Research on Handwritten Chinese Characters in Chinese Proficiency Grading Standards for International Chinese Language Education

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Abstract: As the top-level design of international Chinese language education in the new stage, the *Chinese Proficiency Standards for International Chinese Language Education* proposes that the four basic elements of syllables, Chinese characters, vocabulary and grammar constitute the "four-dimensional benchmark". A list of handwritten Chinese characters is listed separately, and separate requirements for handwritten Chinese characters are made. This paper analyzes the necessity of handwriting Chinese characters, and studies handwritten Chinese characters from various perspectives, such as grading and quantity, relationship with the general Chinese character list, word formation ability, and configuration characteristics. It is found that handwritten Chinese characters have been highly commonly used and have strong word formation ability. The configuration is typical and simple, and the writing difficulty is relatively low.

1. Introduction

At the end of March 2021, the Ministry of Education and the State Language Commission of the People's Republic of China issued the *Chinese Proficiency Grading Standards for International Chinese Language Education* (GF0025-2021) (hereinafter referred to as the *Standards*)[1]. The *Standards* is the first normative standard of the State Language Commission for foreign Chinese learners, which comprehensively describes and evaluates the learners' Chinese language skills and levels. The *Standards* divides learners' Chinese proficiency into "three grades and nine levels", and uses four basic elements of syllables, Chinese characters, vocabulary, and grammar to form a "four-dimensional benchmark"[2]. The three evaluation dimensions, together with the five language skills of Chinese listening, speaking, reading, writing and translation, will accurately calibrate the Chinese level of learners. The release and implementation of the *Standards* is an important symbol of the further improvement of the language norm standard system, and will provide strong support for the development of international Chinese language education.

Chinese characters have always been the most difficult problem in Chinese language learning. Liu Yinglin (2020) pointed out that there are two main reasons for the long-term lag in Chinese character teaching in international Chinese language teaching: one is that in the teaching of four

language skills, listening, speaking, reading and writing, the recognition and reading of Chinese characters and handwriting are carried out simultaneously and in equal amounts for a long time; another reason is that in the overall design of teaching, all Chinese characters are required to both recognition and handwriting[3]. This habitual way of thinking, which bundles listening, speaking, reading and writing together, is difficult to be used as a normative standard, and is not good to the sustainable development of the internationalized, popularized, diversified and globalized Chinese teaching either. Therefore, a moderate separation of Chinese character recognition and reading from handwriting is advocated. In the *Standards*, there are both standard Chinese character lists for Chinese proficiency levels (hereinafter referred to as "the general Chinese character list") and handwritten Chinese character lists. This is a highlight of the *Standards* in solving the problem of Chinese characters.

2. The Necessity of Handwriting Chinese Characters

With the development of science and technology, computers and smart phones are very popular now, and keyboard input of Chinese characters is widely used. Even among Chinese students, there is a "Chinese character crisis" that they ignore handwriting of Chinese characters and forget how to write Chinese characters when they pick up the pen. Jiang Xin (2017) pointed out that in the keyboard era, students' interest and demand for writing Chinese characters has dropped significantly[4]. Therefore, there are two kinds of voices in the society. One thinks that teaching Chinese characters does not need to teach writing. Students only need to be able to input and recognize characters through mobile phones or computers. The Chinese proficiency test has an online test, and keyboard input can complete the test in the whole process. The other party thinks that students should be taught to write Chinese characters, so that students can better memorize the glyphs of Chinese characters and understand the Chinese culture contained in Chinese characters by writing Chinese characters. The *Standards* supports the latter, and creatively separates recognizing and reading Chinese characters from handwritten Chinese characters, and solves the current problems reasonably through different ratios. We agree with this innovative solution and believe that handwriting some Chinese characters is quite necessary.

First, the process of writing Chinese characters stroke by stroke at a time helps to strengthen the understanding and memorization of the meaning and structure of Chinese characters. Chinese characters are ideographic characters, and writing Chinese characters can improve the efficiency of the recognition and memorization of them, which is a requirement of language learning itself.

Second, from the cultural perspective, Chinese characters are the quintessence of Chinese culture and the carrier of Chinese culture. If one does not know how to handwrite Chinese characters, he cannot truly understand Chinese language. Liu Genhuo (2012) pointed out that the process of writing Chinese characters is a process of understanding Chinese culture, and the writing of Chinese characters is related to the inheritance of Chinese culture[5].

Third, relevant research in current psychology also supports that handwritten Chinese characters can better promote the cultivation of reading ability, thinking ability, cognitive ability and personal temperament. Li Huimin et al. (2015) pointed out that writing involves a large number of advanced neural activities, which are related to cognition, personality, and diseases, and also play an important role in individual development[6]. Through quantitative research on the writing process and results, they found some correlations between indicators such as writing speed, pressure, and pen holding with intelligence and cognitive load. Zhu Zhaoxia et al. (2019) believed that writing and reading have a shared neural network. Writing can affect reading. Reading not only depends on visual processing, but also depends on the representation of writing movements[7]. Traditional writing can promote reading, but computer typing has an negative effect on reading. Traditional

writing can strengthen the orthographic representation of Chinese characters and promote the reading of Chinese characters.

Fourth, from the perspective of educational equity, we cannot ignore that in some countries or regions the network coverage is not broad enough and smart devices are not yet popularized, so the keyboard input of Chinese characters cannot be fully implemented. Pens and test papers need to be used, so it is necessary to take into account fairness and provide normative reference for this part of the population. For "International Chinese language education", the concept of "international" indicates a large scope, so the *Standards* should be a global standard in which fairness needs to be taken into account.

Therefore, considering from the perspective of Chinese character learning itself, from the perspective of cultural inheritance, from the researches' results of interdisciplinary psychological experiments, and from the perspective of educational equity, handwriting some Chinese characters is quite necessary.

3. Multi-angle Analysis of Handwritten Chinese Characters in the Standards

3.1 Classification and Quantity of Handwritten Chinese Characters

In the *Standards*, Chinese characters, as one of the four basic elements of language, also correspond to the corresponding quantitative indicators of language. As **Table 1** shows, levels 1 to 6 require 300 Chinese characters respectively, and 1200 Chinese characters are required without internal subdivision for levels 7 to 9. A total of 3000 Chinese characters are required for all levels. The handwritten Chinese character list, as **Table 2** shows, is only divided into the three grades, 300 for elementary grade, 400 for intermediate grade, and 500 for advanced grade, with a total of 1200 Chinese characters.

Table 1: The requirements of the quantity of Chinese Characters proposed by the general Chinese character list

File	The requirements of the quantity of Chinese Characters						
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7-9
General Chinese character list	300	300	300	300	300	300	1200

Table 2: The requirements of the quantity of Chinese Characters proposed by the handwritten Chinese character list

File	The requirements of the quantity of Chinese Characters		
	Elementary grade	Intermediate grade	Advanced grade
Handwritten Chinese character list	300	400	500

3.2 The Relationship between Handwritten Chinese Character List and the General Chinese Character List

3.2.1 The Matching of Handwritten Chinese Characters with Recognizing and Reading Chinese Characters

As for the source of handwritten Chinese characters, all handwritten Chinese characters come

from the general Chinese character list of the *Standards*, that is, the list for recognizing and reading Chinese characters. The *Standards* makes a reasonable ratio between recognizing and reading Chinese characters and handwritten Chinese characters. In elementary grade, there are 900 recognizing and reading characters, and 300 handwritten Chinese characters; in the intermediate grade, there are also 900 recognizing and reading characters, and 400 handwritten Chinese characters; in the advanced grade, there are 1200 recognizing and reading characters, and 500 handwritten Chinese characters. The proportions of the three grades of handwritten Chinese characters to the three grades of the general Chinese characters were 33%, 44%, and 42%, respectively. The number of characters required to be mastered at the elementary stage is relatively few, and the proportions of the intermediate and advanced stages are almost the same, which has a small increase on the basis of the elementary stage, and the ratio is reasonable.

3.2.2 The Level Matching of Handwritten Chinese Characters with the General Character List

The handwritten Chinese characters in three grades do not directly correspond to Chinese character list of the corresponding level in the *Standards*. The detailed distribution of handwritten Chinese characters in the general Chinese character list is showed in **Table 3**. The 300 elementary handwritten Chinese characters come from elementary Chinese characters of level 1 to 3, including 273 level 1 characters, 24 level 2 characters, and 3 level 3 characters. The 400 intermediate handwritten Chinese characters are from levels 1 to 6, and the number of Chinese characters from levels 1 to 6 are 27, 262, 67, 26, 12, and 6. The 500 advanced handwritten Chinese characters are from levels 2 to 6, of which there are 12 characters for level 2, 220 characters for level 3, 162 characters for level 4, 86 characters for level 5, and 20 characters for level 6. In general, the elementary handwritten Chinese characters are mainly from the level 1 characters, the intermediate handwritten Chinese characters are mainly from the level 2 characters, and the advanced handwritten Chinese characters are mainly from the level 3 characters. The 1,200 handwritten Chinese characters are all from elementary and intermediate Chinese characters, of which 888 are elementary Chinese characters, accounting for 74%, and 312 are intermediate Chinese characters, accounting for 26%. It can be seen that handwritten Chinese characters are mainly from elementary Chinese characters, which are relatively less difficult.

Table 3: The distribution of handwritten Chinese characters in the general Chinese character list

General character list / Handwritten character list	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Elementary handwritten characters	273	24	3			
Intermediate handwritten characters	27	262	67	26	12	6
Advanced handwritten characters		12	220	162	86	20

The 300 Chinese characters in level 1 are all handwritten Chinese characters, including 273 elementary handwritten characters and 27 intermediate handwritten characters; among the 300 Chinese characters in level 2, 298 are handwritten Chinese characters, including 24 elementary ones, 262 intermediate ones, and 12 advanced ones. Among the 300 Chinese characters in level 3, 290 are handwritten Chinese characters, 3 for the elementary grade, 67 for the intermediate grade, and 220 for the advanced grade. Taken together, there are 888 handwritten Chinese characters in the 900 Chinese characters for elementary grade, with only 12 exceptions. There are 312 handwritten Chinese characters in the 900 intermediate Chinese characters of the general Chinese character list.

3.3 Word Formation Ability of Handwritten Chinese Characters

A Chinese character can be multiple morphemes, either word formation morphemes or non-word formation morphemes. The *Standards'* vocabulary list has 11,092 words, of which there are 1,655 monosyllabic words. Among the 1655 monosyllabic words, 998 are handwritten Chinese characters, accounting for 83.2% of the total amount of handwritten Chinese characters. It can be seen that most of the handwritten Chinese characters are monosyllabic word formation morphemes.

Let's look at the word formation ability of Chinese characters in the *Standards'* vocabulary. There are 11092 words in the vocabulary list, which are composed of 22012 Chinese characters, but these 22012 Chinese characters are repeated from 2970 Chinese characters, and these 2970 Chinese characters are completely from the general Chinese character list of the *Standards*, which covers all the levels 1-6 characters and 1170 characters of the 1200 Chinese characters of levels 7-9.

As far as the general Chinese character list is concerned, 900 Chinese characters for elementary grade(levels 1 to 3) appear 15,546 times, with an average of 17.27 times per character, and 900 characters for intermediate grade(levels 4 to 6) appear 4,558 times, with an average of 5.06 times for each character, and the 1200 advanced characters, appear 1908 times in the vocabulary, with an average of 1.59 occurrences of each Chinese character. 300 elementary handwritten Chinese characters appear in the vocabulary with a total of 7347 words, and each character appears 24.49 times on average; 400 intermediate handwritten Chinese characters appear in the vocabulary with a total of 5574 words, with each character appearing 13.935 times on average, and the 500 advanced handwritten Chinese characters appear in 4465 words and each character appears 8.93 times on average. It can be seen that the average number of occurrences of each character in the vocabulary of different grades of handwritten Chinese characters is higher than that of the corresponding grades in the general Chinese character list, which reflects the stronger word formation ability of handwritten Chinese characters. The word-forming ability of three grades shows a downward trend, that is to say, the stronger the word-forming ability, the more commonly used, the higher the circulation, and the lower the grade.

3.4 Configuration Characteristics of Handwritten Chinese Characters

Strokes, components and Chinese characters are the three levels of modern Chinese character configuration.

3.4.1 Features of Stroke

The difference between simple and complex glyphs is most intuitively represented by the number of strokes of a word or component. The number of strokes reflects the level of visual complexity. Huang Wei's (2021) summary of psychological experimental research believes that strokes are the basic unit of Chinese character processing, and the number of strokes has an impact on the processing time and writing process of Chinese characters, and is used to represent visual complexity and lexical complexity[8].

The following is a comparison of the number of strokes of Chinese characters between the handwritten Chinese character list and the general Chinese character list. The number of strokes in handwritten Chinese characters ranges from 1 to 19. The number of strokes in elementary handwritten Chinese characters ranges from 1 to 14, and in intermediate handwritten Chinese characters ranges from 1 to 16, and in advanced handwritten Chinese characters ranges from 3 to 19. On the whole, there are less at the two ends and more at the middle. The comparison of stroke difference in ratio of 3 grades of handwritten Chinese characters is showed in **Table 4**. Among the elementary handwritten Chinese characters, 30% are those with 1-5 strokes, 58% are those with

6-10 strokes, and 12% are those with 11-14 strokes. Among the intermediate handwritten Chinese characters, 22% have 1-5 strokes, 57% have 6-10 strokes, 21% have 11-15 strokes, and 1% have 16 strokes. Among the advanced handwritten Chinese characters, 13% have 1-5 strokes, 61% have 6-10 strokes, 24% have 11-15 strokes, and 2% have 16-19 strokes. Generally speaking, 20% of handwritten Chinese characters have 1-5 strokes, 59% have 6-10 strokes, 20% have 11-15 strokes, and 1% have 16-19 strokes. The number of strokes of the characters in the general Chinese character list ranges from 1 to 23, and the corresponding stroke intervals account for 11%, 53.2%, 31.4%, and 4.4% from 16-23 strokes. The comparison of stoke difference in ratio of the general Chinese characters and the handwritten Chinese characters is demonstrated in **Table 5**. Strokes represent the difficulty of writing. Based on **Table 5**, 79% of the handwritten Chinese characters are within 10 strokes, and 64.2% of the general Chinese characters are less than 10 strokes. It can be seen that the overall writing difficulty of handwritten Chinese characters is lower than that of the general Chinese characters.

Table 4: The comparison of stroke difference in ratio of 3 grades of handwritten Chinese characters

Stroke intervals / Grades	1-5 strokes	6-10 strokes	11-15 strokes	16-more strokes
Elementary handwritten characters	30%	58%	12%	
Intermediate handwritten characters	22%	57%	21%	1%
Advanced handwritten characters	13%	61%	24%	2%

Table 5: The comparison of stoke difference in ratio of the general Chinese characters and the handwritten Chinese characters

Stroke intervals / Category	1-5 strokes	6-10 strokes	11-15 strokes	16-more strokes
General characters	11%	53.2%	31.4%	4.4%
Handwritten characters	20%	59%	20%	1%

3.4.2 Components

A Chinese character component is a character-building unit composed of strokes and has the function of assembling Chinese characters. The structure of Chinese characters is the way and rule for forming Chinese characters. The structure of Chinese characters can be divided into single structure and combined structure. There are 12 combined structures, including upper and lower, upper middle and lower, left and right, left middle and right, left-upper closure, right-upper closure, left-upper-lower closure, left-lower closure, upper-left-right closure, lower-left-right closure, full closure and mosaic structure.

According to the "Modern Commonly Used Single Characters Specification", there are a total of 256 single characters in modern Chinese[9]. There are 239 single characters in the general Chinese character list of the *Standards*, and the single characters account for 8%, of which 147 are elementary, 48 are intermediate, and 44 are advanced; 186 single characters appear in the handwritten Chinese character list. The proportion of single characters in handwritten Chinese characters is 15.5%, including 81 characters for elementary grade, 63 characters for intermediate grade, and 42 characters for advanced grade. Three points can be concluded. First, the proportion of single characters in handwritten Chinese characters is very high, which is nearly 8% higher than

that of the general Chinese character list. The second point is that the single characters in the handwritten Chinese characters account for 78% of the single characters in the general Chinese character list of the *Standards*, which means that nearly 80% of the single characters in the *Standards* appear in the handwritten Chinese character list. The third point is that the distribution of single characters in three grades of handwritten Chinese characters is more uniform and gentler than that of the general Chinese character list of the *Standards*.

Except for single characters, among the remaining characters in the handwritten Chinese character list, there are 542 characters with left and right configuration, 11 characters with left middle and right configuration, 326 characters with upper and lower configuration, 9 characters with upper middle and lower configuration, 44 characters with left-upper closure configuration, 31 characters with left-lower closure configuration, and 9 characters with right-upper closure configuration, 3 characters with left-upper-lower closure configuration, 14 characters with upper-left-right closure configuration, 2 characters with lower-left-right closure configuration, and the configurations of the last remaining 11 characters are still controversial. We put aside the controversy for the time being. Looking at other clearly classified Chinese characters in general, we found that the two main configurations of combined characters are the left and right configuration and the upper and lower configuration, accounting for 45.2% and 27.2% respectively, and the two account for 72.4% of the total.

Liu Jianyu (2019) organized a database of the "General Standardized Chinese Character List" (hereinafter referred to as "Character List") and established a word database[10]. The "Character List" contains a total of 8,105 standard Chinese characters, which are divided into three levels according to the degree of commonality and general scope. Among them, the first-level word list has 3,500 characters, which is the most frequently used common word set, and its function is equivalent to the "Commonly Used Modern Chinese Character List". The general Chinese character list of the *Standards* and the "Commonly Used Modern Chinese Character List" have 2932 characters that overlap. It can be seen that Liu's research conclusions on the first-level characters of the "Character List" can basically conform to the general Chinese character list of the *Standards*. Liu found that from the perspective of layout, 2008 first-level characters are left and right structures, accounting for 57.37%, 831 are upper and lower structures, accounting for 23.74%, and the rest are few. It can be seen that the first-level characters in the "Character List" are also dominated by the left and right structures and upper and lower structures, and the two account for about 81%, which is higher than the handwritten Chinese character list, and the left and right structure is 12% higher than that of the handwritten Chinese character list.

Xing Hongbing (2005) conducted a research on Chinese characters in the Outline of Chinese Proficiency Grades and found that Grade-A characters carry very rich information, and 75% of the basic components with strong character formation ability appear in Grade-A characters[11]. Grade-A characters contain 53% of the basic character-forming components and 44% of the combined character-forming components; 40% of the Grade-A characters are directly involved in character formation; 95% of the components with strong character-forming ability appear in the Grade-A characters. 722 of the 800 Grade-A characters in this outline overlap with the 900 elementary Chinese characters in the *Standards*. It can be seen that the handwritten Chinese characters cover 90.25% of the content of the Grade-A characters. Therefore, the conclusions of the research on the Grade-A characters are generally applicable to handwritten Chinese characters of the *Standards*. This also shows that handwritten Chinese characters have strong character formation ability, and most of them are composed of basic components with strong character formation ability.

4. Characteristics of Handwritten Chinese Characters

From the above analysis, it can be seen that handwritten Chinese characters have the characteristics of being highly commonly used, and having strong word formation ability, typical and simple configuration, and low writing difficulty.

4.1 Handwritten Characters are Frequently Used Chinese Characters

According to the "Commonly Used Modern Chinese Character List", among the 3000 Chinese characters in the *Standards*, 2437 are commonly used characters, 494 are secondary commonly used characters, and 69 are not among the 3500 characters in the "Commonly Used Modern Chinese Character List". Among the 1,200 handwritten Chinese characters, 1,196 are commonly used characters and 4 are secondary commonly used characters. It can be seen that the handwritten Chinese characters are all characters included in the "Commonly Used Modern Chinese Character List", and they are frequently used.

4.2 Strong Ability to Form Words

83.2% of the handwritten Chinese characters are monosyllabic morphemes in the vocabulary. The average number of occurrences of each character in the vocabulary list of different grades of handwritten Chinese characters is higher than that of the general Chinese character list, and the high frequency of use of handwritten Chinese characters also reflects their stronger word formation ability. The stronger the ability to form words, the more conducive to the generation of vocabulary and inference and expansion in the learning process. Specifying such Chinese characters as handwritten Chinese characters can greatly improve the efficiency of Chinese learning.

4.3 Typical and Simple Configuration and Low Writing Difficulty

The configuration of handwritten Chinese characters is typical and simple, and the difficulty of writing them is low. 79% of the strokes of handwritten Chinese characters are less than ten strokes, and the difficulty of writing is relatively low. Among the handwritten Chinese characters, 74% are elementary and 26% are intermediate. The single characters in the handwritten Chinese characters account for 78% of the total single characters. Chinese characters with single-body, left-right structure and upper-lower structure together account for nearly 90% of handwritten Chinese characters, and most of the components are components with strong character formation ability, and most of the handwritten Chinese characters directly participate in the formation of characters, which shows that their configuration is typical and simple. The characteristics of the structure of handwritten Chinese characters can alleviate students' fear of learning Chinese characters. Selecting Chinese characters formed by various construction methods such as pictographic characters, ideographic characters, and phonetic characters is beneficial to explain the rationale of Chinese characters, and provide fun and regularity for Chinese character learning.

5. Conclusion

From the perspective of Chinese characters' learning efficiency, culture, educational equity and other interdisciplinary research on Chinese writing, handwriting some Chinese characters is quite necessary. The *Standards* selects 1,200 handwritten Chinese characters from the 3,000-character general Chinese character list according to the characteristics of Chinese characters' frequency of use, word-forming ability, configuration characteristics, and writing difficulty, and forms a

reasonable grading and matching with the general Chinese character list, so as to innovatively solve the problem of difficulty in Chinese characters' learning, provide a basis for the appropriate separation of Chinese character recognition and reading and handwriting, and also provide a reference standard and space for the development of characteristic Chinese character courses.

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