

# SAWC: The Rubric of Chinese Deaf Students' Writing Ability

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**Abstract:** Writing ability measurement, as a significant part of language proficiency measurement, plays a decisive role in the language teaching of deaf and hard of hearing (DHH) students. The measurement of writing ability can assist teachers in accurately measuring DHH students' language proficiency and evaluate the effectiveness of teaching methods. We, however, have not yet formed a complete tool to measure Chinese DHH students' writing ability. Considering the specificity of Chinese and the importance of measuring DHH students' writing ability, the present study aims to develop a rubric of writing ability for Chinese DHH students from a pedagogical perspective by analysing the written language of Chinese DHH students. 46 essays, across three genres, were collected from 11 elementary-aged Chinese DHH students. The findings show that the Structural Analysis of Written Chinese (SAWC) rubric, which consists of the indices of measurement and the scoring criteria, is a valid measuring tool specifically designed for the written Chinese of DHH students. It takes the T-unit as the unit of measurement. To ensure the comprehensiveness and validity of the rubric, SAWC analysed the written Chinese language from three levels, including the number of perfect T-units, flawed T-units, and nonqualified word-strings, as well as the total number and mean number of words and characters in each type of unit. Level 1 analyses the perfect T-units in the written language of DHH students. Level 2 analyses the perfect T-units and flawed T-units in the written language. Level 3 analyses all the units of the written language, including perfect T-units, flawed T-units, and nonqualified word-strings. Because of the comprehensiveness, consistency, unlimitedness, and universality, the SAWC rubric can measure the writing ability of DHH students objectively and effectively.

**Keywords:** SAWC Rubric, DHH Students, Writing Ability, Chinese

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## 1. Introduction

As deaf and hard of hearing (DHH) students have limited oral language skills, their writing ability represents, to some extent, their ability to communicate with hearing people. Therefore, measuring writing ability is an important aspect of measuring the language skills of DHH students. In a broad sense, writing ability includes the ability to use language and text, as well as the ability to compose it [3]. The ability to use language is a microlevel writing skill that refers to the ability to use language units and grammatical rules. The ability to plan and layout ideas is a macrolevel writing skill that involves the content and logic of the whole text [14]. Due to space limitations and for the following two reasons, the microlevel writing ability is the focus in this paper. The macrolevel writing ability will be discussed in a separate paper.

First, DHH students have limited input when learning language due to their hearing impairment, which affects their mastery of the basic units of language and grammatical rules, so that their language development lags behind. In this sense, they have more prominent problems at the language level during writing. Second, microlevel writing ability is the basic ability of writing, which largely influences students' performance at the macrolevel of writing. Marschark [9] compared the micro-writing ability and macro-writing ability of DHH students with those of hearing students. The results show that, similar to hearing students, DHH students consciously use discourse rules in their language output. However, their lack of grammatical and lexical mastery leads to some limitations in the use of discourse rules, giving the reader the illusion that the deaf students do not use discourse rules.

## 2. Literature Review

The exploration of the measurement of microlevel writing ability for DHH students began in the 1930s. La Brant [6] was the first to focus on the written language of DHH students. He used the number of subordinate clauses as a measure of writing ability, i.e., the more subordinate clauses in a sentence, the higher the student's writing ability. Anderson [1] added two additional measures, the use of pronouns and the length of the sentence. Hunt [5] first proposed the T-unit as a unit of analysis for written language, and the T-unit refers to a main clause and all its dependent clauses. By comparing the written discourse of 54 students in grades 4, 8, and 12, he demonstrated that T-unit length and the number of dependent clauses in each T-unit were valid measures of students' writing ability compared to sentence length. Based on Hunt [5], Golub & Kidder [4] defined "syntactic density", which included text length, the number of T-units, T-unit length, the number of clauses in each T-unit, the average length of main clauses, the average length of subordinate clauses, the number of modal verbs, structures with the auxiliary verb "be" or "have", prepositional phrases, noun and verb possessives, temporal adverbs, verbal phrases, and participles. Golub & Kidder [4] took "syntactic density" as a measure of writing ability for DHH students. Yoshinaga [18] used the "syntactic density" to compare the writing abilities of DHH students and hearing students aged 10-14 and suggested that "syntactic density" is the most comprehensive measure of written language for DHH students, thus far. White [12] proposed the Structural Analysis of Written Language (SAWL), which is a statistical analysis of the morphemes and words of each perfect, flawed, and word-string used by DHH students. SAWL is a protocol developed to analyse students' English writing and show detailed growth measures over time [13].

Research on the writing ability of Chinese DHH students started late in China. Most of the studies developed at the

beginning of this century are still at the description stage. They are devoted to statistics and categorization of problems in the written language, such as Wang [11], Liang & Wang [7], Shao & Zhang [10], and Lu [8], which have not yet formed a complete tool to measure Chinese DHH students' writing ability. Research on the measurement of English writing ability of DHH students has started earlier, and the measurement methods are being gradually improved. However, those measurements focus on the English written language, which is not fully applicable to Chinese, due to the large differences in grammar rules between the two languages.

Considering the specificity of the language performance of DHH students and the importance of micro-writing ability, this paper aims to develop a rubric of micro-writing ability for Chinese DHH students from a pedagogical perspective by analysing the written language of Chinese DHH students. For the development of rubrics of Chinese written language, when referring to the existing measurements, they need to be combined with the actual situation of Chinese to make a rubric that is suitable for the Chinese writing ability of Chinese DHH students.

## 3. Method

### 3.1. Participants

Participants of the current study include 11 prelingual DHH students, 6 females and 5 males, aged 9-14 years old (see Table 1). They all wore hearing aids or cochlear implants. At the time of data collection, they were fourth graders of a deaf school in Northeast China. They were born into hearing families and grew up in the language environment of Mandarin. Chinese is the first language which they were exposed to. However, their Chinese ability was not self-sufficient until they entered elementary school. They learned Chinese and Chinese sign language (CSL) simultaneously after entering school.

*Table 1. Student Demographics.*

No.	Name	Gender	Age	Time of onset	Hearing Loss	Amplification	Amplified Hearing Loss
1	FMH	M	11	Innate	7	CI	3
2	HJY	F	10	Innate	7	CI	4
3	HYJ	M	9	Innate	7	CI	3
4	MR	M	10	18 months	7	HA	5
5	MSY	F	10	Innate	6	CI	4
6	WMH	F	11	Innate	7	HA	3
7	WXH	F	11	6 months	7	CI	4
8	WXP	F	9	Innate	7	HA	4
9	XL	F	14	Innate	7	CI	4
10	XZS	M	12	Innate	7	CI	3
11	ZXK	M	11	24 months	6	HA	4

Notes:

Name: Students' names are uniformly replaced by their initials in the phonetic alphabet.

Gender: Male (M) or Female (F)

Age: Based on age at the time of the study

Hearing Loss: 1 = Hearing within normal limits (0 – 15 dB), 2 = Slight (16 – 25 dB), 3 = Mild (26 – 40 dB), 4 = Moderate (41 – 55 dB), 5 = Moderately Severe (56 – 70 dB), 6 = Severe (71 – 90 dB), 7 = Profound (91 dB+)

Amplification: cochlear implant (CI); hearing aid (HA)

Amplified Hearing Loss: 1 = Hearing within normal limits (0 – 15 dB), 2 = Slight (16 – 25 dB), 3 = Mild (26 – 40 dB), 4 = Moderate (41 – 55 dB), 5 = Moderately Severe (56 – 70 dB), 6 = Severe (71 – 90 dB), 7 = Profound (91 dB+)

### 3.2. Data Collection

The data include (1) 2 picture description tasks, 20 in total, and (2) 5 proposition essay tasks (5 topics are *Introducing my school*, *My favourite festival*, *A reading activity*, *The future me*, and *The story of pears*), 26 in total. A total of 46 essays were collected in the current study, covering 3 genres: narrative, expository, and argumentative, which reflect the Chinese writing ability of DHH students in a comprehensive and realistic way.

#### 3.2.1. Procedures for Data Collection

The teacher or the researcher first explains the topic to the students in class through a combination of CSL and spoken Chinese to ensure that each deaf student understands the requirements clearly. Students then begin to write independently for as long as they wish. Students can ask the teacher or the researcher questions at any time during the writing process. All questions are answered in a neutral way, e.g., the student asks, "Do I need to write a title?" The teacher responds, "If you feel you need to write it, write it and complete the essay as you think best." If students cannot complete the essay in class, they can continue writing it after class and just turn it in at the next class. An attempt was made to have students complete their writing as independently as possible to maximize the authenticity of the data. Even if some students' compositions consist of only one or two sentences or are just a meaningless word-string, they are an objective reflection of their real language ability.

## 4. Findings

### 4.1. Unit of Measurement

The first step in developing the rubric is to determine the units of measurement. Hunt [5] used the "Minimal Terminable unit" (T-unit) as a unit of measurement for English writing ability, which simply refers to a main clause (independent clause) and its dependent clauses. Many researchers have since applied the T-unit to English second language (ESL) teaching and to the study of English writing for DHH students (e.g., [2, 12-17]). These studies have concluded that as students' writing levels improve, their performance on various aspects of the T-unit used also changes. These follow-up studies provide further evidence of the validity of the T-unit when measuring writing ability.

The current study uses the T-unit as a unit of measurement of Chinese writing ability for DHH students. However, since the syntactic structures of Chinese and English are different, Hunt's [5] definition is not exact. It needs to be improved in light of the actual characteristics of Chinese and the writing performance of DHH students.

T-unit refers to the minimal terminable unit. For practical convenience, structure analysis was used to determine the T-unit in Chinese. If the first level of the sentence can only divide an independent structure, then the sentence is a T-unit.

For example, the sentence "十年后, 我住在城市里" [*Ten years later, I live in the city*] can only be divided into a subject-predicate structure, so it is a T-unit. Therefore, a T-unit has only one main clause, but it can have several subordinate clauses. A compound sentence is counted as two or more T-units. For example, the sentence "因为美术老师教我画画所以我学习画画" [*I learn to draw, because my art teacher teaches me to draw*] contains two T-units.

#### Example 1

"我叫 MR, 10 年之后我住在北京市大兴 qū 西红门理想城七期二号一单元 404。10 年之后我和爸爸妈妈奶奶家里一共有 4 口人。10 年之后我住房子很大一共有 6 个房间, 每个房间做睡觉、cú 房。房子的外面有三轮车小黄车 ofo 还有一辆是单车。家里有动物是爱龟, 他长着长长的 pó 子, 大大身子, 短短的尾, 还有长长 tuǐ。10 年之后我在做读书, 我在家里读书, 我学习画画, 因为美术老师教我画画所以我学习画画。工作, 在固安工作, 做柜子、马桶、小床、大床……, 因为固安是 18 楼, 是为了爸爸和我、妈妈一起工作。" (Topic: The future me; MR wrote in 26-Dec-2017)

[*My name is MR, 10 years later I live in Beijing Daxing district, Xihongmen Ideal City, Phase 7, No. 2, Unit 404. Ten years later, I have a total of 4 people at home with my mom, dad and grandmother. Ten years later I live in a large house with a total of 6 rooms, each room do sleep, kitchen. Outside the house there are tricycles small yellow car ofo and one is a bicycle. I have got an animal at home, a turtle, with a long neck, a big body, a short tail, and a long leg. Ten years later I'm doing reading, I'm reading at home, I'm learning to draw, because the art teacher taught me to draw so I'm learning to draw. Working, working in Guan, doing cabinets, toilets, small beds, big beds……, because Guan is 18 floors, is for dad to work with me and mom.*]

According to the criteria of the Chinese T-unit, we can divide example 1 into 16 T-units.

(1) 我叫 MR, (2) 10 年之后我住在北京市大兴 qū 西红门理想城七期二号一单元 404。(3) 家里一共有 4 口人。(4) 10 年之后我住房子很大, (5) 一共有 6 个房间, (6) 房子的外面有三轮车小黄车 ofo (7) 还有一辆是单车。(8) 家里有动物 (9) 是爱龟, (10) 他长着长长的 pó 子, 大大身子, 短短的尾, (11) 还有长长 tuǐ。(12) 10 年之后我在做读书, (13) 我在家里读书, (14) 我学习画画, (15) 因为美术老师教我画画 (16) 所以我学习画画。

The written language of DHH students is quite different from other texts, mainly referring to the presence of a large number of nonsense word-strings, such as the 7 units in addition to the 16 T-units in example 1. How should these 7 units be named?

(17) 10 年之后我和爸爸妈妈奶奶, (18) 每个房间做睡觉、cú 房。(19) 工作, (20) 在固安工作, (21) 做柜子、马桶、小床、大床……, (22) 因为固安是 18 楼, (23) 是为了爸爸和我、妈妈一起工作。

According to the criteria for the T-unit, some units in the written language of DHH students are T-units and some are not. The seven units that are not T-units in the above example are referred to as nonqualified word-strings. The difference

between a nonqualified word-string and a T-unit is whether it is a sentence or not. Some T-units are complete and do not contain any syntactic problems and are called "perfect T-units". Others have some problems and are called "flawed T-units". Therefore, all units in the written language of DHH students can be classified into three categories: perfect T-unit, flawed T-unit, and nonqualified word-string.

#### 4.1.1. Criteria for Perfect T-Unit

- (a) Words are used correctly, with no missing, redundant or misused words.
- (b) The sentence components are well coordinated.
- (c) Multiple sentence components are in the correct order.
- (d) The sentence components are used correctly, and there are no missing or redundant cases.
- (e) The intended meaning is clearly expressed.

Among the 16 T-units in Example 1, there are 9 perfect T-units, which are (1), (2), (3), (5), (8), (13), (14), (15), (16).

#### 4.1.2. Criteria for Flawed T-Unit

- (a) The words are used incorrectly.
- (b) The core components of the sentence (subject, predicate, and object) must be present, i.e., if they are missing according to the context in cases where the subject, predicate, and object cannot be omitted, it cannot be considered a defective sentence.
- (c) The sentence components do not match well.
- (d) The order of sentence constituents is wrong.
- (e) The use of sentence components is wrong, mainly in the form of redundancy.
- (f) The intended meaning is basically expressed.

Among the 16 T-units in Example 1, there are 7 flawed T-units, namely (4), (6), (7), (9), (10), (11) and (12). The correct expression for 4) is "10 年之后我住的房子很大" [*I will live in a large house 10 years later*]. The function word "的" is missing in the definite phrase. In example (6), the conjunction word "和" is missing. It should be "房子的外面有三轮车和小黄车 ofo" [*Outside the house, there are tricycles and yellow bikes ofo*]. The predicate "是" is redundant in example (7). The correct expression is "还有一辆单车" [*as well as a bicycle*]. In example (9), the word "爱龟" [*love turtle*] is used incorrectly and is a homemade word. In example (10), the function word "的" is missing in the phrase "长长身子" [*long body*]. In addition, the pronoun "他" [*he*] is used incorrectly at the beginning of the sentence and should be changed to "它" [*it*]. In example (11), the function word "的" is missing. The predicate "做" [*do*] is redundant in example (12). The correct expression should be "10 年之后我在读书" [*10 years later I was studying*].

#### 4.1.3. Criteria for Nonqualified Word-String

- (a) The necessary components of the sentence are missing, mainly the absence of the subject, predicate and object that cannot be omitted.
- (b) The structural relationship between words is not clear.
- (c) The intended meaning cannot be clearly expressed.

(d) Word-strings are not related to the topic.

There are 7 nonqualified word-strings in example 1, some of which are missing the predicate, object, or necessary subject ((17), (20)), some of which are expressed unclearly ((23)), and some of which are irrelevant to the topic ((22)).

## 4.2. The Indices of Measurement

White (1998) called the analysis of written English for DHH students "Structural Analysis of Written Language" (SAWL). Based on White (1998), we call the analysis of written Chinese "Structural Analysis of Written Chinese" (SAWC).

To ensure the comprehensiveness and validity of the rubric, SAWC analysed the written Chinese language from three levels, including the number of perfect T-units, flawed T-units, and nonqualified word-strings, as well as the total number and mean number of words and characters in each type of unit. Level 1 analyses the perfect T-units in the written language of DHH students. Level 2 analyses the perfect T-units and flawed T-units in the written language. Level 3 analyses all the units of the written language, including perfect T-units, flawed T-units, and nonqualified word-strings.

### 4.2.1. The Number of Units

In terms of the number of units, three elements need to be counted: (1) the number of T-units in the first and second levels, respectively; (2) the number of T-units and nonqualified word-strings in the third level, respectively; and (3) the proportion of each type of unit to the number of all units in the third level.

In general, the more perfect the T-units are, the higher the writing ability. The more nonqualified word-strings there are, the lower the writing ability. Therefore, the number of each type of unit and its proportion can reflect the writing ability of each text of DHH students on the whole.

### 4.2.2. The Number of Words

It is generally believed that the longer the T-unit is, the higher the writer's writing ability is, since longer T-units usually contain richer content. It is not surprising that the longer the T-unit is, the more words it contains. Therefore, by analysing the number of words in each T-unit, we can also obtain a general idea of the student's writing ability. When counting the number of words, not only the overall number of words, but also the number of valid words and invalid words should be counted separately.

Hunt [5] did not distinguish between valid and invalid words when counting the number of words because he analysed the written language of hearing students, which had only a small, negligible number of flawed T-units and almost no nonqualified word-strings. In contrast, the written language of DHH students analysed had a large number of flawed T-units and nonqualified word-strings. If we did not distinguish between valid and invalid words, we would not be able to fully and objectively reflect the writing ability of DHH students. For example, Yoshinaga-Itano, Snyder &

Mayberry [19] had problems when they analysed the following two units according to Hunt's findings [5].

(a) The man's car is crash the car. (b) The man crashed his car.

If only the overall number of words is counted, (a) includes 7 words and (b) includes 5 words, with (a) being higher than (b) in the final score. However, it is obvious that (b) has a better performance than (a), contrary to the statistical result. Therefore, to accommodate the needs of DHH students' written language, we distinguished between valid words and invalid words when counting the number of words.

*Valid words* are words that are used correctly in the written language. All words in the perfect T-units are valid words. Some words in the flawed T-units and nonqualified word-strings are valid words. *Invalid words* are words that are used incorrectly in the written language. Some of the words in the flawed T-units and nonqualified word-strings are invalid words, including, but not limited to, homemade words, misused words, redundant words, and words that are irrelevant to the topic.

For example, in the perfect T-unit “我学习画画” [*I learn to draw*], there are three words “我、学习、画画”, and they are all valid words. There are six words in the flawed T-unit “10年之后我在做读书” [*I am doing reading after 10 years*], but “做” [*doing*] is a redundant word and an invalid word. Therefore, we record five valid words (10年、之后、我、在、读书) and one invalid word (做).

When counting words in nonqualified word-strings, it is necessary to distinguish between topic-related and topic-independent nonqualified word-strings. In topic-related nonqualified word-strings, if the meaning of the string formed by three or more words is clear and in the correct order, then we count these words as valid words. The reason for taking three words as the limit is due to the grammatical structure of Chinese. Most of the two words in Chinese are simple structures, such as “小学、吃饭” [*elementary school, eating*], which are not enough to show writing ability. The structures made up of three or more components can generally explain the relationship between things, which can represent written language ability, to a certain extent, such as “我去学校” [*I go to school*] “我们写作业” [*we do homework*], etc. In the nonqualified word-strings “10年之后我和爸爸妈妈奶奶” [*10 years later, I and my parents and grandmother*], there are seven valid words (10年、之后、我、和、爸爸、妈妈、奶奶 [*10 years, later, I, and, father, mother, grandmother*]) and zero invalid words. Although it is missing part of the topic, the preceding part is composed of seven words, and it is related to the topic, in the right order, with proper use of related words, which can enrich the content of the essay. The student's lack of grasp of Chinese grammar is the reason why some necessary components are missing. However, this nonqualified word-string can reflect the student's writing ability, to some extent, so the words as valid words for the sake of statistical accuracy.

The words in the nonqualified word-string that have nothing to do with the topic can be counted as invalid words, even if it is a perfect unit. In example (1), the nonqualified

word-string “因为固安是18楼” is not related to the context nor topic. Although it is a perfect unit, all the words in it are counted as invalid words.

Regarding the counting standards of some controversial words, they were unified as follows: (a) Names, places and proper nouns are counted as one word, such as “小刚、固安、中秋节” [*Xiaogang, Gu'an, Mid-Autumn Festival*]. (b) Numbers are counted as one word, such as “404, 53”, etc. (c) Quantity phrases are counted as one word, such as “18楼、9个、10年” [*18 floors, 9 ~ge, 10 years*], etc. (d) English proper nouns are counted as one word, such as “ofo”.

In terms of the number of words, five items are counted: (1) the number of valid and invalid words in each unit; (2) the number of valid and invalid words in each level; (3) the average number of valid words per unit in each level (number of valid words per level/number of units per level); (4) the number of words in the third level; and (5) the word efficiency ratio (WER) in the third level (number of valid words/number of words).

#### 4.2.3. The Number of Characters

The number of characters is counted in the same way as the number of words. A distinction needs to be made between valid and invalid characters. Valid character refers to the number of characters in a valid word. All characters in perfect T-units, some of the characters in flawed T-units and nonqualified word-strings are valid characters. Invalid characters refer to the other characters in the units after the valid characters are removed, including, but not limited to, characters in homemade words, misused components, redundant components, and topic-irrelevant components. Partial characters in flawed T-units and nonqualified word-strings are invalid text.

The reason why we counted the number of characters as a separate component is that many invalid components in the Chinese written language of DHH students are not words. We did not count them when we counted the number of words. For example, the word “尾” [*tail*] in flawed T-units “他长着长长的pó子, 大大身子, 短短的尾” [*He has a long neck, a big body, and a short tail*] is a wrongly used nonword element, so it cannot be counted as an invalid word.

We count numbers and English words according to the following criteria: a. Numbers are counted as one character, e.g., “404” is composed of three numbers, but we count it as one character. b. English proper names are counted as one character, e.g., “ofo”.

In terms of characters, there are five items to be counted: (1) the number of valid and invalid characters in each unit; (2) the number of valid and invalid characters on each level; (3) the average number of valid characters per unit on each level (number of valid characters per level/number of units per level); (4) the number of characters in the third level; and (5) the character efficiency ratio (CER) in the third level (number of valid characters/number of characters).

In addition, there are many problems with punctuation, miswritten characters, and pinyin in the written language of Chinese DHH students. These special cases are described as follows.

(1) SAWC uses the T-unit as the basic unit of analysis. The criteria for determining the T-unit are not related to punctuation, so punctuation is not considered in the statistics. (2) The problem of miswritten characters is not considered in the statistics; as long as they are used correctly, they are considered valid components. For example, FMH wrote “我知道是他先洗笔，我后洗笔” [*I know that he was the one who washed the pen first, and I was the one who washed the pen later*] in an essay, but the character “洗” [wash] was miswritten as “洗”. However, it was used correctly, so it was

counted as a valid character. (3) Some DHH students choose to use pinyin to replace characters they cannot write. For example, “他长着长长的 pǒ 子……还有长长 tuǐ”. Even if the Pinyin spelling is wrong, as long as it does not affect the understanding and is used correctly, it is counted as a valid component.

After counting the contents in each of the three levels of SAWC, all the data can be placed in one table (see Figure 1), which helps to understand the performance of a text from different perspectives.

Name: _____ Age: _____ Gender: _____ Age for losing hearing: _____ School: _____ Grade: _____ Textbook: _____ Genre: _____ Topic: _____ Time of writing: _____ Total of characters: _____							
Level		No. of units		No. of words		No. of characters	
		T-units	nonqualified word-strings	valid words	invalid words	valid characters	invalid characters
Level 1	Total						
	Average						
Level 2	Total						
	Average						
Level 3	Total						
	Average						
	perfect T-units			WER		CER	
	flawed T-units						
	nonqualified word-strings						

Figure 1. SAWC Statistical Results Display.

### 4.3. The Criteria for Scoring

The statistics of the first and second levels of SAWC can help teachers and researchers understand students' use of perfect T-units and flawed T-units. The third level is the overall performance of students' texts, which can reflect students' writing ability more comprehensively. The data of the third level are also used more often by teachers and researchers to compare the performance of different texts and the writing ability of different students. To visualize writing ability, with criteria set for scoring each index.

The data of the proportion of perfect T-units, the proportion of nonqualified word-strings, WER and CER were

scored. Except for the nonqualified word-strings, the higher the value is, the higher the score. In terms of the nonqualified word-strings, a higher value means a lower score and a lower writing ability. The proportion of flawed T-units were not scored because it did not directly reflect students' writing ability. It needs to be analysed in conjunction with the proportion of perfect T-units and nonqualified word-strings, so the flawed T-units were not scored separately. The scores of the above four components were added together, which represented the score of the student's text. The maximum possible score was 80. The correspondence of specific values and scores for each index is shown in Table 2.

Table 2. The criteria for scoring.

Indices	Proportion (%)	Value	Proportion (%)	Indices
Proportion of perfect T-units, WER, CER	0	0	100	Proportion of nonqualified word-strings
	0.01-10	2	90.01-99	
	10.01-20	4	80.01-90	
	20.01-30	6	70.01-80	
	30.01-40	8	60.01-70	
	40.01-50	10	50.01-60	
	50.01-60	12	40.01-50	
	60.01-70	14	30.01-40	
	70.01-80	16	20.01-30	
	80.01-90	18	10.01-20	
	90.01-100	20	0-10	

The score of 46 texts were calculated according to the above scoring criteria (see Table 3).

**Table 3.** The score of DHH students' texts.

Topic	No.	Name	Score	Topic	No.	Name	Score
Picture description 1	1	ZXK	62	<i>A reading activity</i>	24	ZXK	40
	2	HJY	76		25	FMH	58
	3	HYJ	72		26	HJY	72
	4	MR	76		27	HYJ	62
	5	MSY	78		28	MSY	78
	6	WMH	0		29	WMH	36
	7	WXH	76		30	WXH	64
	8	WXP	68		31	WXP	44
	9	XL	52		32	XL	0
	10	XZS	68		33	XZS	28
Picture description 2	11	ZXK	58	<i>The future me</i>	34	HYJ	56
	12	HJY	76		35	MR	56
	13	HYJ	68		36	MSY	80
	14	MR	72		37	WXP	56
	15	MSY	78		38	XL	20
	16	WMH	50		39	XZS	76
	17	WXH	68		40	ZXK	52
	18	WXP	58		41	FMH	50
	19	XL	66		42	HJY	74
	20	XZS	80		43	HYJ	60
<i>Introducing my school</i>	21	FMH	40	<i>My favourite festival</i>	44	MSY	80
	22	WXP	46		45	WMH	0
<i>The story of pears</i>	23	FMH	56		46	WXP	42

## 5. Conclusion

The current study aims to develop a rubric for DHH students' written texts. The rubric includes two parts: the indices of measurement and the scoring criteria. The indices of measurement refer to the 13 indices in the three levels of SAWC, and the scoring criteria are determined according to the indices in SAWC. Therefore, the rubric of the writing ability of DHH students is called the SAWC Rubric, which has the following advantages.

### 5.1. Comprehensiveness

The SAWC measures 13 items in the written language on three levels, covering sentences, words, and characters. It is a more comprehensive coverage of all aspects of language use in the written language and reflects the students' writing ability as completely as possible.

### 5.2. Consistency

Teachers can use the SAWC rubric to assess students' writing texts at different times. Teachers can use the same criteria regardless of whether students are writing at a high or low level and do not need to change the content of the measures, thus achieving the effect of "one criterion for all the texts". In addition, the SAWC rubric can therefore be used to continuously analyse changes in students' writing ability throughout the learning period, with each improvement or regression shown by a numerical value.

### 5.3. Unlimitedness

When time permits, the SAWC rubric can be used to measure various types of Chinese written texts indefinitely and is not limited by factors such as genre, form, quantity, author, and time. Especially for writing teachers, when evaluating students' writing ability, they can analyse any kind of text of students, without having to hold formal examinations, which greatly saves time. The texts written by students in a more relaxed situation after class can also reflect their real writing ability well.

### 5.4. Universality

The SAWC rubric can be used, not only in special education research, but also in the field of second language teaching and general education. It can be used to measure the writing ability of students with different backgrounds, such as hearing students and DHH students, primary and middle school students, native speakers and second language learners. In addition, the SAWC rubric can be applied to the compilation of teaching materials and the formulation of teaching plans. It can be used to evaluate the language level of teaching materials and extracurricular reading materials and to compare the learning materials with the writing ability of students in the corresponding grades. This can effectively help policy-makers and teachers develop the content of textbooks, formulate teaching plans, and select extracurricular readings.

As an important part of language assessment, writing

ability assessment plays an important role in language teaching for DHH students. The SAWC rubric is a micro-writing ability rubric specially developed for DHH students. Using the SAWC rubric, teachers can accurately grasp the writing performance of DHH students and select appropriate teaching content and methods, which contribute to the improvement of DHH Chinese students' writing ability.

Actually, for the measurement of the language ability of DHH students, no matter how detailed the standards of content are, the results will inevitably be accompanied by subjective factors. However, we cannot give up the measurement of language ability or avoid research in this area because its subjectivity is difficult to eliminate. What we can do is to try our best to be as close to the objectivity and truth as possible, which can also help DHH students learn language effectively.

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## References

- [1] Anderson, J. E. 1937. An evaluation of various indices of linguistic development. *Child development* 1, 62-68.
- [2] Bowers, L., Dostal, H. and Wolbers, K., et al. 2018. The Assessment of Written Phrasal Constructs and Grammar of Deaf and Hard of Hearing Students with Varying Expressive Language Abilities. *Education Research International* 2, 1-10.
- [3] Cui, Yachong (崔亚冲). 2022. The study of Procedural and Strategic Writing Instruction for elementary-aged deaf students. Hunan University Press. [2022, 听障小学生过程与策略写作教学模式研究, 湖南大学出版社。]
- [4] Golub, L. and C. Kidder. 1974. Syntactic density and the computer. *Elementary English* 8, 1128-1131.
- [5] Hunt, K. 1965. *Grammatical structures written at three grade levels*. (Report No. 3, Committee on Research). Champaign, IL: National Council of Teachers of English.
- [6] La Brant, L. 1933. A study of certain language developments of children in grades 4-12 inclusive. *Genetic psychology monographs* 4, 387-491.
- [7] Liang, Dandan (梁丹丹) and Yuzhen Wang (王玉珍). 2007. Error analysis of deaf students' acquisition of Chinese adjective category. *Chinese Journal of Special Education* 2, 23-27. [2007, 聋生习得汉语形容词程度范畴的偏误分析。《中国特殊教育》第2期, 23-27页。]
- [8] Lu, Xuefei (卢雪飞). 2018. An example of grammar teaching in the language of the deaf. *Journal of Modern Special Education* 1, 54-57. [2018, 聋校语文中的语法教学方法例谈。《现代特殊教育》第1期, 54-57页。]
- [9] Marschark, M. 1994. Discourse rules in the language productions of deaf and hearing children. *Journal of Experimental Child Psychology* 57, 89-107.
- [10] Shao, Wei (邵伟) and Weiping Zhang (张伟萍). 2013. Analysis of common errors in written language of deaf students in grades two to four and Teaching Implications. *Journal of Nanjing Special Education Institute* 2, 35-40. [2013, 二—四年级聋生书面语常见错误类型分析及教学启示。《南京特教学院学报》第2期, 35-40页。]
- [11] Wang, Jiaoyan (王姣艳). 2004. The language ability and educational strategies of deaf students' written language. *Chinese Journal of Special Education* 7, 17-20. [2004, 从聋校学生的书面语谈其语言能力与教育对策。《中国特殊教育》第7期, 17-20页。]
- [12] White, Alfred H. 1998. The structural assessment of written English. *Unpublished manuscript*.
- [13] White, A. H. (2007). A tool for monitoring the development of written English: T-unit analysis using the SAWL. *American Annals of the Deaf*, 152 (1), 29-41.
- [14] Wolbers, K. 2008. Strategic and Interactive Writing Instruction (SIWI): Apprenticing deaf students in the construction of English text. *International Journal of Applied Linguistics* 156, 299-326.
- [15] Wolbers, K., Dostal, H. and Bowers, L. 2011. "I was born full deaf." Written language outcomes after one year of Strategic and Interactive Writing Instruction (SIWI). *Journal of Deaf Studies and Deaf Education* 1, 19-38.
- [16] Wolbers, K., Graham, S. and Dostal, H. & Bowers L. 2014. A description of ASL features in writing. *Ampersand* 1, 19-27.
- [17] Wolbers, K., Dostal, H. and Branum-Martin, L. 2018. Strategic and Interactive Writing Instruction: An Efficacy Study in Grades 3-5. *Journal of Educational and Developmental Psychology* 1, 99-117.
- [18] Yoshinaga, C. 1983. *Syntactic and semantic characteristic in the written language of hearing impaired and normally hearing school-aged children*. Dissertation. Northwestern University.
- [19] Yoshinaga-Itano, C., Snyder, L., and Mayberry, R. 1996. Examining written language assessment and intervention links to literacy: Can lexical/semantic skills differentiate deaf or hard-of-hearing readers and nonreaders? *Volta Review* 1, 39-61.