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Research Article

A Study on the Changes in Students' Cognitive Strategies in the Process of International Chinese Teaching

Yufeng Xiang[1*], Yanbo Jiao[2]

[1]Beijing Yizhihuanyu Culture Media Co., Ltd., Beijing, China

[2]The Third Medical Center, PLA General Hospital, Beijing, China

[*]**Correspondence to: Yufeng Xiang**, Beijing Yizhihuanyu Culture Media Co., Ltd., No. 198 Changcui Road, Chengbei Street, Changping District, Beijing 102200, China; Email: easymandarinchina@163.com

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Abstract

Objective: Since the "Belt and Road" initiative has been proposed by China in 2013, the number of foreign learners studying Chinese as a second language has shown a remarkable increase, contributing substantially to the development of international Chinese education. The individual differences of learners have received growing attention in Chinese international teaching, which reaped huge fruits in the research on teaching Chinese as a foreign language in terms of the cognitive style, cognitive strategies, and learning strategies of full-time international students. In the present study, the changes in learning strategies of part-time Chinese learners who work, live, and travel in China will be explored in depth.

Methods: A total of 156 part-time Chinese learners aged 20 to 50 years old from 468 students from 42 different countries with a medium or below level of Chinese proficiency were identified as participants. Using the literature review method of survey analysis, a questionnaire was designed per the actual situation of learners, and statistical analysis was performed to investigate the alterations in the learning strategies during Chinese learning.

Results: The results demonstrated that with the improvement of Chinese Proficiency Test level, the preference of field-dependent and field-independent students in choosing learning strategies converges, which contributes to the teachers' guidance for the foreign Chinese part-time students and boosts their learning efficiency.

Conclusion: The complete separation of learning methods of "independence" and "communication and cooperation" is destructive in international Chinese teaching. In addition to assignments that require students' independent effort, opportunities for cooperation and communication are also indispensable for an optimal approach to teaching.

Keywords: cognitive style, field dependence, field independence, Chinese proficiency, learning strategies

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1 INTRODUCTION

With the diversified development of China's strategic economy, the number of foreign learners who study Chinese as a second language has shown a rising trend. Research on the 2020 China International Trade in Services Forum International Education Service Trade Forum revealed that the cumulative number of people studying and using Chinese globally other than native speakers has reached 200 million, which is an important achievement made by scholars and international Chinese teachers in their active exploration and research. As one of the international Chinese teaching staff, the author also wishes to contribute to the international teaching of Chinese through observation and research. Research on learning strategies, especially on the correlation between learning strategies and academic performance, different language skills learning strategies, and the investigation of the learning strategies of different learning subjects is abundant[1,2]. Despite the late start of the investigations of foreign students' language learning strategies in China, a strong momentum of growth has been witnessed, including research on the cognitive styles and teaching strategies, the relation of learning strategies to academic performance, and the research theories on cognitive methods, learning strategies, and teaching methods. However, little knowledge is available to the changes in cognitive styles and learning strategies of part-time Chinese learners under different Chinese proficiency levels. Accordingly, this study intends to analyze the relationship between different Chinese proficiency levels and cognitive styles and explore the changes in students' cognitive styles and learning strategies.

2 MATERIALS AND METHODS

2.1 Cognitive Style and Learning Strategy Theory

2.1.1 Cognitive Style Theory

Cognitive style refers to the approach an individual habitually uses in information processing such as perception, memory, thinking, and problem-solving, a unique method for individuals to store, understand and utilize information. It is a stable psychological tendency, specifically, a preference for a particular information-processing method, of which individuals are often unaware[3,4]. In 1991, Cheema and Riding reviewed 30 styles in this field, among which the most intensively studied type of cognitive style is the field independence - field dependence. According to psychologist Herman[5], some people are more sensitive to environmental information in their perception, while others are internal factors, such as dietary and lifestyle habits. Accordingly, susceptibility to external factors with more dependence on internal references is considered field independence, and the type with information or knowledge defined by environmental stimuli and communication with the environment as a reference is field dependence. Field independence and field dependence are two different cognitive styles, which are mainly determined by individual genetic factors and physiological basis. Researchers such as Zhang[6], Li[7], and Garrett[8] have made in-depth explorations of this theory. Li and Sui[9] indicated that cognitive level possessed the greatest correlation with comprehensive ability, followed by language ability and communication ability. Li[10] concluded that field-dependence outperformed field-independence in language learning, which is similar to the study results by Xu[11].

In recent years, as the focus of teaching has shifted to students, the focus of language research has also been more focused on teaching methods and teaching models suitable for students. Accordingly, researchers attach great importance to the influence of individual learner differences on the acquisition of Chinese as a second language[12]. At present, foreign scholars such as Pallotti[13] and Ruiz-Funes[14] have all confirmed a strong relevance between second language acquisition and the difference of cognitive style which directly affects learners' performance.

2.1.2 Learning Strategy

Learning strategy is a complex program about the learning process made purposefully and consciously by learners to improve the effect and efficiency of learning[6]. According to the role of learning strategies, Dansereau[15] divides learning strategies into basic strategies and supportive strategies. Basic strategies refer to all types of learning strategies that directly manipulate materials, mainly including the strategies of information acquisition, storage, information retrieval and application. Supporting strategies mainly refer to the strategies that help learners maintain an appropriate learning mental state to ensure the effective operation of basic strategies, such as the strategy of concentration. According to the components covered by learning strategies, Nunan[16] summarized learning strategies as cognitive strategies, metacognitive strategies, and resource management strategies.

Currently, evidence of second language learning strategies is abundant in the relationship between learning strategies and efficiency and related factors. Thomas[17] studied the significance of learning strategies in outdoor teaching and suggested that cooperative learning and group learning could effectively improve learning efficiency. Skehan[18] explored learners' vocabulary learning strategies and stated that strategies such as context-setting and cooperative learning enriched learners' vocabularies. Jia et al.[19] surveyed 376 college students and investigated the relationship between learning strategies, research fields, and learning styles. The empirical study of Sahragarda concluded no correlation between learning style and second language acquisition performance, a weak correlation between learning strategy and second language acquisition performance, and a strong correlation between learning strategy and learning style[20]. Research on learning strategies for Chinese as a second language is highly encouraged by the government with political support such as the twin-track

approach, China's in-depth reform and opening up, and rapid economic growth. Wang[21] reviewed the learning strategies of Chinese as a second language, contoured the current research status and development context in this field, and beaconed the future research direction. Ying[22] reviewed the learning strategies of Chinese as a second language, outlined the research status and development context in this field, and indicated the future research direction, and the correlation between cognitive styles and different cognitive strategies. Lei[23], Zhang[24] studied the learning strategies of Chinese language learners from different countries or regions such as Africa, Thailand, Japan, and Pakistan. Researchers such as Kong[25], Tian[26] successively conducted studies on the correlation between learning strategies and cognitive styles. Nevertheless, evidence is mostly limited to the correlation between cognitive styles and learning strategies in English, while Chinese as the research target has been marginally studied. The results by Zhan[27], and Keller[28] have laid a solid foundation for future in-depth exploration in this field. Furthermore, few scholars have been able to draw on any systematic research into part-time second language learning.

2.2 Methods and Subjects

2.2.1 Research Subjects

In this study, 156 non-Chinese students aged 20-50 years were selected as the research participants. Their Chinese Proficiency Test (HSK) level was below the medium level, and all of them had studied in China for more than 2 years. They were given a Chinese course using the HSK standard course textbook, 4 classes per week, 1.5h for each class. Research data at six months, one year, and over one year of teaching were collected for analysis. All provided courses include paid language teaching courses and free Chinese cultural experience courses, and all the learners voluntarily participated in the study and cooperated with the research after being fully informed of the purpose and process of this research.

2.2.2 Research Methods

(1) Literature review: By consulting related literature on cognitive styles and cognitive strategies, the research experience and theoretical contributions of previous scholars were concluded to design the research protocol of this study and obtain scientific conclusions.

(2) HSK test results were used for the evaluation of changes in students' learning. HSK is an international standardized test for Chinese language proficiency, designed and developed by the Chinese Proficiency Test Center of Beijing Language and Culture University. It evaluates the language ability of non-first language candidates in using Chinese for daily communication, with high reliability and validity.

(3) Mosaic pattern inspection was adopted to measure learners' cognitive styles. Specific operations were referred to No. 152 of the Psychological Experiment Outline, edited by Yang[29].

(4) A Chinese language learning questionnaire was used to test learners' formulation and application of learning strategies. The questionnaire was designed in accordance with the actual situation by referring to the strategy inventory for language learning (SILL) by Oxford[30]. The SILL questionnaire has been widely used in academia, featuring wide coverage, extremely high reliability, and validity. The reliability coefficients of the scale were all greater than 0.93. The questionnaire consists of six parts: memory strategy (MEM), cognitive strategy (COG), compensation strategy (COM), metacognitive strategy (MET), affective strategy (AFF), and social strategy (SOC). The answer to the question is based on the five-meter scale published by Likert in 1932 to accurately measure learners' use of learning strategies.

(5) Statistical analysis: SPSS25.0 software was used for data analysis.

3 RESULTS

3.1 Correlation between HSK Level and Cognitive Style

In general, the proportion of field-independent learners to 156 participants is higher than that of field-dependent learners. According to the average score of test scores, learners with over-average scores are field independent, or otherwise field dependent. The HSK test results: Basic: 66 students (39 field-dependent students, 27 field-independent students); Elementary: 54 students (25 field-dependent students, 29 field-independent students); Medium: 36 students (8 field-dependent students, 28 field-independent students). In addition, the higher the HSK level, the higher the proportion of field independence, as shown in Figure 1 and Table 1.

To verify the correlation between individual differences of students and cognitive styles, the independent-samples T test was performed and revealed that the HSK level and learning time were correlated with students' cognitive style ($P<0.05$), but not correlated with factors such as age and gender ($P>0.05$, Table 2)

One-way analysis of variance demonstrated that the field independence tendency of the medium level is significantly higher than the basic level and the elementary level, suggesting that the cognitive style of part-time Chinese language learners in China is affected by the Chinese language level. There is a significant difference between those who studied Chinese for less than half a year and those more than one year, indicating that longer Chinese language learning presents a propensity for field independence (Tables 3 and 4).

3.2 Learning Strategies

The learning strategy data of 156 learners were processed

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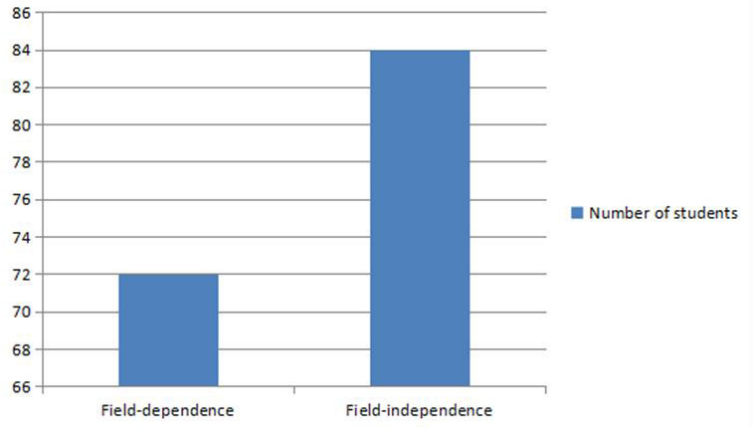

Figure 1. Proportion of different cognitive styles (*n*=156).

Table 1. HSK Test Results and the Proportion of Corresponding Cognitive Styles (*n*=156)

	Basic	Elementary	Medium
HSK test	66 (42.31%)	54 (34.62%)	36 (23.08%)
Field-dependence	39 (25%)	25 (16.03%)	8 (5.13%)
Field-independence	27 (17.31%)	29 (18.59%)	28 (17.95%)
t	4.364	0.593	22.222
P	0.037	0.441	0.000

Notes: *t* refers to significance test value of regression parameter. *P* refers to a parameter that determines the result of the hypothesis test. *P*<0.05 indicates statistical significance.

Table 2. Correlation Test between Individual Factors and Cognitive Style (*n*=156)

Correlation	HSK Level	Learning Time	Age	Gender
t	4.13	6.54	2.45	1.72
P	0.01	0.00	0.34	0.96

Table 3. Multiple Comparisons of Mosaic Pattern Tests for Students of Different HSK Levels

I.HSK	J.HSK	Average Difference (I.HSK-J.HSK)	Standard Error	Significance	95% Confidence Interval
Medium	Basic	6.795	2.270	0.002	2.282-11.308
	Elementary	1.530	3.610	0.000	-5.676-8.676

Table 4. Multiple Comparisons of Mosaic Pattern Test with Different Learning Time

I.HSK	J.HSK	Average Difference (I.HSK-J.HSK)	Standard Error	Significance	95% Confidence Interval
Less than half a year	Six month-1 year	-2.794	2.611	0.315	-7.984-2.396
	Over 1 year	-6.143	1.726	0.000	-9.574-2.713

by SPSS25.0. The overall learning strategy = 3.579 points; over 3.5 points represents various learning strategies adopted in the learning. The preferences of various learning strategies are MET>COM>SOC>COG>MEM>AFF, as shown in Table 5.

3.3 Organization Strategy

Organization strategy mainly includes organization of learning content, preparation of learning content, and self-management. Teachers instructed the students to establish learning goals before the semester. Learning goals can be classified as short-term, medium-term, and long-term goals, and the content of the plan must be clear, specific, and easy to follow. Long-term goals may cover 1 or 2 years, medium-term plans the current semester or academic year, and short-term plans days or weeks.

Before the semester starts, the motivations of the selected students to learn Chinese were understood to formulate different learning protocols. For example, for student D,

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Table 5. Use of Learning Strategies (*n*=156)

	Minimum-Maximum	Mean Value	Standard Deviation	Variance
MET	1.667-5.000	3.870	0.651	0.424
COM	2.000-5.000	3.803	0.545	0.297
SOC	1.750-5.000	3.731	0.784	0.614
COG	1.000-4.644	3.585	0.707	0.499
MEM	2.200-5.000	3.442	0.645	0.417
AFF	1.200-4.800	3.046	0.680	0.462
Overall	1.811-4.644	3.579	0.473	0.225

Notes: Overall refers to the average score of the above six strategies.

who failed the first semester of Elementary Chinese, assignment completion and Chinese song listening are highly recommended after class. Teachers might help students set medium-term goals according to the specific situation of students, such as completing ten HSK texts for the semester, watching two Chinese movies, and learning two Chinese songs. For short-term goals, the daily learning plan was tailored to the specific daily class content. Students in the same class progress at different paces, so it is crucial to assign tasks to international students at different learning levels in the online Chinese class. Students with good performance were required to transcribe a simple text or read it aloud and were to submit their plans for the semester in written form to the teachers for review before the semester begins.

The guidance in the organization strategy mainly refers to the previewing of the lesson with the instructions and reference materials from the teacher. During the training in organization strategy, the general meaning of the text based on the annotations of the vocabulary in the textbook should be provided to the maximum extent. Self-management is an autonomous and step-by-step approach to offline Chinese learning by students. Teachers can give advice related to learning Chinese when training students in the use of organization strategy, such as posting websites for learning Chinese and sharing interesting Chinese mini-videos. The following are questions used when coaching students on organization strategy in online Chinese teaching.

(1) Do you set a plan for your Chinese study every semester?

(2) During your offline study, do you actively preview the vocabulary and texts you will study in the next class?

(3) Do you review the grammar and vocabulary you learned in class in a systematic way after class? And

(4) After class, do you take the initiative to communicate with the teacher using the knowledge you have learned?

3.4 Monitoring Strategy

The monitoring strategy is integrated into the whole online Chinese learning process, including the monitoring of the learning program, the monitoring of learning strategy use, and the monitoring of comprehension. It refers to whether the objectives in the planning strategy and the selection of appropriate learning strategies and methods are followed throughout the learning process. In addition, students are monitored whether they are paying attention to the online Chinese class. In terms of the specific content of Chinese learning, the monitoring strategy refers to the identification of similar grammatical points to the previous ones.

The monitoring strategy also includes monitoring the learning in the online classroom. As an example, students set down content that they do not understand and consult others after class. Students' feedback in online teaching as well as the connection between previous and new knowledge also require attention, for example, the three usages of the character " 了 " in the comprehensive elementary Chinese textbook. Students were instructed to develop self-reflection and self-management skills to identify their problems in the online Chinese learning process and timely adjust their learning strategies. The following are questions used when coaching students on their monitoring strategies during our online Chinese courses.

(1) During the online Chinese class, do you play with your cell phone or get distracted, and if so, can you bring your attention back to the class?

(2) During the online Chinese class, do you try to recall the grammatical points similar to those in the class?

(3) During the online Chinese class, if you encounter any vocabulary or grammar that you do not understand, do you set it down and ask the teacher after the class? and

(4) When you realize that your pronunciation is not correct or you are using the wrong vocabulary during or after the class, do you make adjustments accordingly?

Results found that 62% of students in the online Chinese class would often wander off with their mobile phones but could also bring their attention back to the class. In online Chinese classes, 45.6% tried to recall grammar or similar grammatical content from the previous class. In the case of incomprehensible problems, 84.3% turned to the teacher for help.

3.5 Adjustment Strategy

The adjustment strategy refers to learners' evaluation and reflection on their own learning, identifying problems in the course, analyzing the causes, and summarizing and generalizing their experience in the relevant courses. Evaluation assists students to review the course content and reflect on their previous online Chinese learning experience, so as to allow timely modification of their learning strategies and methods. Self-assessment examines learners' mastery of taught knowledge in online Chinese classes and evaluates their Chinese language level. Students' reasonable and appropriate evaluation of their learning in online Chinese classes contributes to the build-up of learning confidence. Therefore, adjustment strategies were encouraged in online Chinese classes to develop their ability of objective and appropriate self-evaluation. Here are some questions used when training students to use adjustment strategies in online Chinese classes.

(1) Are you able to find your weak points in the process of learning Chinese online and try to improve them?

(2) Do you actively seek help from your teachers and classmates when you have problems with your network during online classes?

(3) Do you evaluate what you have learned in the online Chinese class and make a plan for your next class? and

(4) When you encounter something you don't understand in the online Chinese class, do you mark and review it after the class or watch the video of the teacher's recorded class?

In the course of learning Chinese online, 65% of people will find their weaknesses, and only 48% of them will improve. When faced with Internet problems, 100% of people said they would actively seek help from classmates or teachers. But only 12.5% of them will set the time according to the online Chinese course. When confronted with a problem, 74.6% said they would watch a replay.

3.6 Teaching Strategies to Alleviate the Anxiety of International Students

3.6.1 Teaching

Teachers' guidance is essential for beginner and intermediate international students to correctly use metacognitive strategies in online Chinese classes. Therefore, teachers should cultivate students' awareness of metacognitive strategies in teaching, enrich the teaching methods of online Chinese classes, and alleviate international students' anxiety in online Chinese classes. The results of this study showed that the more frequently students used relevant metacognitive strategies, the lower the level of anxiety of students in online Chinese classes. It can be seen from the survey results that the mean value of MET was 3.87, which was the highest among all cognitive strategies, indicating that metacognitive strategies were also the most frequently used. However, many students in practice teaching were unaware of the specifics of metacognitive strategies, which requires a clear introduction to metacognitive knowledge to help students internalize and generalize the proper use of metacognitive strategies. In the online teaching practice, after each unit exam, students were invited to share the difficulties they encountered during the two weeks of online Chinese learning and their corresponding reflections and practices, followed by a discussion and exchange between students.

In online Chinese teaching, teachers applied the three aspects of metacognitive strategies of organization, monitoring, and adjustment, and guided students effectively for different stages of teaching. When guiding students in using the adjustment strategy, other live-streaming classes may be another excellent online teaching resource. It was found that Beijing Language and Culture University has filmed and produced many excellent teaching videos to consolidate their learned knowledge.

3.6.2 Learning

Learners need to continuously improve their self-cognitive skills, identify and overcome their weaknesses in Chinese learning, and increase the frequency of using metacognitive strategies in the offline learning process to improve their Chinese level. Students in online Chinese classes usually experience anxiety due to their vague understanding of the language. An old Chinese saying "if you know yourself and your enemy, you will never lose any battle" is illuminating to explain the use of metacognitive strategies in the online Chinese lessons, which means that throughout the online Chinese lessons, "yourself" is to know your own learning characteristics and Chinese level, and "your enemy" is to use organization, monitoring and adjustment strategies to identify your learning style and promptly adjust the learning style and strategies.

Language partners can also be invited to help students after class, and a language salon is recommended at a fixed time each week. Cultural exchange activities can also be organized to increase communication opportunities between students, and students are encouraged to communicate with Chinese students to practice their language skills in daily life.

4 DISCUSSION

This study included 156 part-time Chinese learners from Asia, Europe, North America, South America, and Africa for Chinese language learning analysis. In general, the correlation between learning strategies and individual factors of students was not significant; nevertheless, a statistical significance was witnessed between ages ≥25 years and ≤20 years, and between ages ≥25 years and 20-25 years old, indicating a higher frequency of the use of compensation strategies among older learners, which may be attributed to the richer learning experience and the longer learning cycle of the older learners who are more aware of strategies and methods to overcome obstacles

when encountering difficulties in learning. Moreover, a higher frequency of compensation strategy use by students who have studied Chinese for more than one year than that by students who have only studied for half a year was obtained. The study also revealed a slightly higher frequency of field-dependent students using learning strategies than that of field-independent students, with the learning strategy tendency of field-independent students of MET>COM>SOC>COG>MEM>AFF and the learning strategy tendency of field-dependent students of SOC>MET>COM>COG>MEM>AFF. It was observed that students with field cognitive style presented a preference for metacognitive, social, and compensation strategies, other than emotional strategies. Therefore, it can be concluded that with the improvement of HSK level, the preference of field-dependent and field-independent students in choosing learning strategies will gradually converge, which contributes to boosting the learning efficiency of non-Chinese students in studying Chinese.

The research on the correlation between cognitive styles and learning strategies at home is mainly in the field of English teaching, and the field of teaching Chinese as a second language is rarely involved.

Field-independent learners are good at reflecting, summarizing, and self-learning, while field-dependent learners are better at memorizing strategies such as recitation. Schaik and Ling[31] investigated the cognitive styles of 180 college students and found that the cognitive styles of students were closely related to learning strategies. Different cognitive styles will give rise to different learning strategies. Zhu[32] found a significant correlation between the learner's cognitive style and the choice of learners' learning strategies. Heller et al.[33] found that the learning style of learners had an impact on learning strategies to a large extent by using quantitative methods, and the appropriateness of the strategies has implications for academic performance.

Xu[34] found that cognitive style is an important influencing factor for learners' choice of learning strategies. Yang[35] studied the learning strategies and learning styles of 85 successful Chinese learners and found that kinesthetic learners use various learning strategies more frequently. In the study of Korean students' learning styles and learning strategies, Chen[36] suggested that field-independent learners preferred direct strategies; field-dependent learners opted for more indirect strategies such as supplementary strategies and social strategies. Park et al.[37] used a questionnaire survey and found no correlation between the cognitive style of Korean students and Chinese as foreign language learning strategies.

Taken together, the English teaching community in China has conducted sufficient research on the correlation between learners' cognitive styles and learning strategies, whereas there is a paucity of research on such issues in the Chinese as a foreign language community. The results of VanPatten [38] and others have paved the way for future research, but their correlation is marginally explored. Additionally, the insufficient previous research methods and scope of previous research and inconsistent conclusions result in a huge research gap.

Further suggestions for international Chinese teaching based on the results of this study: (1) Results of data analysis demonstrated a lower frequency of learning strategies used in field-independent students than field-dependent students. Therefore, encouragement of the use of learning strategies is conducive to the language learning of field-independent students. To date, VanPatten[38] and Vermeer[39] stated that the increase in the frequency of using learning strategies reaps huge fruits in students' improvement of academic performance. Therefore, teachers can help students build up awareness of learning strategies through lectures, class meetings, and other effective approaches; and (2) the deepening of the value of social strategies for field-dependent students. Discussions, debates, and speeches are productive ways for field-dependent students to enhance their Chinese language learning, which also creates a more active learning atmosphere.

5 CONCLUSION

In conclusion, the complete separation of learning methods of "independence" and "communication and cooperation" is destructive in international Chinese teaching. In addition to assignments that require students' independent effort, opportunities for cooperation and communication are also indispensable for an optimal approach to teaching. However, this research did not conduct an in-depth analysis of students from different continents, which results in the deficiency of the comprehensiveness of this conclusion. Furthermore, integration with artificial intelligence and augmented reality technology practice is also encouraged to explore a more intelligent modern Chinese teaching carrier.

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Conflicts of Interest
The authors declared no conflict of interest.

Author Contribution
Both authors contributed to the manuscript and approved the final version.

Abbreviation List
AFF, Affective strategy
COG, Cognitive strategy
COM, Compensation strategy
HSK, Chinese Proficiency Test
MEM, Memory strategy

MET, Metacognitive strategy
SILL, Strategy Inventory for Language Learning
SOC, Social strategy

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