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Investigating the Factors of Practice Time and Literacy on Children's Chinese Typing Skills

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Abstract: In generally, most people learn about typing skills by practicing, and emphasizing on learners' familiarity with the keyboard and position. Chinese input methods are not simply typing by looking, it needs decoding by phonological or character shape in different forms and then the decoded as input keying sequence. In Zhuyin input method, for example, typist knew through literacy pronunciation after saw the character, then decoded and get a "key sequence" to enter by pronunciation decoding. Literacy skills of children are not as good as adults, it is a key about the character can be successfully decoded by pronunciation. In this study, we tried to analyze the process of students' practice typing. The practice duration may affect the students' level of typing ability. Most important, there is a significant impact on enhancing children's typing skills as improving their one of literacy skill.

Keywords: typing skill, Chinese input method, practice duration, literacy, word cognitive

1. Introduction

The use of technology in the classroom has increasingly been the object of study in recent years, and one way to interact with computer – typing has become an essential skill with young students. Several researches showed that a part of students can't learning by technology goes well because they are not good at typing skills (Wolfe & Manalo, 2004; Yu & Cheng, 2003). How can we help for children to development their typing skill? When asked how we acquire typing ability, it will require lots of practice. Besides, it requires a high level of concentration, visual attention and quick reaction time. In addition, students must have good typing habits for using computers (Figure 2(a)). Of the above strategies, it can decrease the mistakes and make them get higher typing speed.

We defined the minimum unit of Chinese is a character. Before the typist is typing, a character must be translated into a "key sequence" (Figure 2(d)) and typist will type a "key sequence" of Chinese character (Figure 2(e)). The typists have one more step to pick the right word from a list of choice. This method of the most Chinese input involves multiple steps per character, and they perceive it as being too complex and slow (Wong, Chai, & Gao, 2010). Therefore, it is difficult and intuitive to translate the character to key sequence for typists who speak or write Chinese (Lin & Sears, 2005).

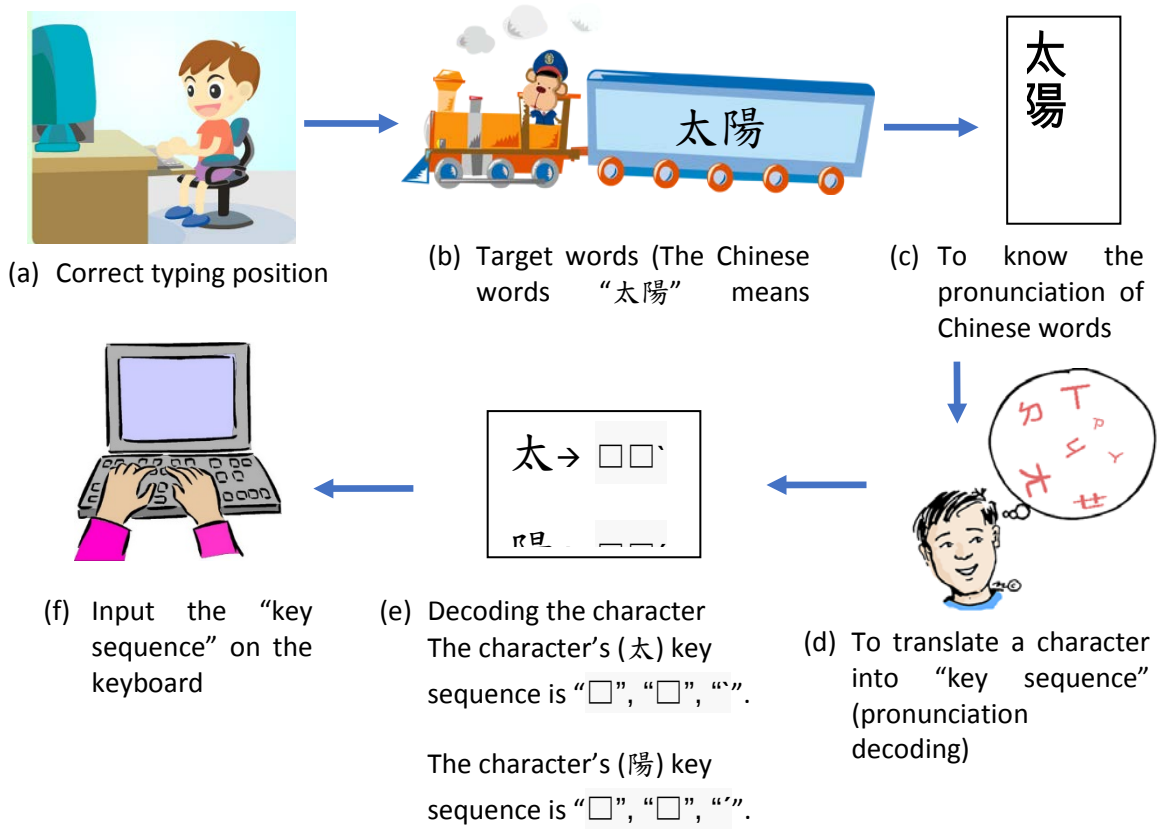
We had designed a typing game which emphasized sustain the children typing exercise to help them learning the basic typing ability. When the typing skill of children was constructing, teachers ask them to be familiar with typing action and key position through much practice. In this process of typing practice, perhaps we ignored the children's capacity to translate character into a key sequence. The ability is involved the typists' literacy skills, especially children. So that children's typing skill did not only depend on their efforts of practice, but also are associated with their word cognitive. If the students cannot enhance their typing skill effectively, it may be the bottleneck of literacy.

2. Typing ability and literacy of children

Procedural learning is repeating a complex activity again and again until all of the works combine with the action to automatically produce. So the acquisition of skill requires much practice includes typing. Although the typing learning is a kind of procedural memory, but there are a bunch of complex message to be processed before pressing key. In fact, a process of type action is complex, it involves the visual receiving, message processing in the brain and fast motor execution by fingers

(Liang, 2009). During acquisition of typing skill, there is a general shift from cognitive to motor limits on performance. Expert typing is characterized by mental processes that overlap in time, successive keystrokes made by fingers of different hands (Gentner, 1984).

We know that Chinese input method is divided into two categories, pronunciation -based input method and shape-based input method. Strictly speaking, the Chinese typist received the information by visual when they saw the character on the screen (Figure 2(b)) and converted the character into "key sequence" through their brain in different ways before he/she typed (Figure 2(d)). We defined this process is called "pronunciation/shaped decoding" which is complex and makes people feel tired (Liang, 2009). It were not noticed in many typing training, because the time they occur too close, people think it is not to go through formal learning and acquisition of skills (Olinzock, 1998).



(a) Correct typing position

(b) Target words (The Chinese words "太陽" means

(c) To know the pronunciation of Chinese words

(d) To translate a character into "key sequence" (pronunciation decoding)

(e) Decoding the character
The character's (太) key sequence is "□", "□", "ˋ".
The character's (陽) key sequence is "□", "□", "ˊ".

(f) Input the "key sequence" on the keyboard

Figure 2. The process of Chinese typing in pronunciation decoding by Zhuyin input method

In Taiwan, the phonetic symbol, named bopomofo (Zhuyin), is used as an educational tool in elementary school. Furthermore, Zhuyin is also a kind of input method for Traditional Chinese characters and most common input method in Taiwan. As a result, the novice typist had to know pronounce of character to type (Figure 2(c)) or else he/she will fail in method of pronunciation decoding. Therefore, the effect of learning typing skill will relate to the ability of word literacy. Because the action of Zhuyin symbols to read and recognition depends on the phonological processing (Hsuan, Su, Chen, Yu, Wang, Chang, & Chu, 2012) and literacy ability equal to the phonetic symbols learning well (Lee & Ko, 2009). Children's literacy ability has not been mature with adults, so the pronunciation decoding is particularly important for them.

3. Method

3.1 Participants and experimental environment

In this work, we try to analyze the typing practice course record in grade 2 students of elementary school. There are 204 elementary school students who aged 8 to 9 years in the same school participate in this experiment. Every student has owned a small touchscreen laptop in a wireless environment classroom and other design, mathematics and language digital materials for learning activities was provided. Before typing exercise, the students have accomplished phonetic fingering and Chinese Characters typing training last semester. Students in the second grade start typing Chinese words practice by phonetic input method for two semesters.

3.2 System design

A flow-based typing game was developed for sustaining the typing practice of students, entitled My-Pet-Typing (Liu, Liao, & Chan, 2012a). In this work, the typing exercise focused on Chinese words typing practice. The game is designed with breaking through the barricade for children and difficulty degree of level refers to formal educational textbook in elementary school of Taiwan. When the students was practicing, they can pass the question until they answered correctly, and spend on average five minutes of practicing per mission. Through the way to accomplish the mission to unlock next station and get basic reward, such as virtual currency, star-level in this system.

3.3 Data collection

Data were collected primarily by means of computer record of the My-Pet-Typing system that the students practiced for one year. The system recorded the answer which were entered by students, the results of question was right or wrong and unit time in every subject. It was also to save the practice duration of single practicing exercise, the number of right/wrong score, rate of accuracy and typing speed when they had finished their missions. Incidentally, typing speed is that the student can type the number of words in one minute in accordance with the Computer Skills Foundation (CFS). All records of students is a detailed typing information, it can be used for follow-up analysis to build their typing capacity or system modifications reference.

4. Results and discussion

4.1 Typing speed and practice duration

The main purpose of typing activity will promote the typing speed to students. The typing speed is that the typist can input the amount of characters in one minute. The participants in this study showed the typing speed on average is 12.48 wpm (Word per Minute) to sustain practice for two semesters. In this study, the researcher wanted to through the difference between the students' practice time and typing speed to understand the construction of typing skills. To take every 5 wpm as a group to analyze about the relation with practice time and typing skills level.

Table 1. Students typing speed group table (n=204)

Typing speed (wpm)	Average of practice time (minute)	IQR (Inter-Quartile Range)	Numbers
0~5	22.97 (0.00)	0.00	1
5~10	198.76 (115.37)	146.10	62
10~15	333.00 (160.10)	168.83	105
15~20	357.22 (193.28)	262.74	24
20~25	549.45 (255.87)	414.97	6
25~	480.51 (304.41)	533.85	6

Table 1 presents the mean of practice time, standard deviation, IQR (Inter-Quartile Range), and the numbers of students in every group. We can represent the above problem with the box-and-whisker plot shown as Figure 3. With the students practice, typing skills increases gradually improve until the typing speed is level-up to 20 wpm. A puzzling phenomenon is the original situation, typing speed increase with the progress of practice time, but the groups of typing speed more over 20 wpm,

whose practice time is even less than the lower ability groups. With a higher level group, the greater difference between the internal practice time. In other words, the students who have more and less practice time is likely in high achievement group simultaneously.
Therefore, the students began to practice typing skill, getting more and more practice of students can get higher typing achievements. When typing speed is raise to a certain level, for example 20 wpm, practice time is no longer the only factor to enhance typing skills. The typing problems are possibly due to the difficulty of pronunciation decoding after the familiar motion. In this case, the cognitive pronunciation decoding may become an important factor to enhance typing skills of children.

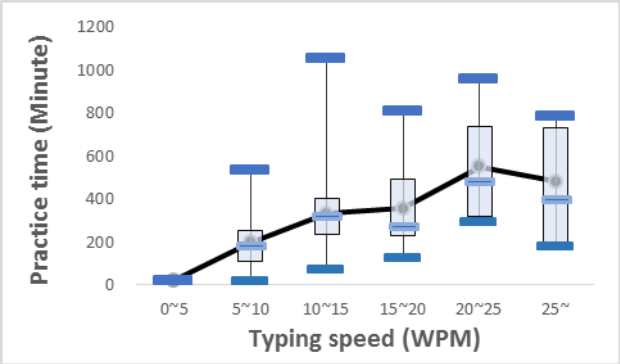


Figure 3. The relation between practice duration and typing speed in box-and-whisker plot of children

4.2 The effect of children's literacy on typing speed

To further analysis in this study, all students will be divided into high-achievement literacy and low-achievement literacy group and then compare with practice time of two groups in each of the achievements of the typing speed (Figure 4). Either high and low capacity of literacy, the results are presented that with practice time increases, the typing speed will be also increased. The result is like the above arguments, showing the practice time difference starts from 20 wpm group.

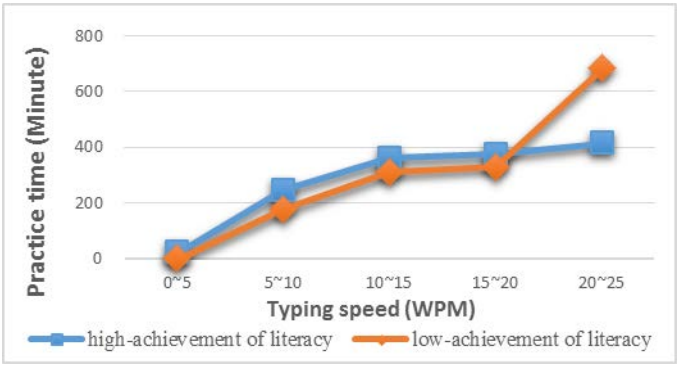


Figure 4. To compare with high-achievement and low-achievement literacy in each typing speed groups

Figure 4 highlights difference between the two literacy-achievement groups. Through the result obtained, we can assume that if a student who has high-achievement literacy can reach 20 to 25 wpm after he/she has practiced around 400 minutes later. Conversely, if he/she is a low-achievement literacy student to practice time nearly 700 minutes to achieve the same type speed. Possible reasons for this conclusion is the higher word literacy skill makes students have better pronunciation decode ability, it can shorten the typing time and has a higher success rate of typing. When the typists faced with decoding failure, they do not know what they can enter, even if the typing action quickly is also useless. However, the children's literacy and typing ability have interaction effect.

4.3 Children typing process of observation

According to the researchers observed the typing exercise in the classroom. The students were observed that they were very familiar with the keyboard and position, because of misuse the phonetic symbols cause failure in typing. The students can know "ㄣ(/en/)" or "ㄥ(/eng/)" where the key is, but they cannot distinguish which one was used because they have similar pronunciation. In the Chinese input method, the students will find out the character by trial-and-error method when they decoding error and cannot find out the correct character from the list. Therefore, the children who have many decoding faults in typing will affect the success rate so that typing speed was reduced.

5. Conclusions

In view of an important exercise for typing is practice, we also purposed literacy factor will affect to students' typing skills. Because reading and decoding the character in typing process is only a very short time, it is often ignored in typing action. About children typing training exercise in addition to increase familiarity with the keyboard, the decoding and word recognition ability are the important capability, too. Typing skills training needs to be supported by students' literacy and also can promote students' ability to facilitating the numerous Chinese words (Liu, Liao, & Chan, 2012b). However, the general consensus is that the Chinese input approach to learning is based on "proficiency", but the students must be accepted the teachings of appropriate before they begin to practice. We interpret that the students meet the criterion of "investment practice longer, higher achievement typing ability be getting". It is mainly to encourage students to practice diligently on learning typing skill and enhances the literacy ability by training process.

The study found that students with high-level typing speed, they are typing in practice time is not necessarily higher than the low-level students, and even spend less time to the performance can be obtained. Because second grade students have large differences in word literacy, so the students' Chinese input capability and literacy itself is also a considerable degree of relevance. The gap caused by the level of literacy achievement put into practice time and students' differences from achievement of typing ability. However, not all of students who are learning Zhuyin input method is fit. If the phoneme inadequate capacity to spelling phonetic symbols, they cannot do the decoding operation on pronunciation. In order to enter by keyboard as the main input method, the students can consider learning to shape decoding based input method.

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