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Multidimensional Linguistic Feature Mechanisms Influencing Chinese L2 Writing Quality: An Empirical Analysis Based on HSK Dynamic Compositions of Vietnamese Learners[1]

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Abstract

Based on the HSK Dynamic Writing Corpus of Beijing Language and Culture University, this paper analyzes in depth the structural effects of vocabulary, orthography, and grammar dimensions on the writing effectiveness of 208 Vietnamese L2 learners of Chinese. By integrating statistical paradigms such as corpus-based quantitative analysis, correlation tests, and multiple linear regression, this study confirms that the above three language indicators have significant predictive power for essay quality, with lexical features having a particularly prominent influence weight ($r^2 = 0.227$). In-depth analysis indicates that the ratio of similar words, length of the text, and frequency of use of advanced vocabulary constitute the core parameters affecting writing quality. Furthermore, the language characteristics of different groups at different levels show obvious hierarchical differences: for intermediate learners, text length and vocabulary richness are the key factors that restrict quality; advanced learners' writing advantages tend to be more about the deep integration of multiple abilities; while the writing performance at the beginner level has not yet shown the decisive influence of a single feature. These findings corroborate the central role of lexical proficiency in the acquisition of L2 writing skills. Therefore, in the subsequent teaching assessment and automatic scoring system construction, we should not only focus on vocabulary accumulation, but also establish a comprehensive evaluation framework that takes into account both orthographic norms and grammatical construction ability, so as to provide empirical reference for the optimization of differentiated teaching strategies.

Keywords

Chinese as a Second Language; Vietnamese Learners; Writing Quality; Linguistic Features; Influencing Factors

Introduction

The quantitative analysis of the quality evaluation system for second language (L2) Chinese compositions and the explanatory weights of various linguistic features are currently a focal point of international Chinese language education research. Existing research has reached a consensus: the quality of an essay, in addition to the logical structure

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of its content, is more directly influenced by the precise allocation of vocabulary and grammar. Among them, vocabulary richness, density, and diversity are considered core predictors of writing ability. For example, Wu Jifeng (2016) empirically demonstrated that lexical variability, complexity, and error rate can cover 46.2% of the variance in writing scores; Wang Yixuan (2017) inferred from a large-scale dataset that features such as word class richness and error rate have extremely high predictive value for scores, with an explanatory power of 92.8%. Simultaneously, the significant effect of syntactic structure (such as topic chain construction and noun phrase depth) on writing assessment has been continuously verified (Zhu, 2021; Jiang, 2013). However, the analytical perspectives of existing literature are still somewhat limited: either due to the size of the sample, or due to an overemphasis on fragmented analysis of a single dimension, resulting in a lack of in-depth academic attention to the comprehensive modeling of multidimensional indicators and the differential comparison between learners of different levels.

To overcome the limitations of existing paradigms, this study adopts the evaluation approach proposed by Qin Xiaoqing and Bi Jin (2015), and innovatively constructs a 15-dimensional assessment model that integrates vocabulary, writing and grammatical features, using a large-scale corpus of essays written by Vietnamese Chinese learners as a starting point. By analyzing the logical interactions between multiple language indicators and writing performance, and by delving into the specific performance differences among learners at different levels, this study aims to provide more substantial empirical support for the innovation of intelligent assessment systems and dynamic evaluation systems for second language Chinese.

1. Research Design

1.1 Research Questions

This study addresses the following questions:

(1) Do the three categories of lexical, orthographic, and grammatical features influence the writing quality of Vietnamese learners of Chinese as a second language?

(2) Among the three categories of features, which category has the greatest impact on writing quality?

(3) Are there differences in the influence of lexical, orthographic, and grammatical features on writing quality across different score bands (high, mid, and low)?

1.2 Corpus Sources and Processing Procedures

The corpus used in this study was selected from the HSK Dynamic Composition Corpus at Beijing Language and Culture University, comprising a total of 208 compositions written by Vietnamese learners of Chinese. Composition scores were divided into three bands: A [80, 90], B (60, 80), and C [50, 60].

The corpus processing procedures were as follows: first, the compositions were exported and organized as electronic text, and metrics such as total word count and number of word types were extracted using the Corpus Word Parser segmentation and part-of-speech tagging tool; second, lexical level and part-of-speech statistics were obtained using the “Chinese Proficiency Grading Standards for International Chinese Language Education” from the Chinese Testing Service website (2001); finally, the statistical data were sorted by composition score from high to low and imported into SPSS for analysis.

1.3 Selection and Analysis of Research Metrics

The study first established composition score as the dependent variable and specified 15 specific independent variables, including total word count, number of word types, number of elementary words, number of intermediate words, number of advanced words, total character count, number of orthographic errors, number of incorrect characters, number of missing characters, number of superfluous characters, number of personal pronouns, number of conjunctions, number of adverbs, number of particles, and number of prepositions. This study focuses on Vietnamese learners of Chinese, categorizing them into three levels—high, medium, and low—based on their writing proficiency. Using SPSS statistical software, descriptive statistics, correlation and regression analysis and other methods were employed to conduct multi-dimensional analysis of the corpus.

2. Data Analysis

2.1 Descriptive Statistical Results

This study collected and analyzed 208 essays written by Vietnamese learners of Chinese. The overall data showed

that the average total word count and total character count were 249.55 and 360.65 respectively, which did not meet the conventional requirement of 400–600 characters for the HSK advanced level. In terms of vocabulary features, the average number of word classes of 132.78 indicates that learners have a weakness in intermediate vocabulary reserves; writing standardization also faces challenges, with an average of 1.55 misspelled words and 0.32 missing words; in terms of grammar, they show good basic ability, and the use of high-frequency words such as personal pronouns, conjunctions and adverbs is relatively stable, but there is still much room for improvement in mastering complex sentence structures.

By further comparing learners at different score levels, the differences in language proficiency levels can be clearly observed. Learners in the high-scoring group (Group A, N = 64) performed best in vocabulary richness, with an average word class count of 145.72 and a total word count of 276.16, which is within the HSK advanced standard range. They also showed significant advantages in the rigor of grammatical structure and the standardization of writing. In contrast, learners in the middle segment (Group B, N = 101) exhibited clear transitional characteristics. Although their total vocabulary was not significantly different from that of the high-achieving group, their vocabulary diversity was insufficient, their grammar processing was relatively lagging, and their writing error rate was also relatively high. Learners in the lower score range (Group C, N = 43) generally have weak basic skills. Not only is their average number of word classes only 112.51, but their total number of words has also dropped to 204.86. Frequent spelling and grammatical errors have significantly hampered their overall writing quality.

2.2 Correlation and Regression Analysis Results

2.2.1 Regression Analysis of the Three Feature Categories and Writing Quality

The predictive effects of the three feature categories—lexical, orthographic, and grammatical—on writing quality are summarized in the regression analysis results, as shown in Table 1.

Table 1. Summary of Regression Analysis for the Three Feature Categories and Writing Quality

Model	r	r^2	Adjusted r^2	Standard Error	Change Statistics				Sig.F Change	Durbin-Watson
					r2 Change	F Change	df1	df2		
1	0.477[a]	0.227	0.208	9.394	0.227	11.877	5	202	<.001	0.433
2	0.427[a]	0.183	0.171	9.614	0.183	15.184	3	204	<.001	0.330
3	0.383[a]	0.147	0.126	9.870	0.147	6.959	5	202	<.001	0.285

Note: Model 1 predictors of lexical features are (constant), number of advanced words, number of elementary words, number of word types, number of intermediate words, and total word count. Model 2 predictors of orthographic features are (constant), total character count, number of incorrect characters (C), and number of missing characters (L). Model 3 predictors of grammatical features are (constant), number of prepositions, number of personal pronouns, number of particles, number of adverbs, and number of conjunctions. The dependent variable is composition score.

The regression model for lexical features and writing quality shows that the five indicators under lexical features can explain 22.7% of the variance in writing quality ($r^2 = 0.227$), that is, the extent to which total word count, number of word types, number of elementary words, number of intermediate words, and number of advanced words influence writing quality is 22.7%. The influence of lexical features accounts for a certain proportion, indicating that lexical indicators have a significant effect on writing quality for Vietnamese learners of Chinese, but their explanatory power is limited.

The regression model for orthographic features and writing quality indicates that the three indicators of orthographic features (total character count, number of incorrect characters, and number of missing characters) can explain 18.3% of the variance in writing quality ($r^2 = 0.183$). Both lexical and orthographic features explain more than 15.0% of the variance in writing quality, reflecting their importance in predicting writing quality.

The regression model for grammatical features and writing quality shows that the five indicators of grammatical features can explain 14.7% of the variance in writing quality ($r^2 = 0.147$). Compared with lexical and orthographic features, grammatical features have a relatively weaker degree of influence on writing quality.

2.2.2 Correlation Analysis of Sub-indices of the Three Feature Categories and Writing Quality

This study conducted correlation analyses between each of the sub-indices under lexical, orthographic, and grammatical features and writing quality, the data results are shown in Table 2.

As shown in Table 2, among the five indicators within lexical features, the number of word types has the highest correlation with writing quality ($r = 0.447$, $p < 0.01$), followed by total word count ($r = 0.420$, $p < 0.01$) and number of advanced words ($r = 0.380$, $p < 0.01$). The correlation between the number of elementary words and writing quality is relatively weak ($r = 0.223$, $p < 0.01$), and the correlation between the number of intermediate words and writing quality is extremely low ($r = 0.039$, $p = 0.576$). This indicates that lexical diversity and the richness of advanced vocabulary have a certain facilitating effect on writing quality, while the quantity of elementary and intermediate vocabulary has limited impact.

For orthographic features, only total character count shows a moderate correlation with writing quality ($r = 0.394$, $p < 0.01$), incorrect character count shows a weak negative correlation with writing quality ($r = –0.165$, $p = 0.17$), and the correlation for missing character count is extremely low. Because there were no occurrences of miswritten characters and superfluous characters in the corpus of this study, their correlations could not be calculated. It is thus evident that text length still plays a certain role in composition evaluation, and although the number of incorrect characters affects writing quality, the degree of correlation is limited.

For grammatical features, all five statistically analyzable indicators show a certain degree of positive correlation with writing quality, with correlations ordered from strongest to weakest as particles ($r = 0.345$, $p < 0.01$), conjunctions ($r = 0.258$, $p < 0.01$), adverbs ($r = 0.244$, $p < 0.01$), personal pronouns ($r = 0.183$, $p = 0.008$), and prepositions ($r = 0.176$, $p = 0.011$), but none reach the criterion for strong correlation. This indicates that grammatical indicators have some influence on writing quality, but the role of any single indicator in improving writing proficiency is relatively limited.

Table 2. Correlation Analysis Results Between the Three Feature Indices and Composition Scores

Lexical Features	Total Word Count	Number of Word Types	Number of Elementary Words	Number of Intermediate Words	Number of Advanced Words
Composition Score	0.420**	0.447**	0.223**	0.039	0.380**
Orthographic Features	Total Character Count	Number of Incorrect Characters	Number of Miswritten Characters	Number of Missing Characters	Number of Superfluous Characters
Composition Score	0.394**	-0.165*	--	0.17	--
Grammatical Features	Number of Personal Pronouns	Number of Conjunctions	Number of Particles	Number of Adverbs	Number of Prepositions
Composition Score	0.183**	0.258**	0.345**	0.244*	0.176*

Note: Because the corpus contained no instances of miswritten or superfluous characters, these variables were excluded from the correlation and regression analyses.

In summary, across the three main dimensions of vocabulary, writing, and grammar, the explanatory weights of the various secondary indicators for writing quality show significant differences. Statistical results show that word class richness, total word count, and text length have the strongest correlation with the final score, confirming that text size and lexical diversity are the core variables that determine the writing performance of Vietnamese learners of Chinese. In contrast, the proportion of vocabulary at the beginner and intermediate levels, the error rate in writing, and individual grammar items showed a weak correlation with the scores, suggesting that these indicators have a relatively limited weight in the overall evaluation system. Overall, the predictive validity of single language variables on writing effectiveness is not balanced, which further emphasizes the decisive role of vocabulary resources and length control in improving writing skills.

2.2.3 Correlation Analysis of Variables Across the Three Score Bands

This study further explored the correlation between language indicators and essay scores in different score ranges.

Among learners in Group A (high-scoring group), the influence of language features on essay scores was generally low and did not show statistically significant differences. Among them, the total number of words ($r = −0.059$, $p = 0.642$), the number of word classes ($r = −0.014$, $p = 0.912$), and the advanced vocabulary ($r = −0.035$, $p = 0.782$) all showed extremely weak negative correlations. In terms of grammatical dimension, although there is a weak positive correlation between conjunctions ($r = 0.213$, $p = 0.090$) and adverbs ($r = 0.145$, $p = 0.251$), neither of them crossed the significance threshold of 0.05.

The correlation of the B group (middle segment) samples was more prominent. A significant positive correlation

exists between vocabulary and essay quality: word class richness ($r = 0.371$, $p < 0.01$), total word count ($r = 0.351$, $p < 0.01$), and advanced vocabulary ($r = 0.268$, $p < 0.01$) all reached the significance level; in the grammatical dimension, the frequency of adverb use ($r = 0.204$, $p < 0.05$) also showed a weak but significant positive correlation. In contrast, the correlations among the various indicators in group C (lower score segment) were generally weak and did not reach a significant level. Although the number of word classes ($r = 0.235$, $p = 0.128$) and the total number of words ($r = 0.118$, $p = 0.448$) showed a slight positive correlation, the statistical significance was not obvious.

Overall observations revealed that as writing proficiency increases, the explanatory power of a single linguistic feature decreases; the logical focus of evaluating writing quality has shifted to the organic synergy of multidimensional linguistic features, meaning that the constituent elements of excellent writing performance exhibit more complex and diverse characteristics.

3. Conclusion

This study analyzed the differential impact of vocabulary, writing, and grammatical features on the writing effectiveness of Vietnamese learners of Chinese. Research shows that improvement in writing skills does not depend on quantitative changes in a single dimension, but rather on the synergistic operation of multidimensional language abilities. The writing quality of high-scoring individuals relies more on the integration of multiple abilities, while the writing quality of average-scoring individuals is greatly influenced by the breadth of their vocabulary and the length of their essays. For low-scoring groups, a breakthrough in a single indicator is not enough to bring about a qualitative change in overall quality; the path to improvement is more complex. Based on this, teaching practice should abandon the "single-point breakthrough" model and instead seek a balanced allocation of vocabulary, writing and grammar. By strengthening vocabulary usage, delving into syntactic structure and improving discourse coherence, precise training strategies can be provided for learners of different levels.

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