

The Influence of Technology to Hand Writing Chinese Character Ability

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Abstract. Nowadays students mostly used a pinyin input method to study Chinese, which had adverse effects on their Chinese character writing skills. The research method using qualitative method, where the researcher gave two types of tasks to 58 students, some of whom used the pinyin input method and some who did not. According to the findings, there are 67.25% of the students (38 out of 58) making errors when writing by hand. These errors included 47.44% of errors related to similarities between Chinese characters, which could be categorized into three types: word formation similarities (5%), character component similarities (15.25%), and single letter similarities (27.11%). Additionally, 25% of the errors were sound equation errors, such as "是" as "视" ("shì"). Furthermore, 27% of the errors were related to the formation of new Chinese characters. When the students used the pinyin input method, the percentage of errors decreased significantly to 25.86%, most of the errors made using this method were due to word selection errors (60%) and vowel errors (40%). The research suggests that using the pinyin input method may have a negative impact on students' motivation to write Chinese characters, which, in turn, can affect their handwriting skills.

1 Introduction

Along with the times and the pressure under the pandemic, we are slowly moving away from conventional learning and starting to learn using technology. Learning Mandarin vocabulary, which is quite complex, is not only seen in their characters but also in similarities in reading that differ from other words. Learning Mandarin, which is not only about vocabulary but also about pinyin aspects, creates a big challenge for students, including the ability to recognize characters [1].

In line with that, there have also been various new methods or breakthroughs in learning to write Chinese characters, for e.g., using Augment Reality (AR)-based learning materials for training Chinese writing skills [2] and also using *cw2vec*, which is a new method for learning insertion of words in Mandarin [3].

However, from within the students themselves, it is very difficult to break away from the habit of using pinyin to write Chinese characters. This could also be a significant relationship between sensitivity to letter patterns in pinyin spelling and Chinese character pinyin skills, so the ability to detect written language is significantly related to students' reading and writing skills [4]. Pinyin plays only a limited role in understanding Chinese sentences [5] so learning Chinese character letters is also very important; character learning is a complicated process, and the use of strategies is only one aspect of the process to be able to learn characters efficiently [6].

In general, the stroke, structure, and pinyin features provide the internal features of Chinese characters [7]. When writing in Chinese, students can particularly imagine hand gestures corresponding to the order of

strokes in Chinese characters, helping them modulate brain activity [8]. In addition, the high accuracy of the handwritten character recognition system will enable and inspire many other related tasks [9]. In this case, linguistic features in writing samples can also be used to predict the quality and development of writing. With longer practice time, learners can quickly practice handwriting [10].

In teaching studies [5] through two learning strategies (stroke-order learning and writing exercises), concluded the effectiveness of learning Chinese characters among CFL students. A written Chinese vocabulary knowledge test should present target words in pinyin along with characters, combining Pinyin input with traditional Chinese character teaching methods to teach writing Chinese characters. In terms of sounds, phonological awareness does not mediate the effect of pinyin knowledge on character recognition [11]. The presence of handwriting difficulties related mainly to lexical variables such as character frequency, AoA, contextual word familiarity, and number of strokes and individual differences in pen exposure, print exposure, and digital exposure [12].

Mandarin teachers must use typewriting to master Chinese characters [13]. While, stated that mobile applications could support learning in the classroom and at home [14]. In others, that using the Pinyin input system in typing is an important skill for all Chinese speakers in online communication, social media, and online school [15].

However, is it clear that the pinyin input method will directly affect students' learning abilities? Or is it just media in learning? As we know, Chinese characters are not limited to pinyin; different tones also give different

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meanings to a word. So through this study, researchers tried to find out the relationship between the use of China's language input and students' handwriting skills.

2 Conceptual Background

2.1 Error Analysis in Writing

A study was conducted on 44 first-year high school students in Banda Aceh regarding their English writing. The data was obtained from a written test of descriptive text entitled "My School," with a word length of 120-140 words. This study found that three out of four sentence errors in the students' writing were sentences that lacked a subject, the absence of a verb, the absence of both subject and verb, the absence of a verb in a dependent clause, and the absence of an independent clause [16].

A study on paragraph writing among 120 students at Jazan University found that the most common errors were: verbs, word order, prepositions, articles, auxiliary verbs, and spelling. These errors were classified and tabulated according to their frequency in the students' English paragraph writing. Most of these errors were found to be caused by intralingual transfer rather than interlingual transfer. In addition, the findings and results clearly indicate that English paragraph writing skills require more attention and improvement, and pedagogical recommendations and implications acknowledge the important role of EFL teachers, curriculum designers, educators, and policymakers in achieving the desired outcomes [17].

A language error study was conducted on 25 third-year Mandarin language students at UBRU during the academic year 2017. The research instrument used was an essay - one topic for free writing with the theme "My Future Career" (我未来的事业). The essay had to be at least 350 characters long. The research findings showed that most students made six errors in their Mandarin writing: 1) word choice, 2) word order, 3) punctuation, 4) incorrect Mandarin characters, 5) conjunctions, and 6) classifiers [18].

A study on error analysis in Korean language learning focused on recording errors in the writing of learners. The research findings showed that learners make mistakes due to differences in basic understanding and usage of words based on different Chinese character etymologies. The errors were classified as spelling errors and content-based errors; the latter category was further divided into errors influenced by the learners' native language and developmental errors. In short, the ratio of different types of errors at various levels is as follows: 1) spelling errors versus content-based errors for beginners 78%:23%, for intermediate 20%:80%, for advanced 36%:64%; and 2) native language interference errors to developmental errors to unique errors for beginners 11%:87%:2%, for intermediate 21%:69%:10%, for advanced 29%:71%:1%.[19]

This paper reports on the analysis of errors in orthographic representation of written Chinese characters among Mandarin as a foreign language (MFL) learners at the beginner level in a Malaysian public university in their dictation assessment. A total of 262 types of errors in orthographic representation strokes in written Chinese characters were collected and analyzed. The errors were classified into four major categories among 165 MFL learners who took part in this study.

The study found that the participants made the most errors in stroke number and orthographic representation shape in written Chinese characters. It was also found that there were errors detectable in the stroke relationship and orientation of orthographic representation in written Chinese characters. Cognitive factors contributing to the types of errors in orthographic representation in written Chinese characters were discussed. It was concluded that beginner MFL learners will have a greater tendency to make some character errors when writing Mandarin due to their low orthographic awareness and possibly high cognitive load given to them as they transition from writing alphabetic script to writing Chinese characters. Future research could investigate how MFL learners adapt cognitively when transitioning from alphabetic script to Chinese characters. The findings will guide instructors in teaching Chinese characters more efficiently and further allow them to interpret orthographic representation and write Chinese characters more accurately.[20]

3 Research Method

Research method using qualitative method, where the researcher gave two types of tasks to 58 students who are learning Chinese language. All students were asked to compose with predetermined themes. The first task required students to compose on the topic of "My School." The manuscript was typed in Chinese characters with a word count between 200-300 words. The typing method used the pinyin input method (a romanization or phonetic notation system and the conversion of characters into Latin letters for the Mandarin language; figure 1.). The second task was on the topic of "Shopping Mall" with a word count of 200-300. The composition was handwritten on provided paper. After both tasks were collected, the researcher compared the errors in writing Chinese characters from the students' compositions. The following are the results of the students' compositions (Figure 2 and Figure 3).



Figure 1. Chinese Pinyin Input

Note. Taken from Baidu Input Themes, 2023, Baidu ([9])

我的校园

八华有一个校园，八华的校园是一个很大和美丽的校园，像一个花园一样美丽。进校园的时候你可以看到很多又大又高的树，像一个巨人一样。在校园里除了很多树以外，你可以看到很多种植物和很宽阔地草地。

因为八华是一个很大很大的学校，所以八华有很多很多的东西。其中我最喜欢得是电脑室。我喜欢电脑室是因为电脑室有电脑，放学后我可以用电脑室得电脑和另外一个原因是电脑室很冷，而我喜欢很冷的地方。但是除了电脑室以外我还喜欢八华的图书馆，因为图书馆是一个安静的地方，我放学后可以在那里做作业和图书馆有很多书我可以读。

八华是一个很好的学校，希望八华能做得越来越好。

Figure 2. By Using China Language Input System

Note. The image was created from student's homework, 2023, (<https://classroom.google.com/h>).

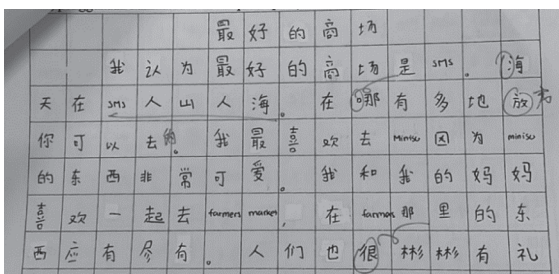


Figure 3. Student Handwriting's Answers

Note. The image was taken from student's exam results, 2023.

The flow of this research is as follows:

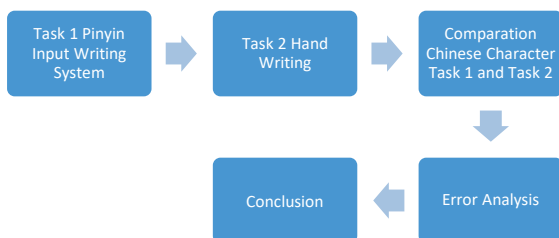


Figure 4. Research Roadmap

Note. The research roadmap is based on research conducted to the student's writing ability, 2023.

4 Result and Discussion

4.1 Conditions for learning Mandarin in Grade 8 Middle School

Along with the normalization of learning from online to offline teaching media, it is common for students to be unfamiliar with an offline learning environment, especially in learning Mandarin, where several words have different meanings but with the same pinyin also, for e.g.: 声 with 生 sheng. In this case, if we type in pinyin input, it will bring up not only these two words, but also

the words that the pinyin is "sheng", such's 省、升、声、盛、胜、剩 etc, all of these words have the pinyin "sheng". so that when we ask the students to type the mandarin characters, sometimes they still can be confused which characters must be used.

4.2 Test Results

Based on the results of student tests, students' ability to write Chinese characters showed a significant decrease, where the error rate increased by 67.25% (38 out of 58 students), while previously using the input method, it was clear that the word filling errors were only 25.86% (15 students out of 58 students). As for the types of errors in writing, Chinese characters are more dominated by handwriting, while errors in the input method are errors in sound equations.

1. Errors in writing on the similarity of Chinese characters (47.44%)

Characters in the Mandarin language are quite complex, and there are often similarities between one letter and another, so it is not uncommon for errors to occur due to the similarities in these letters; this happens not only to students who write on exam papers but also to students who write with the pinyin input method, for e.g.:

a. Similar word formation (5%)

In this case, Mandarin has a different word structure, for e.g., left and right 很(hěn=very) & 和(hé=and), top and bottom 是(shì=is) & 最(zuì=most), 华(huá=Chinese) & 帮(bāng=help), although both words have the same forming structure, the two words are different and cannot replace each other.

b. Similarity of character components (15.25%)

In addition to the forming structure, the similarity of the character components also affects students writing of Chinese characters. This error is often found in writing Chinese characters and with the Pinyin input method.

For e.g.: 海(hǎi=sea) & 没(méi = no), 饮(yǐn = drink) & 饭(fàn = meal), 方(fāng = square)&放(fàng = let out) & 海(hǎi = sea)& 每(měi = every)

c. Single character similarity (27.11%)

The similarity of single word letters, which at first glance will look the same, but the meanings are totally different, for e.g.: 夭(yāo = die young) & 天(tiān= sky); 亡(wáng=dead) & 忙(máng= busy); 西(xī = west) & 面(miàn = face); 令(lìng = command) & 今(jīn = today)

2. Error in terms of homophon

This error rate is quite high for students who use the input method, this can also be caused by students who have not memorized the exact tone of the mandarin

word vowels used or there are similarities in the way of reading between the consonants forming the spoken word (see Table 1).

Table 1. Student Answers

Student answers	Correct Answers
得 de = auxiliary	的 de = auxiliary
美 měi = beauty	每 měi = every
哪 nǎ = which	那 nà = that
时 shí = at that time	是 shì = is
买 mǎi = buy	卖 mài = sell
老鼠 Lǎoshǔ = mouse	老师 lǎoshī = teacher
设 shè = set	是 shì = is
比价 bǐjià = price ratio	比较 bǐjiào = compare
美国 měiguó = US	每个 měi gè = everything

Note. The result is from data analysis, 2023.

3. Formation of new Chinese characters (27%)

In the formation of new words, what is most often encountered is when writing Chinese characters, many students need to remember how to write Chinese characters, resulting in them ending up writing a new word with no meaning. This error is only found in errors when writing characters, but the following errors are not found when writing using the input method.

Table 2. Student answers

Student answers	Correct Answers	Meaning
	和 hé	and
	期 qī	period
	候 hòu	time
	为 wèi	for
	家 jiā	home
	最 zuì	most
	跟 gēn	follow
	如 rú	be like

Note. The result is from data analysis, 2023.

Based on Table 2, even though we can guess the word in question, the different strokes will give different meanings in Mandarin.

Based on student answer sheets written and typed on the doc, there is a fundamental difference in that students' writing skills have decreased quite a lot. We can see this by the emergence of various types of student errors in writing Mandarin in writing, and it is different from the input method; student errors are based more on similarities in sound or pronunciation, where the overall student error rate is only 25.86% (15 students/58 students), with errors dominated by word selection errors

that have Pinyin which the same as much as 60%, for e.g., 八花(bā huā)&八华 (bā huá) and errors in vowels that form Chinese characters by 40%, for e.g., 设(shè) &是(shì).

The ratio of the level of differences in mandarin pinyin input & handwriting can be seen in Table 3.

Table 3. Comparison of students' Chinese writing errors

Using Pinyin Input	Handwriting
25.86 %	↑67.25 %

Note. The result is from research result of the ratio of the level of differences in mandarin pinyin input & handwriting, 2023.

5 Conclusion

With this study, the pinyin input method can make students less motivated to write Chinese characters, which indirectly has a significant effect on the ability to write Chinese character and using pinyin input also causes various errors when writing Chinese characters. However, in terms of practicality, the pinyin method can save more time entering the characters in practice.

The contribution of this research is to provide an overview for teachers to understand better the effect of using Chinese pinyin input on the level of students' handwriting skills, which can also be a basis for teachers in how useful the use of Chinese mobile input is in everyday learning.

In the future, the research results will not only be limited to the test results obtained by students during the learning process but also to the conditions under which students study and why they prefer to use pinyin input. Further research is expected to be carried out because it will provide a more precise and comprehensive picture of the differences between the use before and after using pinyin input.

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