students to write a message to their principal explaining if they thought students should participate in the typing class. There were 256 students who provided a response. Nearly all students believed

that typing was an essential skill and participating in the typing class was important and beneficial. Students shared the beneficial outcomes from their involvement, such as improved accuracy and speed, as well as technique. Specifically, students shared that they now use all of their fingers, both hands and do not rely on looking at the keyboard. Some students explained that the pilot program helped build muscle memory and typing endurance.

“I think that grade 3s should use this website because it helped me improve my typing a lot and I think it will help other grade 3s.” (Girl, Grade 3)

“I think all students from grade 3+ should go to typing class. [...] Before I used typing class, I was slow at typing. [...] The games are fun and educational, too. If all grade 3+ students participated, we would build up our endurance and be really good at typing.” (Girl, Grade 3)

Students found that the typing class was fun and fostered self-reliance. Another noteworthy outcome was the expansion of students’ vocabulary through this pilot program.

“I like typing better than speaking into the computer and having the computer write the words for me.” (Boy, Grade 3)

Many students commented on the utility of typing skills for their futures. They explained having a command of typing would be incredibly beneficial for homework and projects in the short-term as well as in the long-term, such as post-secondary education and the workforce.

“I think students should participate in typing class because it is important to [type] in grade 3 and it is useful when you are a [grown] up.” (Boy, Grade 3)

“I think everyone should learn to type because it is extremely useful and it is a lot neater than writing. It also helps get your work done faster and better. It also helps if you have a project, just type it out! Plus you will need to know how to type to get a job.” (Boy, Grade 3)

There were seldom comments negative in nature. A few students expressed concern over discomfort they experienced, likely due to ergonomic issues. Other students felt bored when participating in the typing class.

“[First] I think it hurts my hands and would hurt other people's hands. [Lastly], we could just type how we always type and not have to type at school.” (Girl, Grade 3)

Students' Keyboarding Performance

Student keyboarding performance data retrieved from Typing.com were also evaluated. Descriptive analyses revealed that, on average, students attempted 9.68 lessons but fully completed 6.95 lessons. While the amount of time spent on Typing.com lessons did not statistically differ before or after the pilot program (see Figure 18), accuracy and words per minute (i.e., speed) did. Students' accuracy rate significantly increased (see Figure 19) while their words per minute significantly decreased (see Figure 20). That is to say, students were typing somewhat slower but with greater accuracy (i.e., fewer errors).

Figure 18: Students' Mean Duration on Typing.com Lessons Before and After the Keyboarding Pilot Program

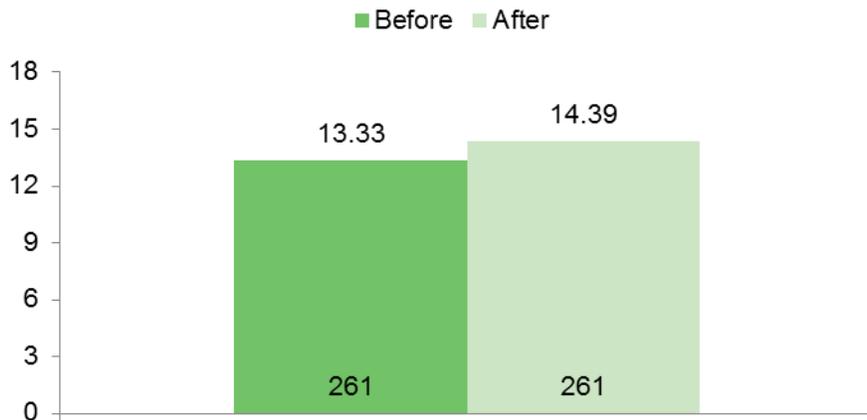


Figure 19: Students' Mean Accuracy Rate on Typing.com Lessons Before and After the Keyboarding Pilot Program

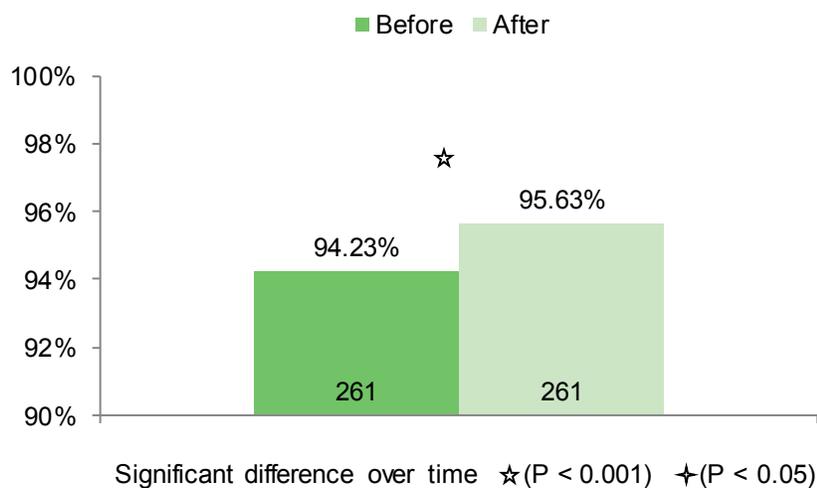
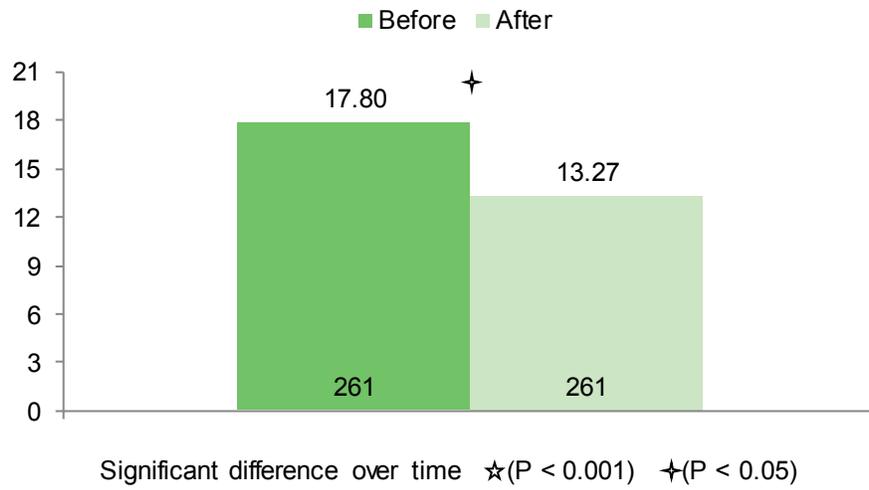


Figure 20: Students' Mean Words per Minute on Typing.com Lessons Before and After the Keyboarding Pilot Program

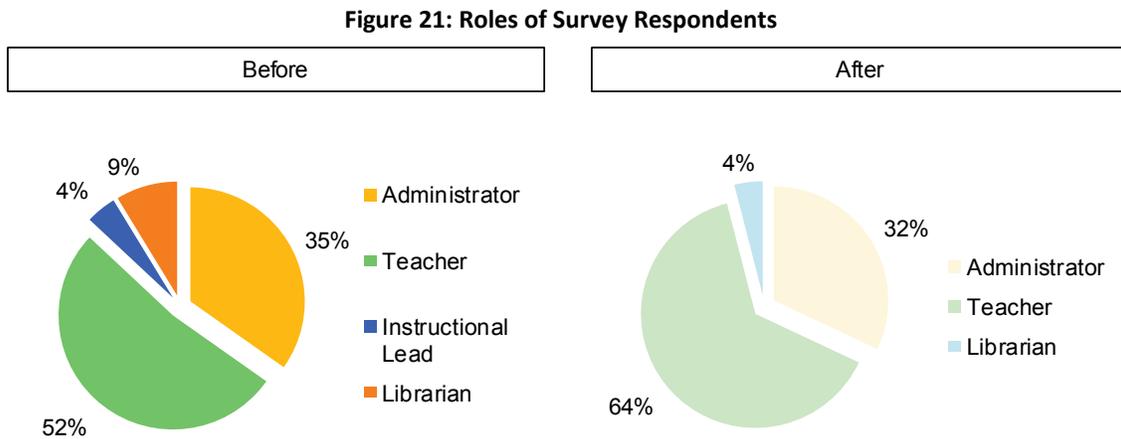


Staff Findings

Staff Characteristics

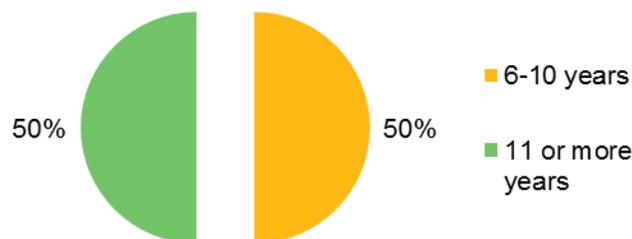
There were 23 and 25 staff members who responded to the surveys administered prior to and after the completion of the Keyboarding Pilot Program, respectively.

More than half of survey respondents identified their role as classroom teacher, followed by administrator, librarian, and instructional lead before and after the pilot program (see Figure 21).



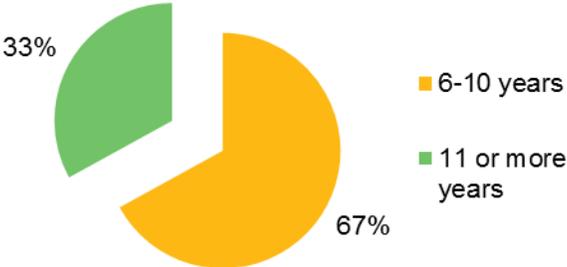
Administrators were asked how many years they taught prior to becoming an administrator (see Figure 22). There was an equal proportion of administrators who had 6-10 years and 11 or more years of experience.

Figure 22: Years Teaching Prior to Becoming an Administrator



Two thirds of administrators have served in this role for 6 to 10 years, while one third has served for more than 11 years (see Figure 23).

Figure 23: Number of Years as a School Administrator



Prior to becoming an administrator, most staff members were classroom teachers, followed by working in library or media services and special education (see Table 2).

Table 2: Subject Area(s) Taught Prior to Becoming an Administrator

Subject Area	N
Classroom Teacher	6
Library or Media Services	1
Special Education	1

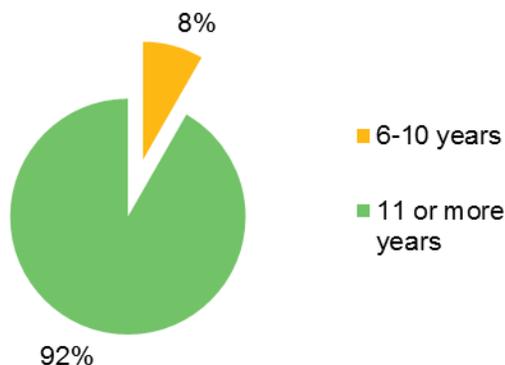
More than half of teachers surveyed indicated that they taught Grade 3, followed by Grade 2 and Grade 4 (see Table 3).

Table 3: Grade Level(s) Taught by Participating Teachers

Grade Level	N
Grade 1	1
Grade 2	4
Grade 3	11
Grade 4	3
Grade 5	1

Nearly all teachers participating in the Keyboarding Pilot Program have been teaching for more than 11 years (see Figure 24).

Figure 24: Number of Years Teaching



Nearly all teachers participating in the pilot program were classroom teachers, followed by working in library or media services and special education (see Table 4).

Table 4: Subject area(s) Taught by Participating Teachers

Subject Area	N
Classroom Teacher	10
Library or Media Services	1
Special Education	1

Perceptions of Keyboarding

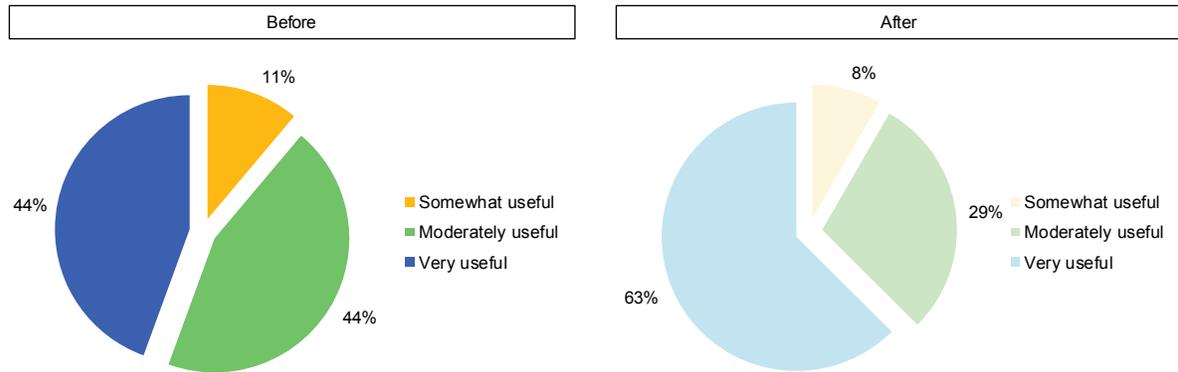
Survey respondents' perceptions surrounding keyboarding were evaluated before and after the Keyboarding Pilot Program (see Figure 25). Prior to their involvement, most staff members strongly agreed or agreed that keyboarding is an important skill for students to learn, a lifelong skill, a foundational skill for today's technological age, helps students produce and communicate written information more efficiently and can be applied across the curriculum. The majority of respondents also strongly agreed or agreed that keyboarding should be mandatory for all students, is important for the formation of good keyboarding habits, and that keyboarding instruction should focus on technique and accuracy rather than speed. Over three quarters of staff members strongly disagreed or disagreed that keyboarding is outdated, the hunt and peck method of typing is as efficient as keyboarding and keyboarding instruction is not necessary as students already know how to use a keyboard through their use of computers and other technology tools. Study design prevents statistical comparisons over time; however, a frequency comparison reveals that more staff members are in strong agreement or agreement with the aforementioned perceptions after the Keyboarding Pilot Program. After the Keyboarding Pilot Program, half of staff members strongly disagreed or disagreed that they would prefer the paid version of the typing curriculum, while half somewhat agreed that they would be willing to upgrade to the paid version.

Figure 25: Staff Members' Keyboarding Perceptions Before and After the Keyboarding Pilot Program



Before the Keyboarding Pilot Program, less than half of staff members believed that with the advances in new technologies, such as smartphones and touch screen technologies (e.g., tablets), keyboarding will be very useful in the future (see Figure 26). After the pilot program, nearly two thirds of staff members felt this way.

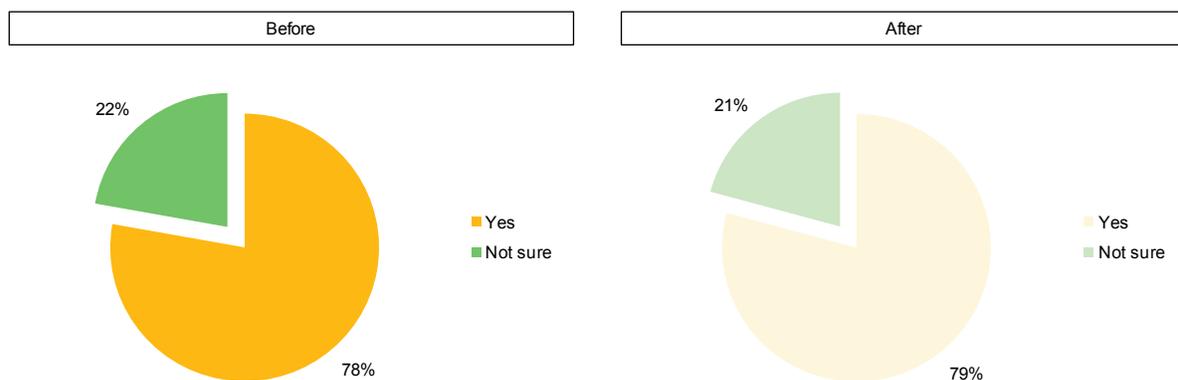
Figure 26: Staff Beliefs Regarding the Usefulness of Keyboarding in the Future Before and After the Keyboarding Pilot Program



Attitudes about Keyboarding Instruction

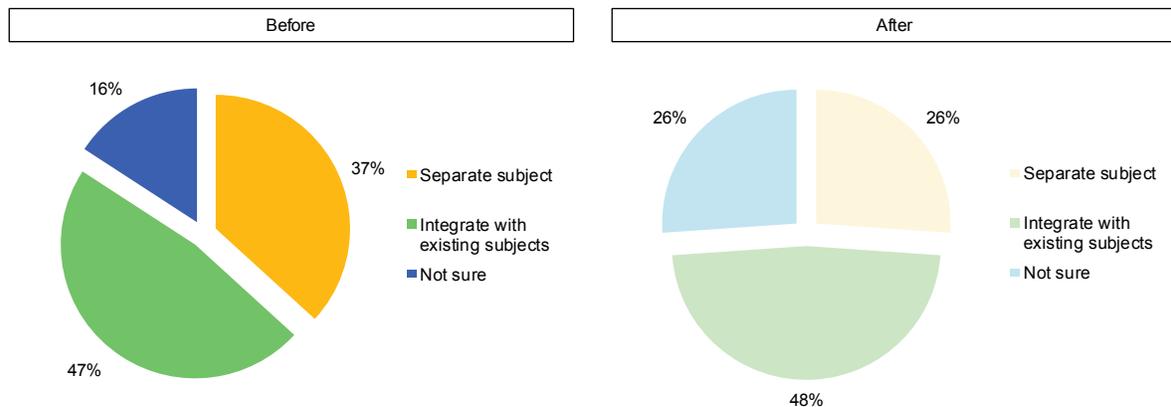
Teachers’ and administrators’ position on whether keyboarding instruction should be part of the Ontario school curriculum was unchanged from before to after their involvement in the pilot program (see Figure 27).

Figure 27: Inclusion of Keyboarding Instruction in Ontario’s School Curriculum Before and After the Keyboarding Pilot Program



Teachers' and administrators' position on whether keyboarding instruction should be integrated with the instruction of other subjects remained the same from before to after their involvement in the pilot program (see Figure 28). However, after the pilot program, fewer respondents believed it should be taught separately, while more respondents were unsure.

Figure 28: Integration of Keyboarding Instruction with other Subjects Before and After the Keyboarding Pilot Program



Before and after the Keyboarding Pilot Program, respondents who answered “Integrate with existing subjects” were asked to detail a way in which they thought typing could be applied within the existing curriculum.

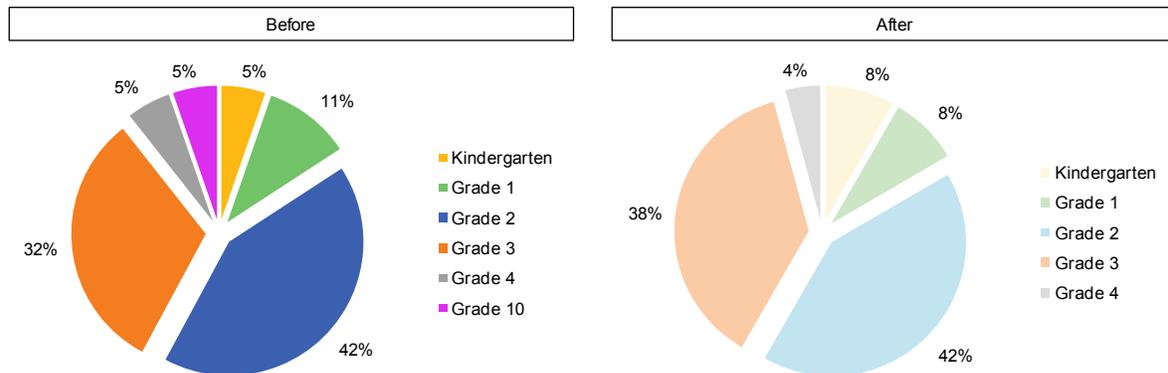
Before the Keyboarding Pilot Program, 8 staff members identified that typing could be integrated within the following existing subject areas: social studies, science, mathematics, technology, media literacy, and languages. They added that typing skills could be incorporated when conducting research for and preparing different projects or reports. Another respondent shared that typing is useful in any subject that produces written work, including graphing and online discussions (e.g., Google Classroom). As succinctly conveyed by one respondent, “Things don't need to be taught in isolation as it's inefficient to do so. Things should be learned in context.”

After the Keyboarding Pilot Program, 11 staff members identified similar subject areas throughout which typing could be integrated: social studies, science, media literacy, literacy and languages. They explained that this 21st century skill can supplement curricula as it “is a tool for communication and it can both improve and inspire communication in any of the subject areas; writing, presentation, inquiry, blogging, etc.” Another staff member shared:

“Although keyboarding is essential, like all forms of language acquisition, it must be part of a meaningful task. Students need to think digitally, but at same time must be given opportunities to practise. It is essential that instruction be blended.”

By extension, most educators believed that students should begin receiving keyboarding instruction in the primary grades (see Figure 29). This belief was similar before and after the pilot program.

Figure 29: Grade Level to Begin Keyboarding Instruction Before and After the Keyboarding Pilot Program

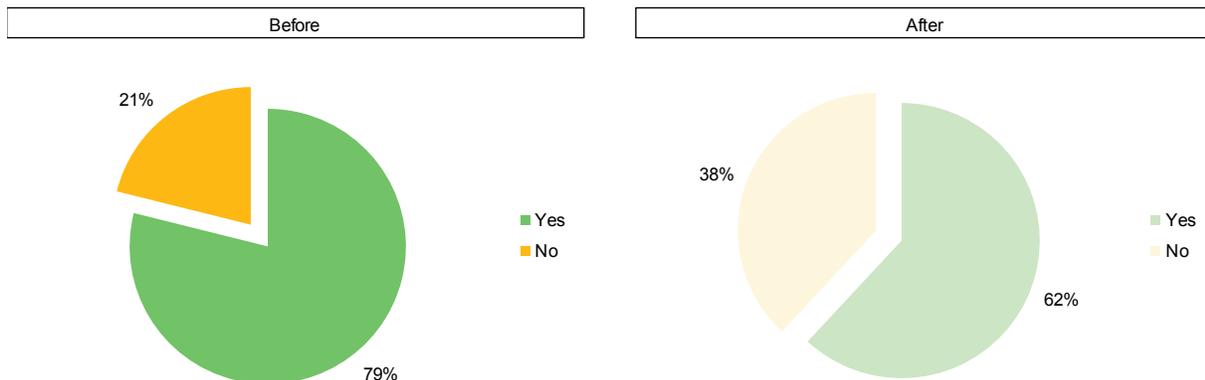


Experience with Keyboarding Instruction

Survey respondents' experience with keyboarding instruction was also assessed prior to and following their participation in the pilot program.

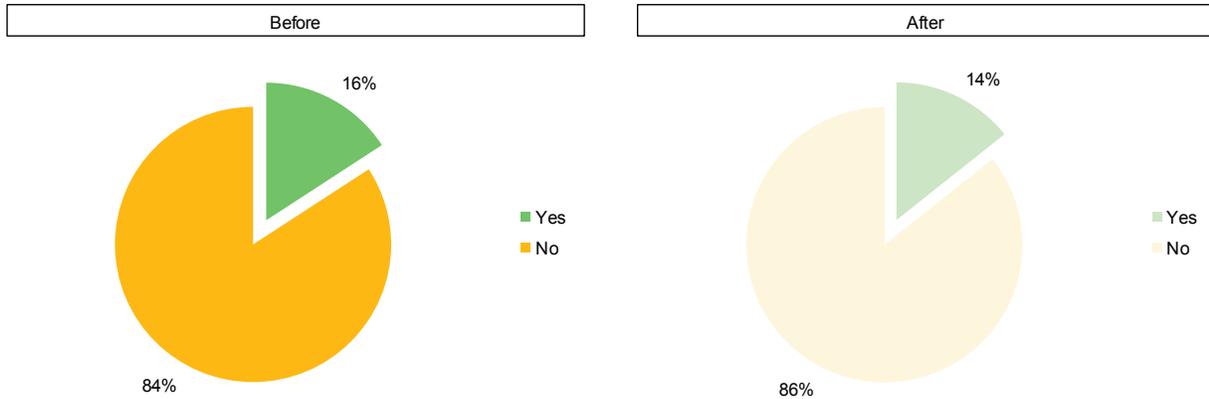
Three quarters of staff members indicated that they had formal training and/or coursework in typing or keyboarding before the pilot program, while two thirds did afterwards (see Figure 30). This discrepancy may reflect the slightly different sample at each time point, thereby reflecting differing previous experiences.

Figure 30: Formal Training/Coursework in Typing or Keyboarding Before and After the Keyboarding Pilot Program



As depicted in Figure 31, prior typing or keyboarding instruction before their participation in the pilot program was similar across time.

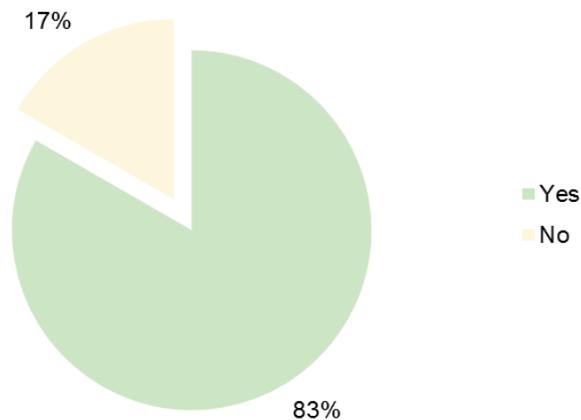
Figure 31: Prior Typing or Keyboarding Instruction Before and After the Keyboarding Pilot Program



Implementation of the Keyboarding Pilot Program

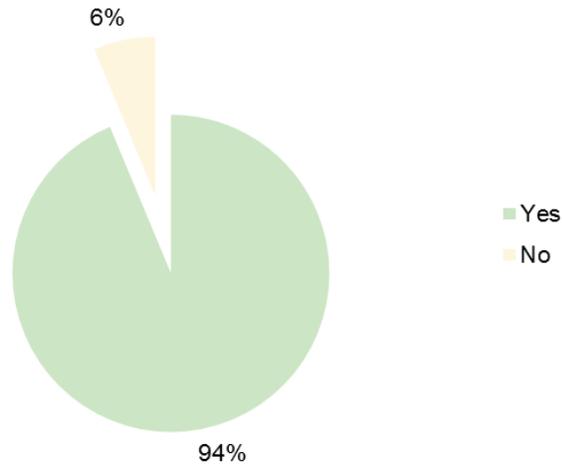
Interestingly, 83% of respondents reported that their school was engaged in keyboarding instruction using the typing curriculum (Typing.com) prior to the start of the pilot program (see Figure 32).

Figure 32: School Engagement in Keyboarding Instruction using Typing.com Curriculum, Reported After the Keyboarding Pilot Program



By comparison, nearly all respondents engaged in keyboarding instruction using the typing curriculum (Typing.com) prior to the start of the pilot program (see Figure 33).

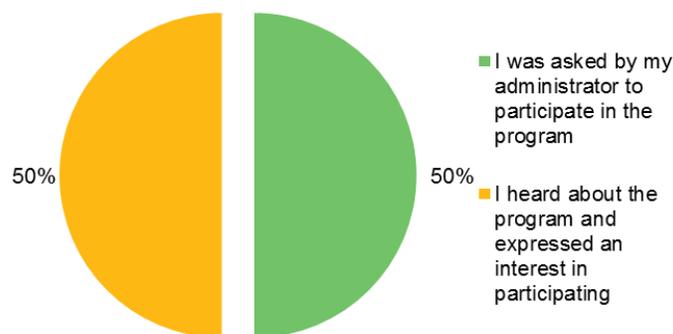
Figure 33: Class Engagement in Keyboarding Instruction using Typing.com Curriculum, Reported After the Keyboarding Pilot Program



For schools or classes that were not engaged in keyboarding instruction using the typing curriculum (Typing.com), respondents were asked to clarify this information after the pilot program. Only one respondent did so and they explained that they had difficulty accessing desktop computers and time allotment was insufficient. Eventually, this school/class acquired iPads for the Grade 3 classes but deemed this technology less useful for keyboarding.

Half of staff members became engaged in the Keyboarding Pilot Program because they were asked by their administrator to participate, while the other half learned about the program and expressed an interest in becoming involved (see Figure 34).

Figure 34: Rationale for Staff Engagement in the Keyboarding Pilot Program



Teachers were asked how they broached the topic of keyboarding and explained it to their students. A total of 14 respondents shared their approaches; the most prominent introduction to keyboarding included an emphasis on the importance and transferability of the skill in the short- and long-term, both inside and outside of the classroom. Staff members communicated to students that this opportunity would help them learn proper keyboarding techniques (e.g., posture, not looking at the keyboard) to improve their typing skills (e.g., accuracy, speed). One staff member likened this experience for students to riding a bicycle: “typing gets easier and quicker with the continued practice.” These introductions also involved a description of the Typing.com curriculum, how to log on, and necessary instructions

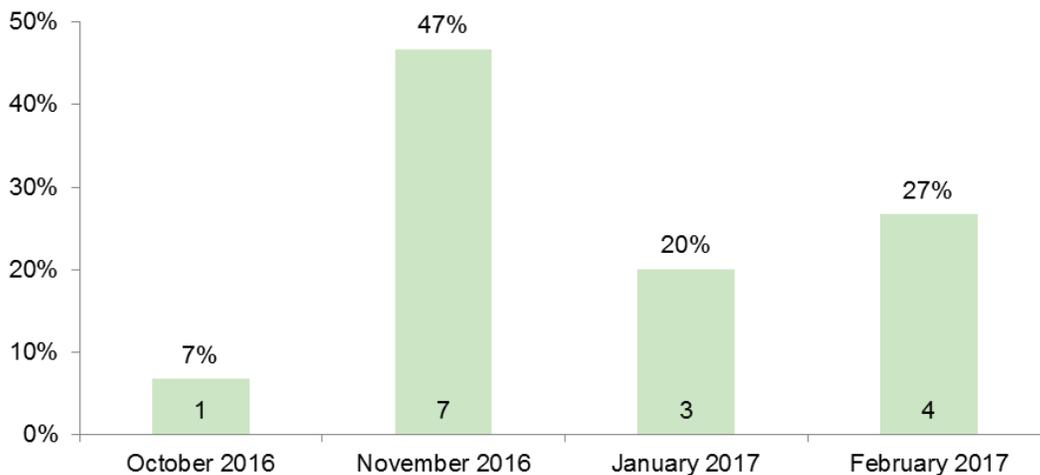
“We discussed why keyboarding is important (makes communicating your ideas faster and easier), then we looked at the organization of keys and why “touch typing” was important to learn.”

Among the 12 classes who were represented in the survey administered before the pilot program, the mean number of students enrolled in each class was 19.82 (SD = 6.04, Min = 3, Max = 27). Nearly all of these students received instruction (or was going to receive instruction) using the typing curriculum (Typing.com) (mean = 19.67, SD = 6.07, Min = 3, Max = 27).

Among the 15 classes who were represented in the survey administered after the pilot program, the mean number of students enrolled in each class was 21.53 (SD = 6.14, Min = 14, Max = 40). Nearly all of these students received instruction using the typing curriculum (Typing.com) (mean = 22, SD = 6.64, Min = 14, Max = 40).

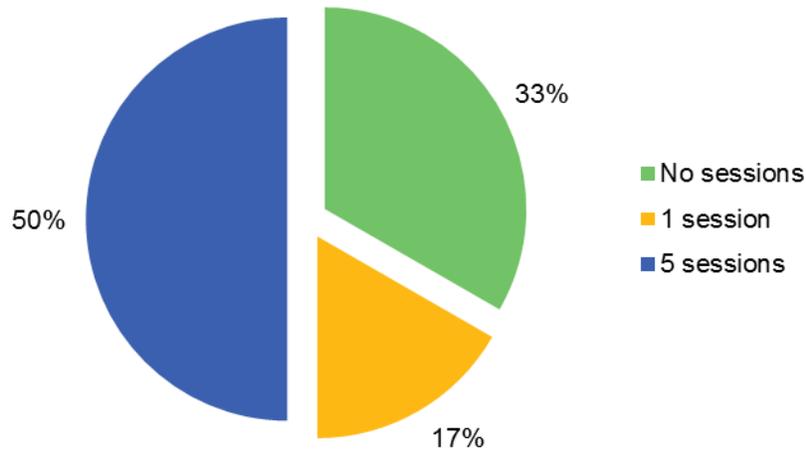
According to the survey administered before the pilot program, close to half of staff members indicated that they began keyboarding instruction in their classroom in November 2016, with the remainder starting in the early winter months (see Figure 35).

Figure 35: Commencement of Keyboarding Instruction, Reported After the Keyboarding Pilot Program



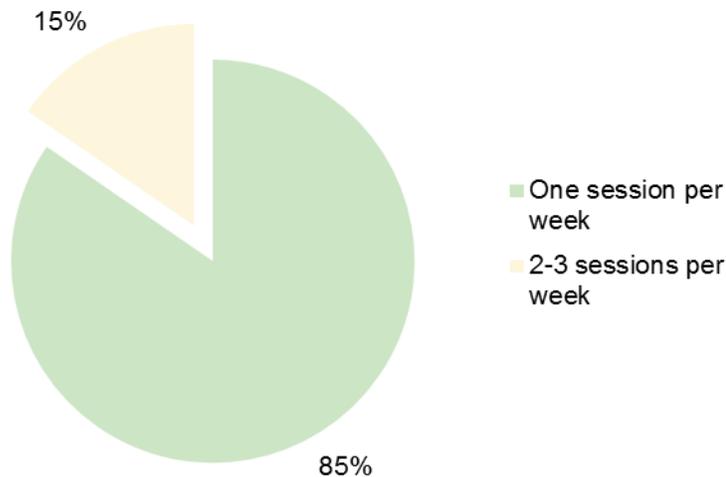
For research integrity, it is critical to know that only one third of respondents did not begin the keyboarding curriculum prior to completing the initial survey (see Figure 36).

Figure 36: Number of Keyboarding Sessions Provided in Class to Date



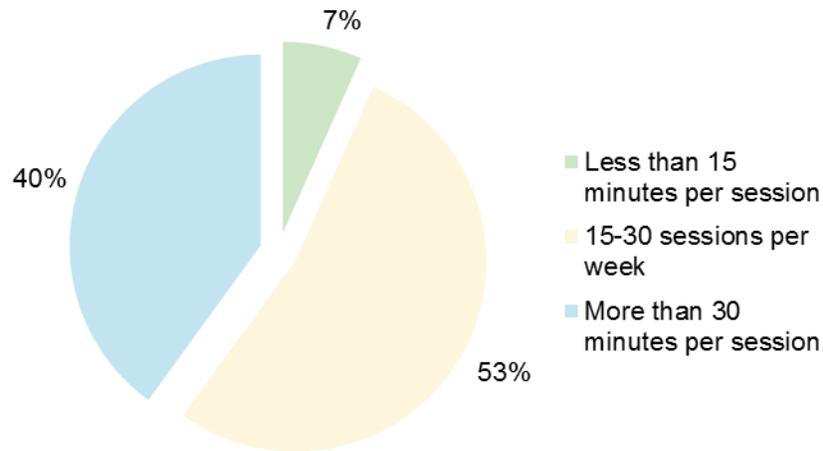
Since the beginning of the Keyboarding Pilot Program, respondents estimated that they had completed approximately 17.33 (SD = 10.57, Min = 5, Max = 40) keyboarding sessions in their class. Most staff members offered keyboarding sessions on a weekly basis (see Figure 37).

Figure 37: Frequency of Keyboarding Sessions



In most cases, keyboarding sessions were 15-30 minutes in duration (see Figure 38).

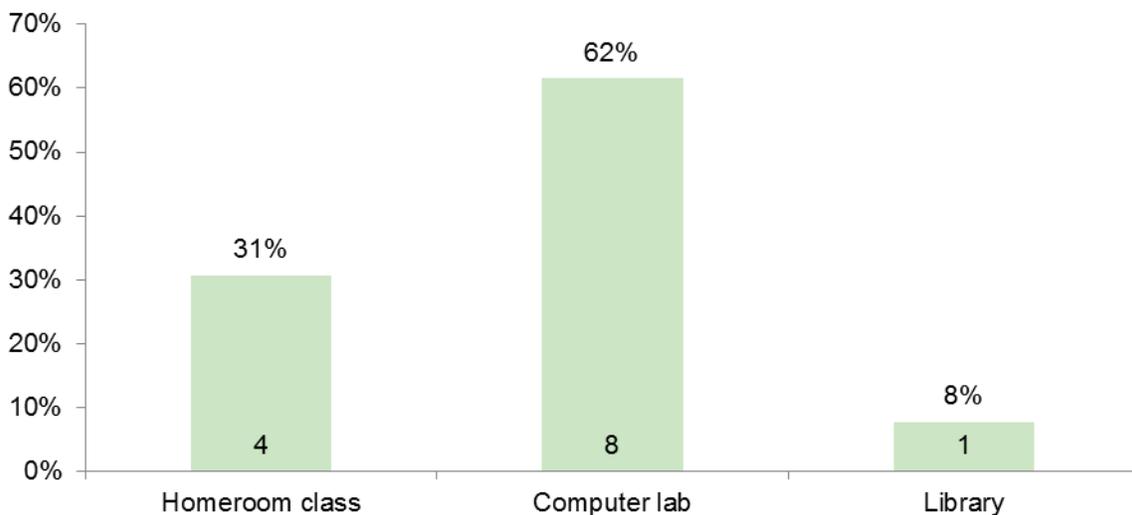
Figure 38: Typical Duration of a Keyboarding Session



Since the beginning of the Keyboarding Pilot Program, classes engaged in keyboarding instruction for approximately 13.93 weeks in total (SD = 5.55, Min = 5, Max = 22).

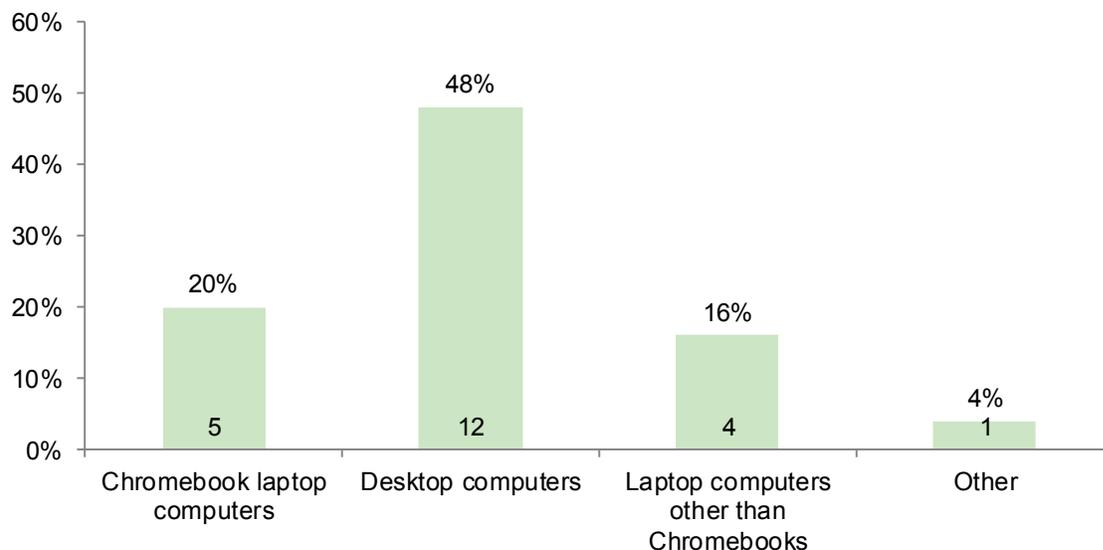
Keyboarding instruction was more likely than not to take place in the school computer lab, followed by homeroom class, and library (see Figure 39).

Figure 39: Location of Keyboarding Instruction



Keyboarding instruction relied primarily on desktop computers, followed by Chromebook laptop computers, other types of laptops and other devices (see Figure 40).

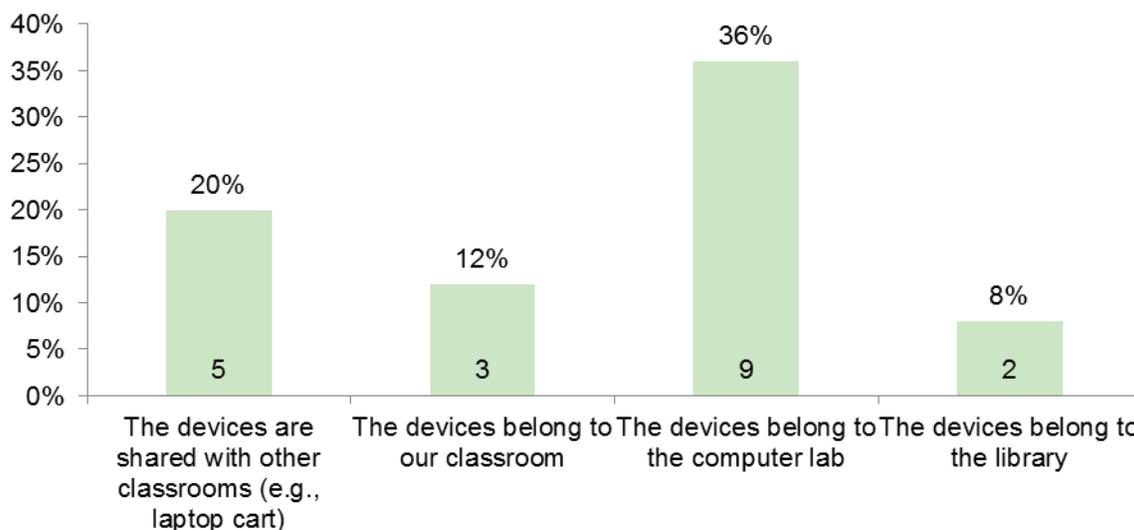
Figure 40: Devices Used by Students for Keyboarding Instruction



Note: "Other" included an integrated white board.

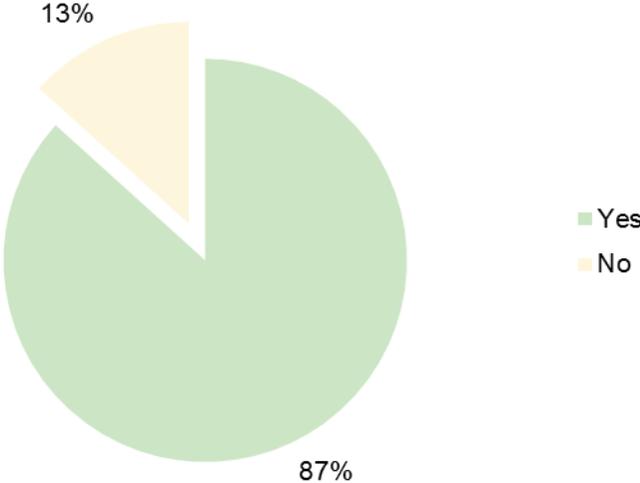
The aforementioned devices used to administer the Keyboarding Pilot Program were accessed through the computer lab for slightly more than one third of respondents, while others indicated that the devices used were shared with other classrooms (20%), belonged to their classroom (12%) or belonged to the library (8%) (see Figure 41).

Figure 41: Methods of Accessing Devices for Keyboarding Instruction



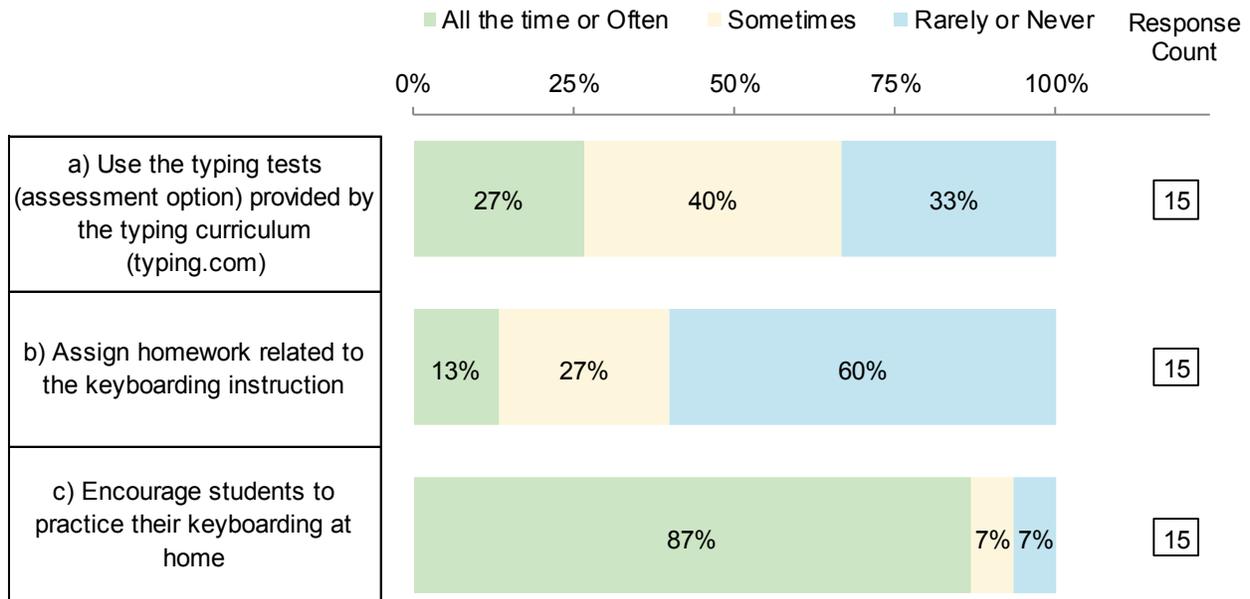
Fortunately, 87% of students had access to an individual computer/device for the keyboarding instruction (see Figure 42).

Figure 42: Proportion of Students with Access to an Individual Device for the Keyboarding Pilot Program



For staff members who implemented the Keyboarding Pilot Program, 27% used the assessment option provided by the typing curriculum (Typing.com), 13% assigned keyboarding homework, and 87% encouraged students to practice keyboarding at home all the time or often (see Figure 43).

Figure 43: Efforts to Extend Keyboarding Instruction

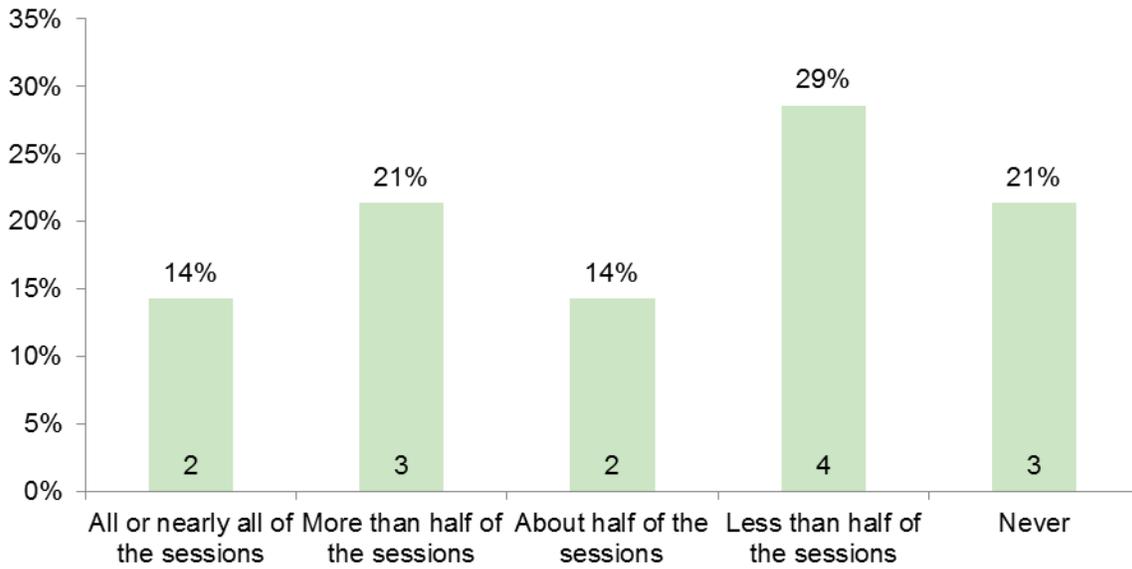


Educators were invited to describe other ways in which they have used the typing curriculum (Typing.com) in their teaching and extended the development of typing skills. Fourteen (14) staff members shared their practices. Generally, teachers had students type out stories, letters, poetry, paragraphs, responses to reading comprehension, pamphlets, and online discussions they had written as classwork. The typing curriculum was also embedded in conducting research for projects.

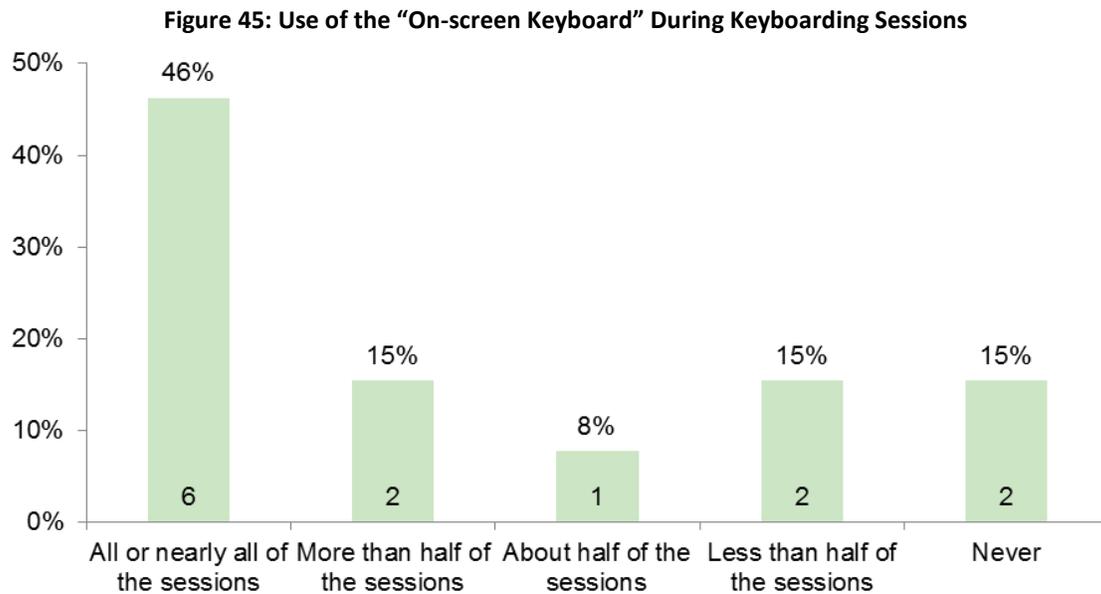
“Keyboarding was used to complete all language arts writing tasks; they used Read and Write Gold regularly and learned to type proficiently.”

The typing games feature of the typing curriculum was not frequently used during keyboarding sessions, as demonstrated in Figure 44.

Figure 44: Frequency of Use of Typing Games During the Keyboarding Pilot Program

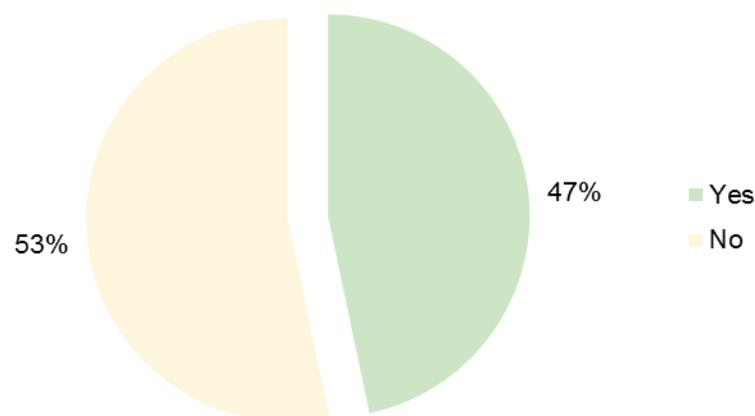


More than half of staff members relied on the “onscreen keyboard” during more than half to all keyboarding sessions (see Figure 45).



None of the survey respondents received any feedback from educators about technology issues with the typing curriculum (Typing.com). Nevertheless, almost half of educators shared that when using the computer equipment for keyboarding, the students experienced ergonomic issues (e.g., computer design, the proper positioning of arms, hands, wrists, sitting at the correct height for the computer, etc.) (see Figure 46).

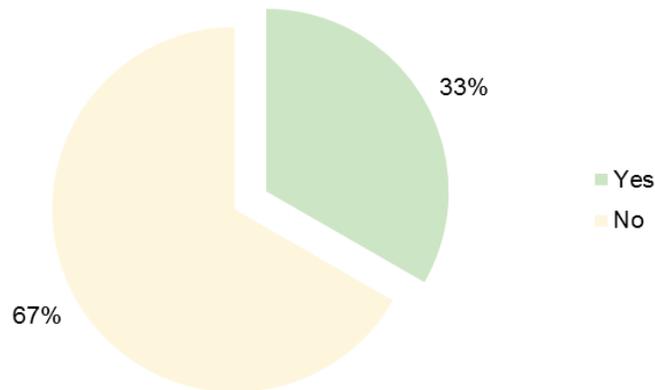
Figure 46: Student Experience of Ergonomic Issues during Keyboarding Pilot Program



Educators were asked to elaborate on the types of issues that their students encountered. Seven (7) respondents did so. They shared that many students did not have ideal typing posture as they had difficulty positioning their hands properly, twisted their wrists, slouched in their chairs, sat too close to the keyboards and sat sideways in chairs. Environmental ergonomic issues, which are more difficult to change, included the students' inability to reach their feet to the floor and correctly position their wrists, arms, and hands due to the height of the computer table and inability to adjust the chairs. The several educators who responded to this open-ended question indicated that these ergonomic issues occurred in an average of 11 students (SD = 5.02, Min = 5, Max = 19).

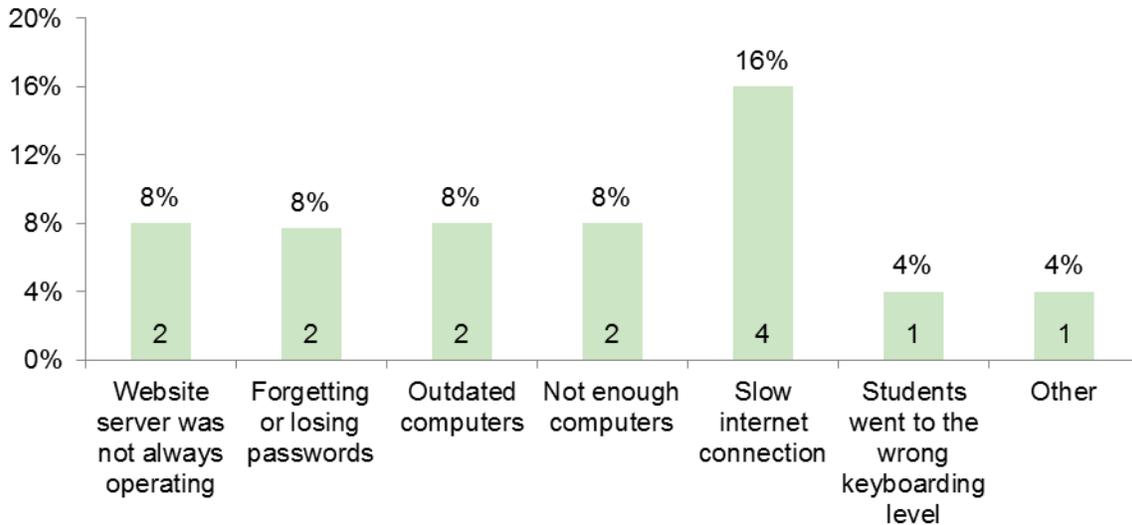
Fortunately, only one third of educators shared that their students encountered problems using the typing curriculum (Typing.com) (see Figure 47).

Figure 47: Problems Experienced by Students Using the Typing Curriculum



For educators who indicated that their students encountered problems, the leading issue was a slow internet connection (see Figure 48).

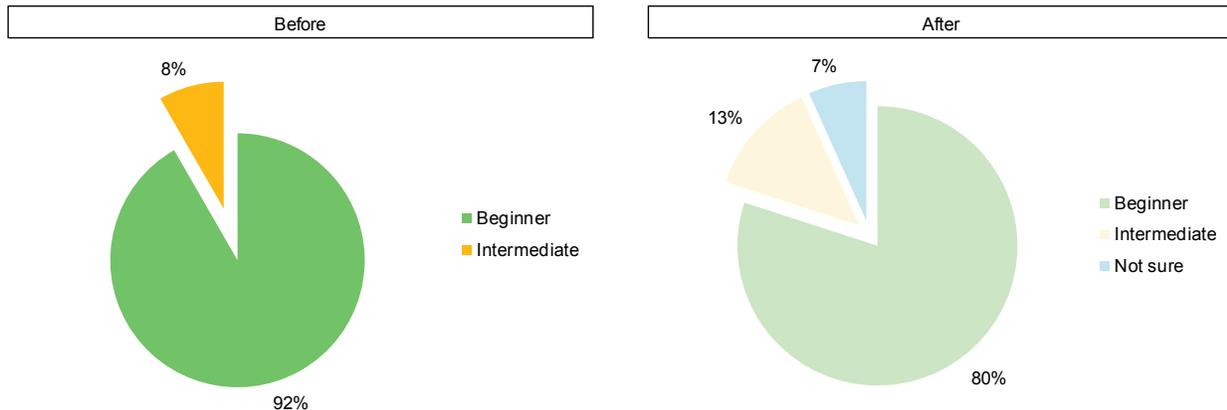
Figure 48: Issues Encountered by Students when Using the Typing Curriculum



All survey respondents shared that they received all of the necessary information from the Teaching and Learning department in order to implement the Keyboarding Pilot Program.

Owing to the Keyboarding Pilot Program, there were modest gains in students' overall proficiency level in keyboarding, as rated by educators (see Figure 49). Before starting the Keyboarding Pilot Program, 92% were considered to be at a beginner level, whereas after the program, only 80% were considered to be at a beginner level.

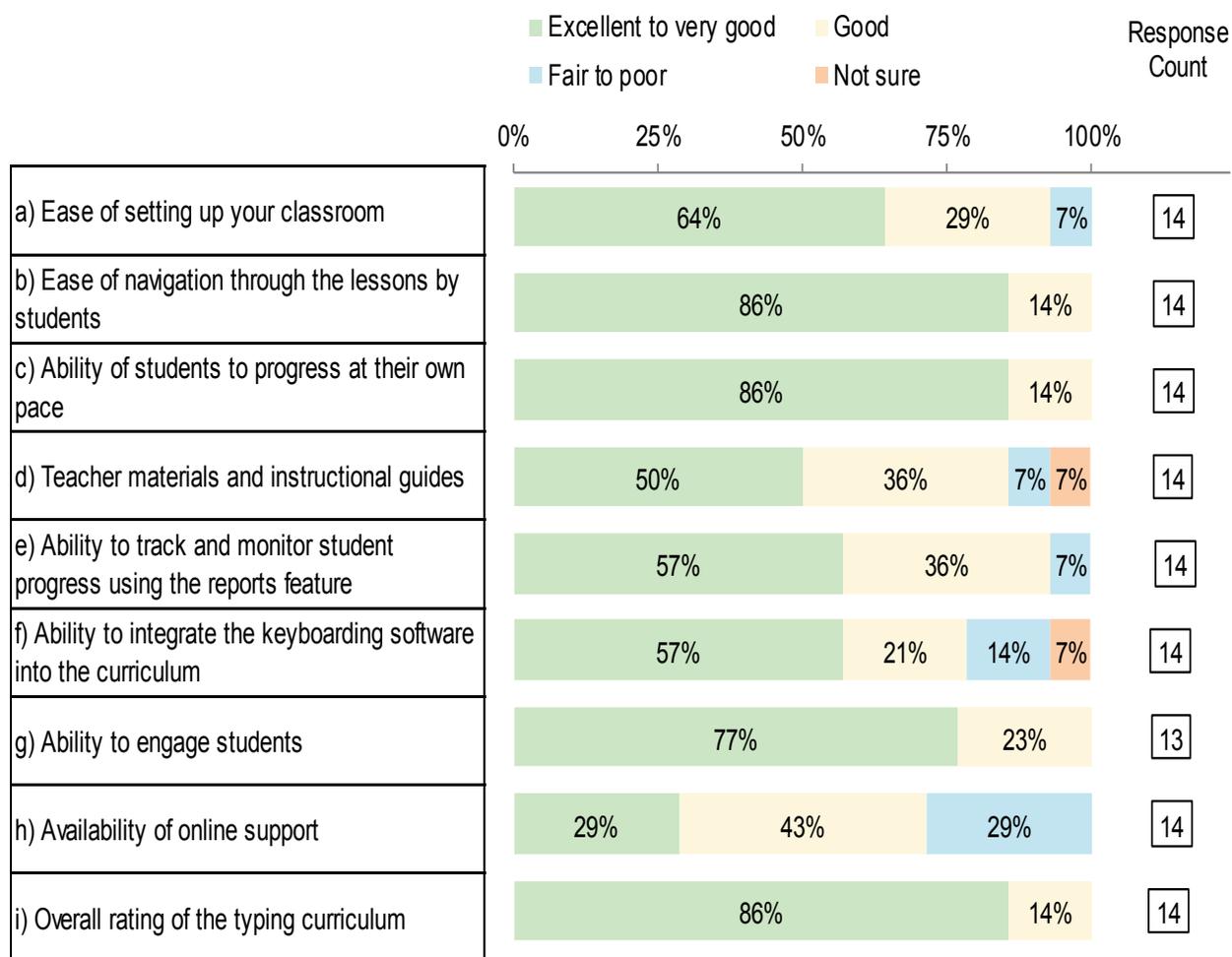
Figure 49: Students' Overall Proficiency Level in Keyboarding Before and After the Keyboarding Pilot Program



Perceptions of the Keyboarding Pilot Program

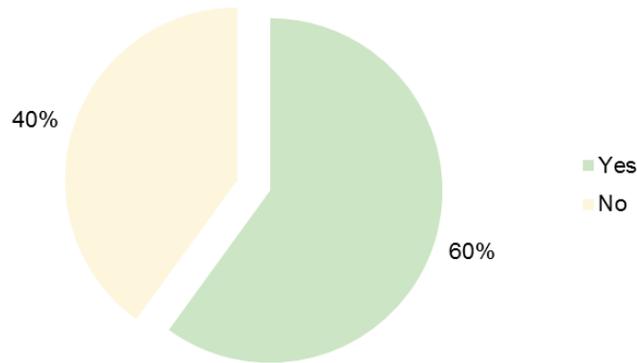
Survey respondents were asked to share their experiences and satisfaction with the typing curriculum (Typing.com) (see Figure 50). Most educators found students' ease of navigating through lessons, ability of students to progress at their own pace, ability to engage students, and their overall rating of the typing curriculum to be excellent to very good. Fewer educators found the ease of classroom set-up, teacher materials and instructional guides, ability to track and monitor student progress, and the ability to integrate the software into the curriculum to be excellent to very good. Less than a third of educators described the availability of online support to be excellent to very good.

Figure 50: Satisfaction with the Typing Curriculum (Typing.com)



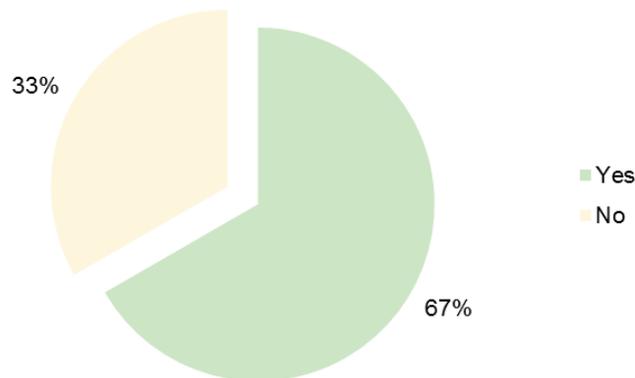
Nearly two thirds of educators indicated that they have colleagues in their school who are also part of the Keyboarding Pilot Program (Typing.com) (see Figure 51).

Figure 51: Presence of Colleagues at School also Participating in the Keyboarding Pilot Program



Approximately, two thirds of the sample indicated that they have discussed the Keyboarding Pilot Program with their peers in their school (see Figure 52).

Figure 52: Discussion of the Keyboarding Pilot Program (Typing.com) with Colleagues at School

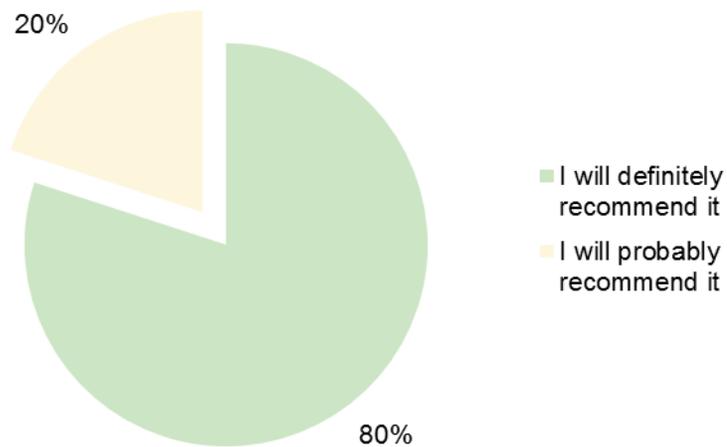


Educators were asked to share the nature of their discussions. Ten (10) respondents opted to do so. For the most part, participants explained the importance and benefit of keyboarding and their positive experiences thus far with their colleagues. They also shared how and why they implemented the program in their class, along with lesson applications and strong student uptake. In doing so, other colleagues at their schools, who are not participating in the Keyboarding Pilot Program, tried out the software and introduced it to their classes. One

respondent revealed the challenges of using the program (i.e., unreliable Wi-Fi connection) with their colleagues.

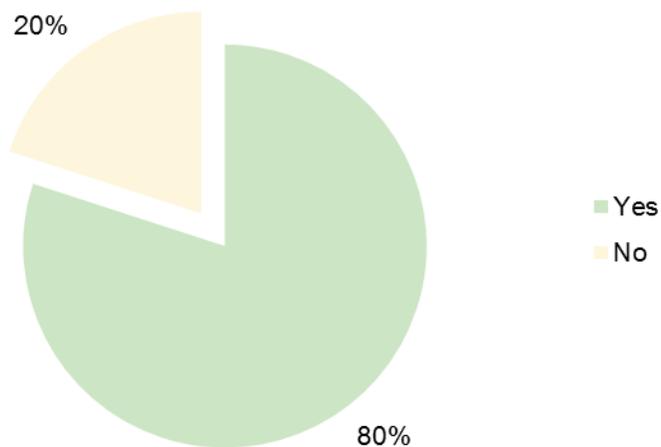
All educators who participated in the Keyboarding Pilot Program said they would probably or definitely recommend the typing curriculum (Typing.com) to other educators (see Figure 53).

Figure 53: Recommendation of the Typing Curriculum (Typing.com) to Other Educators



Eighty percent (80%) of administrators who completed the survey received feedback from educators about the Keyboarding Pilot Program (see Figure 54).

Figure 54: Administrators' Reception of Feedback from Educators about the Keyboarding Pilot Program



Four administrators elaborated on the feedback they received, all of which was positive. In particular, educators shared with their administrators that the program was easy to use, students enjoyed the program, the software provided students with feedback and improvement was evident when students practiced diligently.

By comparison, 13 teachers and librarians shared that they received feedback from students about the typing curriculum (Typing.com). Student feedback was overwhelmingly positive. Students conveyed to their educators that they enjoyed the various aspects of the program (e.g., games, lessons) and found it was a fun experience. Students were often disappointed when it came to the end of each of their keyboarding sessions. Educators also shared that the program was appropriate for English as a Second Language (ESL) learners as there were visuals along with the instructions. As such, these students found it very clear and easy to follow.

“All of my students and parents [found an] appreciation [for] the program and see the value.”

Educators also explained that some of their students experienced initial discomfort while learning how to type:

“[The students] do complain about their hands hurting. I tell them that they need to develop their wrist muscles and endurance to hold their fingers in place.”

Additional Training or Support

Eleven (11) survey respondents disclosed additional training or support that educators require to implement the Keyboarding Pilot Program. The leading areas were the provision of sufficient technology (i.e., dedicated keyboards for each student) and time (e.g., to explore resources, the typing curriculum, etc.). Other staff members shared the need for a formal curriculum, guidelines, and pedagogies regarding keyboarding instruction. Another individual explained that organizing a professional learning community where educators can share ideas and feedback would be beneficial.

“Teachers should be made aware of pedagogies with respect to implementing the typing curriculum effectively and timely.”

“[It] would be nice for teachers to physically meet prior to commencing [the] program and to have opportunities to meet throughout [the] program to share ideas and feedback.”

Recommendations to Improve Keyboarding Instruction

Nine (9) survey respondents communicated recommendations to improve keyboarding instruction moving forward. The leading recommendation concerned reliable and frequent access to technology. Educators shared that for keyboarding instruction to be effective, it should take place more than once per week to establish good habits, it should start at the

beginning of the school year and clearer instructions on classroom set-up should be provided. They also explained that the establishment of some sort of benchmark would help educators understand if the students are progressing as expected.

Additional Comments

Seven (7) survey respondents provided additional comments. They revealed their positive experiences and outcomes associated with the Keyboarding Pilot Program. For example, one individual revealed that the teacher-librarian at their school witnessed how successful the program was, that they integrated it into the library time they had with their students from Grade 2 and up. Similarly, other staff members shared their appreciation and enthusiasm about the program and their keenness to continue participating.

“I think that this is an excellent program and should be implemented into the curriculum. Many students and families appreciated the ability to continue working at their own pace and able to work from home. I feel as if typing provides students with an invaluable skill, which they will remember and use in their future endeavours. Thank you for the opportunity to participate.”

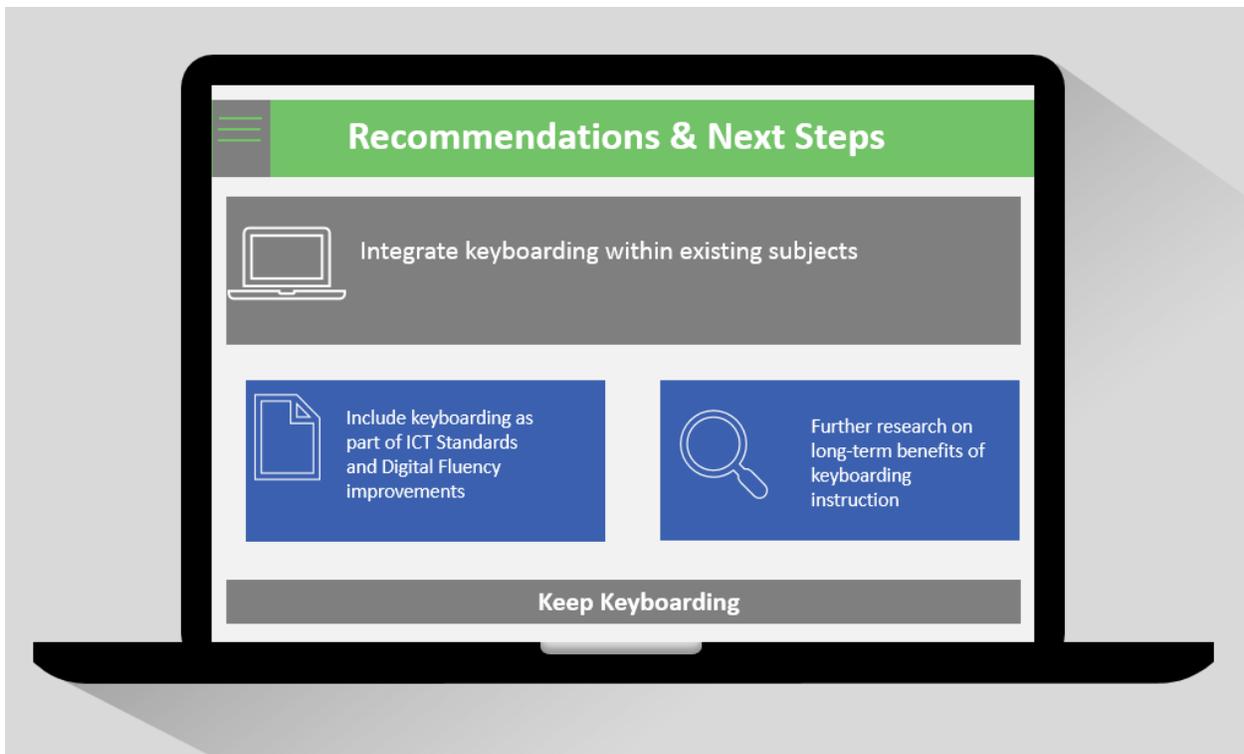
Another comment stated that the Media Literacy teacher should take ownership of and implement this program in the future. Lastly, one individual shared the difficulties with their school Wi-Fi connection which significantly hampered the ability to implement the Keyboarding Pilot Program.

Recommendations and Next Steps

This study indicates statistically significant improvements in students' keyboarding knowledge and practices and accuracy from before to after the Keyboarding Pilot Program. Further research is needed to examine the long-term benefits of keyboarding instruction and the relationship between students' keyboarding knowledge and practices and their achievement.

In terms of recommendations, it is suggested that keyboarding be integrated with existing subjects rather than taught as a separate class. Educators suggested incorporating keyboarding instruction in the following subject areas: social studies, language, media literacy, and science. However, when integrating keyboarding within existing subjects, it is essential that students are provided opportunities to build the fundamental and foundational skills that are necessary in keyboarding so that they can be proficient in typing. It is also recommended that keyboarding instruction be part of ICT standards and digital fluency improvements.

Figure H: Recommendations and Next Steps



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