

Basic Instructional Design for Digital Chinese Character Writing in International Chinese Education

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Abstract. More and more Chinese language classes around the world use computers and phones. So, typing Chinese characters on computers or phones becomes more common. Many teachers and researchers tell learners to type characters now. They say learners should not only write by hand. But there is not much research on how to teach Chinese learners to type well. Typing well means typing fast and without mistakes. So, this paper makes a simple typing course for Chinese learners who just start to type. This course has three parts: beginning to learn, typing faster, and practicing in real life. There are five lessons in total. The aim of this course is to help both teachers and students learn easy ways and skills to type Chinese characters. Besides, the paper also talks about when to start the course, how to teach it, what content to put in the course, and how to check if students have learned it well. This study can help teachers in international Chinese education teach typing better. It can also help future research on typing Chinese characters.

Keywords: typing Chinese characters, international Chinese education, foreign students, basic course design

1. Introduction

China is becoming richer and doing better in business. Its place in the world is also becoming more important. So, more and more people from other countries choose to learn Chinese. But when they learn Chinese, there are two big problems. First, there are many Chinese characters. And these characters have difficult shapes. Second, when you look at a Chinese character, it's hard to know how to read it. What a character looks like and how it sounds don't have a clear easy connection. People who speak languages with letters (like English) find Chinese characters very hard to learn. They are also a key thing to focus on when learning Chinese [1].

With the development of information technology, electronic devices have become highly popular, the internet has achieved comprehensive coverage, and the world has entered the era of digital writing. In recent years, a considerable number of researchers believe that character teaching should begin to focus on digital character writing, rather than overemphasizing handwriting. Chu Chengzhi advocates for "digital writing as primary, handwriting as supplementary" [2]. Lu Jianming calls for "innovating the teaching mode of Chinese characters in international Chinese education" and suggests "initiating with digital typing of characters" [3]. Chen Yong also advocates using computers, mobile phones, and other tools to assist in character teaching [4].

Simultaneously, many scholars have discussed the advantages of digital character writing. For example, Wang Weijia points out that learners no longer need to carry heavy textbooks and can use electronic devices instead, which is very convenient. Furthermore, the application of technologies like "digital platforms and intelligent tools" can help students improve learning efficiency [5]. Zhou Zhiping and others argue that for Chinese learners, digital writing of characters is less difficult and more efficient than handwriting, which can help resolve learners' problem of "difficulty in writing characters" [6]. Additionally, some researchers have explored the issues Chinese learners encounter during digital writing. Zhai Naigang identified errors made by Canadian elementary school students in the process of digital character writing, including problems related to grammar, pronunciation, character form, input methods, etc., and concluded that "the benefits of pinyin typing outweigh the drawbacks" [7].

The review of the above literature shows that existing research discusses how digital character writing has become an inevitable trend in the new context. Most scholars believe that both handwriting and digital writing of characters should be utilized. However, in reality, for most Chinese learners, how to engage in "digital writing" remains a problem. Although digital writing of characters is easier compared to handwriting, it still requires a certain foundation in character recognition, basic handwriting, pinyin, and grammar. Issues such as pronunciation, character forms, and differences between Chinese and English keyboard layouts also come into play. Yet, there is currently little research discussing how to implement foundational courses in digital writing for Chinese learners, specifically "how to teach them to write characters digitally".

Based on this, this paper will focus on foundational courses for digital Chinese character writing aimed at Chinese learners. The aim is to explore how to teach these learners the basic knowledge of digital character writing, help them master digital writing skills, and improve their efficiency in digital writing.

2. Design of a foundational course for digital Chinese character writing

2.1. Overall design

This course is primarily aimed at beginner-level Chinese language learners. The teaching objective is for learners, after approximately five class hours of study, to be able to accurately type 20 Chinese characters within one minute. The course is divided into three main sections, as detailed in the table below.

Table 1. Design plan for the foundational course in digital Chinese character writing

Stage	Main Content	Estimated Class Hours
Stage 1 Foundational Stage	Basic knowledge of the Pinyin input method	1–2 class hours
	Basic input techniques (initial–final decomposition, fuzzy pronunciation, switching between Chinese and English, punctuation marks, etc.)	
	Differences between Chinese and English keyboard usage (using v to represent ü, syllable separators, etc.)	
	Practice: copy typing and dictation exercises for single characters and words	

Table 1. (continued)

Techniques for improving speed and efficiency in Pinyin input			
Stage 2 Speed and Efficiency Enhancement	1. Mastery of full Pinyin and abbreviated Pinyin, with appropriate use of abbreviated forms.		2–3 class hours
	2. Long-sentence input and the correct selection of efficient segmentation strategies.		
	3. Issues related to character form and pronunciation: personal pronouns, homophones and homophonous words, visually similar characters and words, and near-homophones and near-homophonous words.		
	4. Practice: copy typing, dictation, and free-input exercises involving long sentences and sentence clusters		
Stage 3 Contextual Application	Context-based application training		2–3 class hours
	1. WeChat communication		
	2. Email writing		

The table above tells us this course has three main parts: Basic Learning Part, Typing Faster and Better, and Practice in Real Situations. Each part uses the same method: first teach, then let students practice. The first part focuses on learning basic Pinyin input method knowledge. It needs 1 to 2 class hours. The time depends on the students' level. The second part tries to help students type faster with the Pinyin input method. It can take 2 to 3 class hours. The third part is practice in real scenes. It needs 2 to 3 class hours to finish.

2.2. Stage of teaching basic input method knowledge

In the first part, students need to learn the basic Pinyin input method rules. This includes learning simple Pinyin and knowing how to type Chinese characters with rules.

2.2.1. Basic input methods

Inputting Single Characters: First, use the full Pinyin way. Let's take the Sogou Input Method as an example. To type the character "你" (it means "you"), you need to type its full Pinyin "ni" (do not add the tone mark). Then, you can press the number key that shows this character on the candidate list. (As Figure 1 shows, pressing the number "1" on the keyboard will let you type the character "你"). One important thing to remember: "ü" is written as "v". For example, to input "女" (it means "female") (see Figure 2), you should type the Pinyin "nv" (without the tone).



Figure 1. Typing the character "你" (ni, you)

Note: The character "你" (you) is typed by entering the pinyin "ni". The input method candidate list shows homophones and similar-sounding characters, with the target character "你" in the first position.



Figure 2. Typing the character "女" (nv, female)

Note: The character "女" (female) is typed by entering the pinyin "nv". The input method candidate list displays the target character "女" in the first position, followed by other characters with the same pinyin.

Inputting Disyllabic and Polysyllabic Words: The full Pinyin method can also be used. Even if there is an incorrect syllable in the input, if it is a pre-set "fuzzy Pinyin", there is no need to deliberately input or modify the syllable until it is completely correct. The input method will automatically match characters/words corresponding to the fuzzy Pinyin. Regarding this, Sogou Input Method's official definition states: "Fuzzy Pinyin is specifically designed for people who easily confuse certain syllables." Examples are provided: when fuzzy Pinyin is enabled, for instance, for sh<-->s, inputting 'sī' can also produce '十', and inputting 'shī' can also produce '四'. Fuzzy Pinyin supported by Sogou includes: "Initial Consonant Fuzzy Pinyin: s <--> sh, c <--> ch, z <--> zh, l <--> n, f <--> h, r <--> l; Final Vowel Fuzzy Pinyin: an <--> ang, en <--> eng, in <--> ing, ian <--> iang, uan <--> uang." This means that when using the Sogou Input Method, even if there are habitual differences or cognitive confusion in distinguishing the pronunciation of certain initials or finals—such as users from some regions easily confusing "n" and "l", "h" and "f", or having difficulty accurately distinguishing between front and back nasal finals like "en" and "eng", "in" and "ing"—there is no need to repeatedly adjust the input syllables to pursue absolute accuracy. For Chinese learners, this undoubtedly lowers the barrier to input. For example, for the fuzzy Pinyin of "知道" (to know), inputting "zidao", even if not the completely correct syllable, can still produce the word "知道", as shown in Figure 3.



Figure 3. Example of inputting "知道" (zhidao, to know) with fuzzy pinyin

Note: This screenshot demonstrates the "fuzzy pinyin" function. The user incorrectly typed "zi'dao" instead of the standard "zhi'dao", but the input method still correctly suggests "知道" (to know) in the candidate list, as the sounds "z" and "zh" are often confused by some speakers.

Secondly, Chinese input keyboards also have a predictive association function. Taking the Sogou Input Method as an example, suppose you want to type "回忆" (memory). Since this input method prioritizes candidate words with higher word frequency (like "会议" - meeting) to appear first, as shown in Figure 4, you need to further judge whether the first candidate word is the one needed for your sentence during input.



Figure 4. An example of the predictive association function

Note: This picture shows what the input method's predictive association can do. You type "huiyi". The system does two things. First, it suggests single small character parts. Second, it guesses common words and phrases. It puts these guesses first. For example, there is "会议" (huiyi, meeting) and "回忆" (huiyi, memory). This makes typing much faster.

Last, people often have trouble with sounds when they type Chinese words on phones or computers. Problems with First Sounds: Chinese has two kinds of sounds. One is flat-tongue sound (平舌音). The other is curled-tongue sound (翘舌音). If your tongue is not in the right place, you will say the sound wrong. Then the Pinyin you type will be wrong too. Many new learners can't tell these two sounds apart. For example, they may type "souji" when they want to write "手机" (shǒujī - mobile phone). Students also mix up first sounds like "n" and "l". They may type "liunai" instead of "牛奶" (niúnnǎi - milk). Problems with Last Sounds: Some of these problems are about nose sounds. Nose sounds are split into front nose sounds and back nose sounds. The way to say them is almost the same. Many students can't get it right. For example, they may type "xiaojin" instead of "小径" (xiǎojìng - path). Also, when the last sound "er" is used at the end of a word, you should write it as "r" by the Chinese Pinyin rule. For example, to type "花儿" (huār - flower), you need to type "huar". For other last sounds, some are easy to spell wrong, like "ui" and "iu". Last of all, the main reason for these mistakes is that learners don't know the right Pinyin for the words well. So, it is very important for new learners to have a good Pinyin base.

2.2.2. How Chinese and English keyboards are different

The teacher shows students the differences between Chinese and English input methods and keyboards.

Here are the key points: Punctuation Marks: Easy to Mix Up Chinese and English punctuation marks are easy to confuse. Students need to know how they are different. Chinese punctuation marks (like ,, ;, “”) are full-width. They take up the space of two English letters. English punctuation marks (like ,, ;, “”) are half-width. They take up the space of one English letter. The difference is small. So the teacher needs to show these marks and stress this difference. This helps students tell them apart.

Switching Between Chinese and English: In the Sogou input method, here's how to switch modes: To switch typing modes (Chinese/English), you usually press the Shift key. To switch punctuation modes (Chinese/English), you can press Ctrl + dot (.).

You can also switch by clicking a small picture on the input method's bar. This small picture shows either a Chinese or English punctuation mark. Clicking it changes the mode.

People who speak Chinese first often miss these small things. But for those who learn Chinese as another language, these points are helpful. The teacher needs to explain them clearly.

2.2.3. Practice methods for the foundation stage

To help students learn and keep knowledge in mind well, practice in class or after class is very important. The teacher can let students do dictation in class. Students need to type the Chinese

characters or words they see or hear. This helps them learn better. The practice has two parts: Type one Chinese character each time; Type one Chinese word each time. Both parts are based on what students see or hear. Students must type in the correct way. They should not use "fuzzy pinyin" too much. This practice also helps students remember Chinese characters and Pinyin better.

Here are some example exercises below.

(1) Character Typing Practice (Based on Sight)

The teacher shows characters with initials that are easy to mix up (no Pinyin). For example: “资 (zī), 之 (zhī), 四 (sì), 事 (shì).”

Next, the teacher shows characters with special finals. For example: “而 (ér), 二 (èr), 饿 (è).”

Then, the teacher shows characters with nasal finals (no Pinyin). For example: “金 (jīn), 京 (jīng), 因 (yīn).”

Also, the teacher shows characters that are easy to type wrong in Pinyin (no Pinyin). For example: “错 (cuò – often typed as cùo by mistake)” “虐 (nüè – use 'v' instead of 'ü', type 'nve’)” “绿 (lǜ – type 'lv’)”

These exercises mainly train students to tell apart easy-to-mix initials correctly. They also help students recognize and use special finals and nasal finals well. Students will learn Pinyin rules for characters that are often spelled wrong. This training makes students' basic Pinyin knowledge stronger. It also makes their Pinyin typing more accurate.

(2) Word Typing Practice (Based on Sight)

After the above training, move to the second practice stage: typing common two-character words. For example: “学校 (school), 电脑 (computer), 学习 (study)” and other words people use a lot every day. Students should try to use abbreviated Pinyin (简拼) often.

At the same time, add practice with words that need the syllable-division symbol (隔音符号). For example: “西安 (Xi'an), 方案 (plan), 平安 (safe and sound).”

Then, move on to typing multi-character words. For example: “中华人民共和国 (People's Republic of China), 计算机科学与技术 (Computer Science and Technology).”

(3) Character Typing Practice (Based on Hearing)

After completing the sight-based exercises, move to hearing-based drills. Here, the teacher can read a character 1-2 times, requiring students to type the correct pinyin accurately. Characters can include “爸 (bà, father), 蓝 (lán, blue), 南 (nán, south).” For polyphonic characters (characters with multiple readings), the teacher needs to specify, for example, “蓝 is 'lán' as in '蓝天 (blue sky)’” (see Figure 5).



Figure 5. Inputting the character "蓝" (lan, blue)

Note: This screenshot displays the candidate list for the pinyin "lan". The target character "蓝" (blue) appears in the first position, followed by a long list of other characters sharing the same pronunciation (homophones), such as "兰", "拦", and "澜", demonstrating the vast number of homophones in Chinese.

(4) Word Typing Practice (By Listening)

This exercise wants to check if students can tell different sounds apart. We can use words that sound almost the same. For example: "事实 (shìshí, fact)" and "四十 (sìshí, forty)"; "知道 (zhīdào, to know)" and "指导 (zhǐdǎo, to guide)"; "吃饭 (chīfàn, to eat)" and "示范 (shìfàn, to demonstrate)"; "少数 (shǎoshù, minority)" and "小数 (xiǎoshù, decimal)".

2.3. Stage to type Chinese faster and better with pinyin

First, the teacher shows students how full pinyin (全拼) is different from short pinyin (简拼). Then students try using short pinyin. Short pinyin is a fast way to type Chinese with pinyin. You just type the first letter of each part of the word's pinyin. This makes typing quicker. When students use short pinyin, teachers need to check if they split words too much with the "2+2+2" method. For example, when typing "星期天我要去爬山" (On Sunday I want to go hiking), students might split it wrong: "星期 / 天我 / 要去 / 爬山". This is bad. It breaks the sentence into wrong parts. The meaning gets messed up. The words they type will not make sense. So teachers must remind students: The "2+2+2" split does not work for all sentences. When using short pinyin, think about three things: How words usually go together; The sentence's parts; If the meaning is clear. Split words in different ways when you need to.

2.3.1. Kinds of mistakes with how characters look and sound

Teachers need to gather and correct students' mistakes about two things: how Chinese characters look, and how they sound. These mistakes are of three types: Personal pronouns (like 他, 她, 它); Characters or words that sound the same, but look different and have different meanings; Characters or words that look the same, but sound different and have different meanings. Teachers make a list of these mistakes. This list is called an error list. In class, they make exercises. The exercises help students practice telling these different characters and words apart.

Personal Pronouns: The words "他", "她", and "它" all have the same Pinyin: "ta" (no tone marks). Students often mix them up. For example, they may type the boy word "他" when they mean the girl word "她". To fix this, teachers explain clearly when to use each of the three. They give many example sentences. The sentences help students understand how to use them in context. Like: "张三是个男孩,他很喜欢打篮球" (Zhang San is a boy; he really likes playing basketball). "小美是个女孩,她很漂亮" (Xiaomei is a girl; she is very pretty)..

Same-Sound Characters/Words These are characters or words that sound the same, but look different and have different meanings. Examples: "波" (bō, wave) and "播" (bō, to sow) (see Figure 6). When you type the Pinyin "bo", both show up. Students easily use the wrong one. "启示" (qǐshì, enlightenment) and "启事" (qǐshì, notice) (see Figure 7). When you type "qishi", both show up. Students often mix them up. Teachers put these words in the error list. This helps summarize students' mistakes.

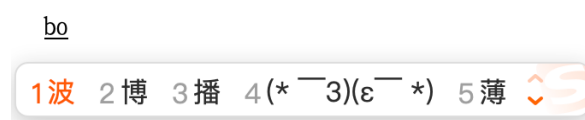


Figure 6. How to type the characters "波" (bo, wave) and "播" (bo, to sow)

Note: This picture shows what happens when you type the Pinyin "bo". The list of words that pop up has "波" (wave) and "播" (to sow). These two words sound the same. The picture also shows a middle step when typing. In this step, the user is picking the last part of the Pinyin sound. This is a usual thing in some Pinyin input methods.



Figure 7. How to type the phrases "启示" (qishi, enlightenment) and "启事" (qishi, notice)

Note: This picture shows what happens when you type the Pinyin phrase "qi shi". The input method gives a list of words and phrases that sound the same. These include "启示" (enlightenment), "启事" (notice), and "其实" (actually). This shows how hard it can be to choose the right word when they all sound the same but have different meanings and characters.

We can split these into two kinds: Characters that look almost the same but sound different; Characters that look almost the same and sound the same. 1. Similar Look, Different SoundA common mistake: students mix up these characters. They look nearly the same, so it's easy to get them wrong. Examples: "鸟" (niǎo, bird) and "乌" (wū, crow); "拨" (bō, to dial) and "拔" (bá, to pull out). 2. Similar Look, Same SoundThese are harder to learn. Why? Because they sound the same AND look almost the same. Example: "俘" (fú, captive) and "浮" (fú, to float) (see Figure 8). They look similar and sound the same, but their meanings are totally different. Words That Look Almost the SameThese are words that look nearly alike. If students don't learn them well, they often type the wrong words. For example: "必须" (bìxū, must – use when you need to do something) and "必需" (bìxū, essential – use for things you need to have) (see Figure 9). These two words sound the same, look similar, but they are used in different ways and have different roles in sentences.



Figure 8. Example of continuous input for "停" (ting, to stop) and "浮" (fu, to float)

Note: This screenshot illustrates continuous phrase input. The user has likely typed a longer pinyin string, and the input method engine is intelligently segmenting it into candidate words like "停" (to stop) and "浮" (to float).



Figure 9. Differentiating between "必须" (bixu, must) and "必需" (bixu, essential)

Note: This screenshot shows the list of words for pinyin "bi xu". There are two common words that sound the same: "必须" (must – use when you have to do something); "必需" (essential – use for things you need to have)The input method helps you pick the right

word by looking at what you're writing (context).

Characters/Words with Similar Sounds: These words sound almost the same. When typing their pinyin on the computer, the letters are similar. So students often type the wrong one. Examples: Type "蓝" (lán, blue) but write "南" (nán, south); Type "打印" (dǎyìn, to print) but write "答应" (dāyìng, to promise). These sounds are close—only a little different (like the second pair's difference is mainly in tone).

If teachers make a list (error database) of these common mistakes and talk about them in class, they can help students avoid many errors. This will make students much better and faster at typing Chinese characters digitally.

For other common mistakes (like "when 'er' is a final, you need to write 'er' instead of 'r'"), teachers should also explain and warn the whole class in advance. This way, these mistakes will happen less. Also, making students want to learn more helps them type faster and better. Teachers should: Choose materials that are common and useful

Focus on characters/words that are used a lot and form other words often; Think about the areas where students will use these characters in future life; Explain where characters come from and how they changed over time. This stops students from feeling bored and not wanting to learn.

2.3.2. Practice methods for the speed improvement stage

To help students learn the skills well, teachers should give exercises like: Typing long sentences or groups of sentences by looking at them; Typing by listening; Typing their own writing. Below are example exercises you can use for practice:

(1) Abbreviated Pinyin (简拼)

Type by looking at the words: "发布寻人启事" (post a missing person notice). You need to tell the difference between the two words that sound the same: "启事" (notice) and "启示" (enlightenment). For abbreviated pinyin, try "fb xr qs".

(2) Sight-Typing Long Sentences

"春天到了,鸟儿站在树枝上唱歌." (Spring has arrived; birds are standing on the branches singing.) This sentence helps students distinguish between "鸟" (bird) and "乌" (crow), and also practice using the 'er' final correctly.

"他快速地完成了老师布置的作业." (He quickly completed the homework assigned by the teacher.) This sentence helps students learn to differentiate between "他, 她, 它" (he, she, it) and "的, 地, 得" (structural particles).

"奶奶做的冬瓜肉丸汤的味道特别鲜,我吃得开心." (The taste of the winter melon meatball soup Grandma made is especially delicious; I ate it very happily.) This sentence is excellent for distinguishing between homophones with different characters (e.g., "道" [way/taste] vs. "到" [to arrive]) and the usage of the particles "的" and "得".

"我答应帮你忙." (I promise to help you.) This sentence helps students grasp the difference between "打印" (to print) and "答应" (to promise), distinguishing easily confused words with similar sounds.

(3) Hearing-Typing Sentence Groups

The teacher reads a sentence aloud twice, and students type it from memory. For example:

"小张不小心把花盆碰倒了,土撒在作业本上,他赶紧用毛巾擦干净,生怕被妈妈责怪." (Xiao Zhang accidentally knocked over the flowerpot; soil spilled on his homework notebook. He quickly wiped it clean with a towel, afraid of being scolded by his mom.) This sentence helps students

distinguish the homophones "倒" (to fall over) and "到" (to arrive), involves the different usages of "撒" (to scatter) and "洒" (to sprinkle), and reinforces the use of "的, 地, 得" in a specific context.

(4) Free Composition Practice

Please type 2 sentences about things you do every day. For example: "我每天中午12点下课,然后去食堂吃午餐." (I finish class at 12 noon every day, then go to the cafeteria to eat lunch.) Pay attention to the correct use of "的, 得, 地".

2.4. Scenario application training

Finally, let students engage in scenario application. The ultimate goal of digital character writing is to apply it in daily life. Applying it to daily scenarios like WeChat chatting and email writing allows students to gain practical experience, reduce error rates, and increase typing speed.

During scenario application, first set a target for students, such as typing 20 characters per minute. They should appropriately use the abbreviated pinyin learned earlier and be mindful of avoiding common errors, etc.

Teachers can set specific chat topics for different scenarios. WeChat Chatting Scenario: Set the topic as "Extracurricular Hobbies." In the dialogue, students can use vocabulary and sentence patterns like: "爱好, 喜欢, 跑步, 音乐, 好玩, 有意思, 在哪里, 太好了, 下次一起去" (hobbies, to like, running, music, fun, interesting, where is, great, let's go together next time). Email Writing Scenario: Set the theme as "Asking a Teacher a Question." In this scenario, students can learn the format for writing Chinese emails and use vocabulary and phrases like: "尊敬的, 您好, 关于, 我想请教一下, 不太明白, 请问, 谢谢您" (Respected, Hello, regarding, I'd like to ask about, I don't quite understand, may I ask, thank you).

After Students Finish the Tasks: First, ask students to check their own work against clear requirements. For example: Are there mistakes with words that sound the same? Are there mistakes with unretroflexed/retroflexed sounds? After checking their own work, students can swap their work with classmates. Classmates check and correct each other's work. Finally, the teacher gives feedback and corrects the mistakes.

3. Reflections on the design of the foundational course for digital Chinese character writing

3.1. Timing for initiating the foundational course in digital writing

This course is for people who just started learning Chinese. It needs about 5 class hours to finish the teaching goals. From the above analysis, we can see that learners need some basic Chinese skills to do typing tasks and pick the right characters. But when exactly to start this course still needs more practice and checking. The writer thinks the best time is near the end of a basic Chinese Pinyin course. This way, learners can read Pinyin of simple Chinese characters well (following the "Chinese Proficiency Grading Standards for International Chinese Language Education") before starting. This stops weak basic knowledge from making it hard to learn digital writing skills.

We can give a Pinyin test before the course. The test includes three things: reading initials and finals correctly (for example, telling "ü" and "u" apart, or telling unretroflexed and retroflexed sounds apart), spelling Pinyin for common characters correctly, and reacting quickly to simple Pinyin combinations. Learners can start the digital writing course only if two things are true: first, they get 85% or more correct answers in the test; second, they can write Pinyin for 20 simple characters correctly in one minute. Also, from the course content above, these learning materials and

training ways can help learners get better at Chinese overall—like understanding Pinyin better and recognizing more characters.

In summary, digital Chinese character writing is now a key topic for research in international Chinese education. But both theory research and teaching practice still need to grow and improve. This course design is just the writer's first try. It will need more tests and changes through future practice.

3.2. Reflections on teaching methods and content

Regarding the choice of teaching methods for digital character writing, the early and middle stages of the course mainly use theory talks and mistake warnings. The teacher explains basic knowledge like Chinese Pinyin and the differences between Chinese and English keyboards. The teacher also points out common mistake examples early, and makes an error database to predict and cut down on frequent mistakes. In the later stages of the course, a task-based way is used. The teacher designs many real-life situations, and gives different digital writing tasks. This encourages students to use what they have learned in real life. Finally, students check each other's work to make their digital writing skills even better.

Regarding final application feedback, using situation-based practice can make students much more interested in learning. Through practical exercises, students can also see how useful digital character writing is in real life. But the situations designed in teaching are mostly about daily life. They don't cover enough academic and work-related fields. Because students have different needs, we should design situation exercises for many different areas.

3.3. Reflections on individual student differences and learning outcome assessment

Ye Minghui and Qu Shaobing have an idea. When teachers teach students to type Chinese characters on phones or computers, students from other countries use Chinese input methods in different ways. Each student makes different mistakes when typing. Students also have other differences: Different habits of typing; Different feelings about learning; Different levels of understanding how to type Chinese this way. So, teachers should make teaching plans that fit each student's needs [8]. What's more, they say students are different at different learning steps. So Ye and Qu also suggest: "We need to make Chinese character teaching plans. These plans should fit different learning steps, different countries, and can change when we need them to" [8].

It is easy to think that students will definitely be different from each other. Also, the same student can be different at different learning stages. Now, teachers mainly learn about these differences by watching students in class and giving regular tests. Teachers do not watch enough how students type digitally after class. This means that mistakes students make when doing homework cannot be found quickly and added to the error database. When checking students' learning results, people mainly look at how many characters students type, how correct they are, and how fast they type. There is less checking of things like "how well students can use typing in real situations". We need to add more things to check and do a full evaluation.

3.4. Digital typing can never completely replace writing by hand

This class is all about teaching digital typing. It can fix the problem of "finding it hard to type on phones or computers" for new learners. But we must be clear about one thing: digital typing can

never fully take the place of writing by hand. The two should work together and help each other when teaching Chinese to students from other countries.

Feng Siyun has something to say. Digital typing can make learning Chinese characters faster. It can also make students' typing skills better. But it has bad parts too. For example, it "harms learners' ability to know and remember what characters look like" [9]. So digital typing has its limits. It cannot completely replace writing by hand. That is why Feng Siyun suggests we should balance digital typing and writing by hand. This way, we can get the best results when teaching characters [9].

Writing by hand is a key way to enjoy the beauty of character shapes and their cultural ideas. It helps learners understand and master the culture in Chinese characters and Chinese culture as a whole. Digital typing, however, can only show the final look of a character. It makes it hard for learners to feel the beauty of how strokes are written in order and how characters are built step by step.

Writing by hand helps us know and remember characters better—and digital typing can never take this place. Psychology studies show that when we write by hand, our eyes, hands, and brain work together. This makes our memory of character shapes and strokes stronger. For example, when writing the character "赢" (yíng, to win), practicing its stroke order again and again makes it easier for learners to remember its complicated shape. Digital typing uses Pinyin input. Learners only need to remember the Pinyin to pick the right character. Over time, this can cause a problem: learners can type the character but cannot write it by hand. This affects their deep understanding and mastery of the character.

Writing by hand is still needed in some specific situations. For example, students from other countries need basic handwriting skills for: The writing part of the HSK (Hanyu Shuiping Kaoshi) exam; Signing Chinese documents; Writing greeting cards and short notes.

In future class designs, we need to add proper handwriting training while making digital typing skills better. For example, arranging regular Chinese character handwriting practice every week can help learners develop all-around abilities to use characters well.

4. Conclusion

Shi Feng and Ji Zhuanzhuan have said that "digital typing of Chinese characters is a very important trend in the information age" [10]. Because of this, this study focuses on one thing: teaching students from other countries how to type Chinese characters on phones or computers. The study makes a course system with several parts. This system meets the digital needs of teaching Chinese to students from other countries. The course we made is split into three clear stages. Teachers teach step by step. They give different levels of training. This structure helps students from other countries in two ways: It helps them build a strong base in digital typing. It also helps them get better at using Chinese characters. This research can give a useful example. It can help make Chinese character teaching more digital. Future studies can do two more things: They can learn more about how to make digital typing teaching methods better. They can also mix theory and practice more deeply. This would give students around the world better ways to learn Chinese characters. In the end, it would help teaching Chinese to students from other countries develop and grow well.

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