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The Practical Path of Multimodal Teaching to Enhance Learners' Comprehensive Chinese Language Skills in the Perspective of International Chinese Language Education

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SUMMARY: *With the in-depth advancement of digitalization in education, the ecology of international Chinese language education has undergone significant changes, and multimodal teaching has become the main mode of international Chinese language education. This paper discusses the multimodal teaching mode of international Chinese language education, and gives a practical path for the improvement of learners' comprehensive Chinese language skills. It then conducts a comparative study of international students in a university's School of International Education by means of a teaching experiment, and realizes the quantitative assessment of the improvement of students' comprehensive Chinese language skills by means of statistical analysis and regression analysis. The results show that the improvement of comprehensive Chinese language skills of the experimental students is significantly better than that of the control students, and with the advancement of teaching, the level of variability of the two classes increases from 5% to 1%, and the improvement of comprehensive Chinese language skills of the experimental students also increases from 6.76% to 12.18%, which verifies the facilitating effect of the multimodal teaching mode on the improvement of comprehensive Chinese language skills. Among them, the explanatory degree of the multimodal teaching mode on the improvement of Chinese comprehensive skills is 33.8%.*

KEYWORDS: *regression analysis; teaching experiment; multimodal teaching; international Chinese language education*

1 Introduction

Since the launch of the International Chinese Language Education Volunteer Program in 2004, China has sent volunteers to 151 countries and regions a total of more than 60,000 times, teaching in more than 4,000 schools around the world [1, 2]. By the end of 2025, 90 countries in the world have incorporated Chinese language into their national education systems, more than 190 countries are carrying out Chinese language education, and the number of people learning Chinese language in the world other than China is more than 30 million (Data from the network). International Chinese language education is not only language teaching, but also an important bridge for spreading Chinese culture, promoting cultural exchanges between China and foreign countries, and enhancing mutual understanding and friendship among people from different countries, as well as an important carrier for China's participation in global

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governance and conveying the idea of a community of shared destiny for mankind [3-6]. The significance of international Chinese language education is obvious. Jia [7] emphasizes that international Chinese language education bears the important mission of promoting Chinese language and culture, and that idioms can play a special role as a unique linguistic wealth, and explores the teaching of idioms from the perspectives of peer-to-peer, cognitive metaphors, and second-language acquisition theories through the comparative analysis of the corpus, so as to analyze the paths of their incorporation into the vocabulary system from the perspectives of word frequency, semantic transparency, etc. in order to explore new ways of disseminating culture through the teaching of idioms. In order to explore the new method of cultural transmission through idiom teaching, Tang [8] emphasized that international Chinese language education has long been placed under the framework of second language acquisition, while Chinese is mostly learned as a third language overseas, and the introduction of trilingual acquisition theory can help to reveal the acquisition mode of multilingual learners. It also reviewed the research on trilingual acquisition and found that there is a triple-coupling relationship between its teaching objectives, methods and model construction and international Chinese language education, and emphasized that the introduction of the concept can promote the innovation of teaching mode It is emphasized that the introduction of this concept can promote the innovation of teaching mode and the development of teaching materials. Zhang et al. [9] describe that in the past decade, Chinese language education in Ireland has developed rapidly due to the growth of trade and exchanges between the two countries, and the establishment of Chinese language majors in colleges and universities and Chinese language courses in secondary schools have effectively promoted the dissemination of language and culture as well as bilateral understanding, and laid a positive foundation for the enhancement of humanistic exchanges and long-term cooperation between China and Ireland.

Despite the remarkable achievements of international Chinese language education, a series of problems have been exposed in the process of development. For international students, it is more difficult to improve their comprehensive Chinese language skills [10, 11], and there is an urgent need for in-depth research on effective teaching and learning practice paths in order to realize the sustainable and high-quality development of international Chinese language education. With regard to the difficulties faced by international students in learning Chinese, Chua et al. [12] explored the difficulties faced by international Chinese learners and their coping strategies, and found that the degree of difficulties and coping styles varied among different learners, and that the obstacles had nothing to do with gender and course type, and explained the obstacles that triggered the sense of powerlessness and the ways to overcome them, emphasizing that the existing coping strategies were based on limited evidence and that there might be more actual methods than reported. Lin et al. [13] identified specific learning difficulties for 13 grammatical structures in second language Chinese based on teacher assessment, and found that their difficulty levels highly overlapped with the acquisition sequence and teaching sequence, indicating that there are unique learning bottlenecks for different grammatical points, and that the difficulties perceived by teachers are closely related to students' actual abilities and teaching stages. Gong et al. [14] emphasize that international Chinese language education faces teaching and learning challenges in six key areas, such as teaching Chinese characters, reading and learning, and technology assistance, which need to be continuously examined in order to cope with specific difficulties in global development. With the rapid development and wide application of technologies such as artificial intelligence, virtual reality, and multimodal large-scale modeling, a new vitality has been injected into the multimodal teaching of international Chinese language education courses, which breaks the limitations of the unidirectional mode of “theoretical lectures” in traditional curriculum teaching and promotes learners' comprehensive Chinese language skills. It breaks the

limitations of the unidirectional mode of “theory teaching” in traditional curriculum teaching and promotes the improvement of learners' comprehensive Chinese language skills [15-17]. Multimodal teaching, as a teaching method that integrates multiple educational resources such as images, audio, and video to mobilize learners' multiple senses, enriches the curriculum resources and broadens the path of learning practice through the use of multiple modalities such as video, music, and audio in classroom practice [18-21]. Given the intrinsic connection between multimodal teaching and the teaching of international Chinese language education, it has become a brand-new path to explore the improvement of comprehensive Chinese language skills.

Regarding the research on the enhancement of learners' comprehensive Chinese language skills by multimodal teaching in international Chinese language education, Nie [22] elaborates that in the era of informationization, big data and Internet technology are pushing international Chinese language education to break through the traditional teaching mode, discusses how to use new technologies such as cloud computing and the Internet of Things to realize personalized teaching, optimize multimedia course libraries and develop special software to stimulate learners' interest and satisfy their individual needs, and emphasizes that the construction of multimodal teaching resources is the key direction for the development of “Internet + International Chinese Language Education”, aiming at promoting the comprehensive improvement of Chinese language skills. Wang et al. [23] point out that mobile learning provides a new platform for international Chinese language teaching, and multimodal courses can create a multi-sensory teaching atmosphere to enhance learning initiative. Taking the award-winning listening and speaking course as an example, we analyze the modal characteristics of its different teaching phases, which provides a new perspective for the design of the mobile learning course, summarize the shortcomings of the traditional listening and speaking course, and put forward a strategy for integrating the multimodal course with mobile learning to optimize the learning experience. Qi et al. [24] use text-generated image technology to generate high-quality multimodal teaching resources, and through experiments with 180 international students, it is found that this technology significantly improves the attendance rate and response rate, and analyzes its advantages in promoting personalized learning and creating an immersive environment, etc. At the same time, it points out that we need to pay attention to the information disruption, the teacher's role change, and other potential problems, and finally puts forward targeted suggestions for the application of text-generated image technology in the international Chinese education classroom. Finally, it puts forward targeted suggestions for the application of text-generated image technology in international Chinese language education classrooms. Han et al. [25] examined the multimodal application of bilingual teachers in teaching Chinese as a foreign language. Based on the theory of dual coding and social semiotics, it was found that teachers were able to design targeted activities and utilize digital technology based on research, and that the uniqueness of the Chinese character writing form provided an opportunity for multimodal application, but that the socio-cultural differences between teachers and students might lead to inconsistent construction of meanings. Pang [26] aims to design a multimodal teaching platform to enhance the learning experience and fluency of spoken Chinese. The system adopts a support vector machine optimized based on the Drosophila algorithm for parameter optimization and vocabulary classification, and experiments have shown that its stability, sensitivity, and recall are better than those of existing systems, and it can effectively stimulate the learning interest and improve the efficiency and level of spoken language learning. Wang et al. [27] points out that vocabulary teaching is increasingly emphasized in the context of international Chinese language teaching, and multimodal language landscape, as an effective tool and an important source of input, can help learners mobilize visual and other multi-sensory senses to promote vocabulary acquisition. Based on this theory,

we discuss the possibility of applying multimodal language landscape to Chinese vocabulary teaching through questionnaire surveys and empirical studies, such as interviews, with the aim of providing new ideas and teaching modes for international Chinese language teaching. Based on this theory, we discuss the possibility of applying multimodal language landscapes to Chinese vocabulary teaching through questionnaires and interviews.

In the perspective of international Chinese education, this paper proposes a multimodal teaching model from six dimensions: multimodal online platform, multimodal interaction, multimodal teaching method, multimodal data, multimodal competence and multimodal evaluation. Based on the teaching practice of international students in a university's School of International Education, the multimodal teaching model is applied to the international Chinese education classroom. This paper uses a one-way equal-group experimental design, collects and analyzes the use of classroom modality by questionnaires, and explores the effect of comprehensive Chinese language skills enhancement of the students in two classes through the comparison of midterm grades, regular grades and final grades. Then, using the multimodal teaching mode and the improvement of comprehensive Chinese language skills as independent variables and dependent variables respectively, regression analysis was used to further examine the effects of the multimodal teaching mode on the improvement of comprehensive Chinese language skills.

2 A Multimodal Teaching Model in the Perspective of International Chinese Language Education

In order to enhance learners' comprehensive Chinese language skills, this paper constructs a multimodal teaching model based on international Chinese language education as shown in Figure 1. The multimodal teaching model is a model system constructed by six dimensions: multimodal online platform, multimodal interaction, multimodal teaching method, multimodal data, multimodal competence and multimodal evaluation.

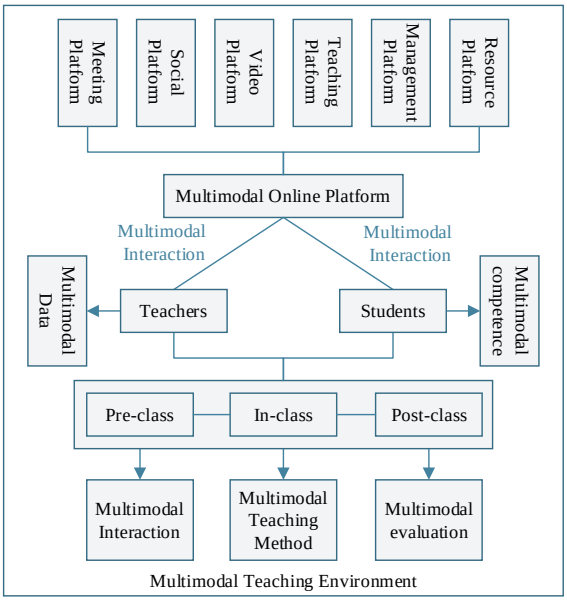

Figure 1: Multi-modal Teaching Model Based on International Chinese Education

2.1 Multimodal Online Platform

In this paper, multimodal online platforms are categorized into the following six types according to the characteristics of international Chinese online teaching: online conference platforms, online social platforms, online video platforms, online teaching platforms, online course management platforms, and online resource platforms. The continuous enrichment and innovation of online platforms provide multiple paths for teachers and students to access digital resources and carry out Chinese online teaching, which helps to promote the diversified development of international Chinese language education.

2.2 Multimodal Interaction

Multimodal interactions in international Chinese language education can be divided into the following aspects:

First, multimodal interactions between people, including teacher-teacher interactions, teacher-student interactions, and student-student interactions. Teacher-teacher interactions are reflected in resource sharing and student information exchange. Teacher-student interaction is reflected as organizing lessons, issuing tasks, class feedback, etc. Student-student interactions are reflected in group presentations, group discussions, personal interactions and so on.

Second, multimodal interaction between human and multimedia. Teachers' interaction with multimedia is mainly to carry out teaching through various online platforms and teaching software and programs. Students' interaction with multimedia mainly involves using the whiteboard, voting, documents, chatting, group discussion functions in the online meeting platforms as well as using software, programs, etc. to participate in learning.

Third, the multimodal interaction between human and content, including teacher-content interaction and student-content interaction. The former is embodied in teachers' resource learning and teaching with the help of online platforms, and the latter includes students' learning in online classrooms and other platforms.

Fourth, modality-to-modality interaction, which mainly refers to the collocation and coordination between modalities, such as spoken plus written language.

2.3 Multimodal Teaching Method

The transformation of teaching models and the change of online interaction forms require international Chinese education to fully utilize technologies such as multimodality, multimedia, and artificial intelligence to motivate students and enhance the authenticity of interactions. Teachers can use various software, programs, and technologies like AR and VR to enrich students' participation methods and classroom activity forms. For example, they can use facial expression recognition to assess students' emotions, utilize intelligent recognition technology to evaluate students' voices, use the comment function of pop-up messages to promptly collect students' feedback, use data to customize personalized learning resources for students, and apply speech synthesis technology and automatic speech recognition technology to online classrooms to provide rich and professional language materials that meet teaching needs.

2.4 Multimodal Data

Due to the use of multimodal means, teachers can obtain multimodal data such as students' language, vision, hearing, etc. from multiple channels. Different types of data have different pedagogical significance, and by mining the online data of teachers and students, we can understand the psychological state, cognitive ability, and interactive effect of teachers and students in the online teaching environment. Multimodal data can help teachers grasp the

personalized learning characteristics of students in a more comprehensive and systematic way, which is an important basis for evaluation. In addition, multimodal data can be used for multimodal learning analysis, which is an important source of teaching reflection and research, and helps to further improve the effectiveness of teaching.

2.5 Multimodal Competence

In the context of the information age, massive data are presented in diversified forms, and traditional literacy is difficult to adapt to its changing situation, which urgently requires students to develop multimodal competence, that is, multifaceted literacy. Teachers need to continue to promote the development of students' multimedia technology literacy, information selection and searching ability, multimodal selection and design ability, information technology ability, online social communication and cooperation under the guidance of the multifaceted literacy development model.

2.6 Multimodal Evaluation

Multimodal evaluation mainly consists of evaluation content and evaluation mode. Multimodal evaluation means that teachers evaluate students multimodally with the help of online data collected, including written and oral assignments, interaction, students' status in class, etc. Multimodalization of evaluation means that teachers can take tests, video filming, conversations, reports, performances, demonstrations and other ways of multimodal evaluation, so as to expand the dimensions of the evaluation methods, and to investigate and evaluate the multimodal competence of the students in various aspects.

3 Application Design of Multimodal Teaching Models

3.1 Purpose of the Experiment

Based on the previous chapter, this chapter applies the proposed teaching model to actual teaching and verifies the effect of the improvement of learners' comprehensive Chinese language skills under the guidance of the multimodal teaching model of international Chinese language education.

3.2 Subjects and Variables

3.2.1 Experimental Objects

The teaching target of this design is the first-year international students in the School of International Education of a university. Based on the factors of students' age, nationality, Chinese language proficiency and class size, two eligible primary classes are selected for the experiment, both of which are 17-22 years old, with zero Chinese language proficiency and comparable learning ability. One class, with 16 students, was the experimental class, and the other class, with 15 students, was the control class. In order to control the interference of unrelated factors, both classes were taught by the same teacher.

3.2.2 Experimental Factors

Self-variables: the instructional design of international Chinese language education based on a multimodal teaching model.

Dependent variable: the effect of improving students' comprehensive Chinese language skills.

Hypothesis: It is assumed that learners' comprehensive Chinese language skills can be effectively improved through one semester of multimodal teaching.

3.2.3 Other Information Notes

(1) Class Schedule

According to the arrangement of the college, the International Chinese Language Program offers Comprehensive Basic Chinese Classes twice a week, each lasting 120 minutes, and the teaching is arranged according to the schedule of two class per week. The control class completes the teaching of vocabulary, text and Chinese characters in the first 120 minutes, and completes the teaching of after-school exercises and writing in the second 120 minutes, and the teaching is conducted in strict accordance with the order of textbook arrangement. The experimental class did not follow the order of the textbook completely. The first 120 minutes were used to complete the teaching of vocabulary, text and Chinese characters, and the second 120 minutes were used to teach writing, with the after-class exercises as homework, and a time was chosen to focus on solving the errors in the exercises.

(2) Teaching tools

The experimental class synthesized a variety of modality combinations, organized the classroom according to the proposed teaching mode, and the teacher's discourse and PPT were designed in a multimodal way. The modality used by the control class was not designed, and the class was organized according to the order of the textbook, using the PPT accompanying the textbook to teach, and the teacher's discourse was natural.

3.3 Experimental tools

3.3.1 Testing tools

(1) Mid-term and final test questions of the International Chinese Language Education Program. The midterm and final tests consist of four parts: writing words in pinyin, choosing the correct interpretation of words, selecting appropriate response sentences, and imitating writing an essay, which examine the learners' comprehensive Chinese language skills such as reading and writing Chinese characters, comprehending words, communicating orally, and organizing chapters, etc., and they are scored out of 100 points. The questions for the midterm test are from Lessons 1-7, and the questions for the final test are from all lessons of the course.

(2) Questionnaire on the use of course modality. A questionnaire was designed and distributed to understand the selection and use of modality in the international Chinese teaching classroom. The first part of the questionnaire is basic personal information. The second part of the questionnaire was about the selection of teaching modality, and the questions were mainly designed from four levels: oral modality, visual modality, auditory modality, and somatic modality, and the use of different modalities was investigated in the four main classroom sessions: vocabulary teaching, text explanation, Chinese character teaching, and classroom practice. The questionnaires were distributed and collected from the teachers and students of the experimental class after the midterm and final tests, and a total of 34 valid questionnaires were collected, with a validity rate of 100%. The Cronbach' Alpha coefficient of the questionnaire was 0.919 and the KMO value was 0.786, which indicated that the questionnaire had high reliability and validity.

3.3.2 Analytical Tools

(1) Statistical tool: SPSS 25.0.

(2) Multiple regression analysis method. Multiple regression analysis is a method of modeling the linear relationship between multiple variables by quantitatively analyzing the

relationship between variables. Multiple linear regression analysis is to choose the appropriate linear regression model to further represent the relationship between the dependent and independent variables, establish a multiple linear regression model, and derive the multiple linear regression equations by solving the model. In this paper, we use multiple regression analysis to explore the effect of multimodal teaching model on the improvement of learners' comprehensive Chinese language skills.

Multiple linear regression model:

There are p independent variables $x_1, x_2, \ldots, x_p$, a dependent variable y, which satisfy the following relationship:

$$y = F\left(x_1, x_2, \ldots, x_p; a_1, a_2, \ldots, a_p\right) + \varepsilon \tag{1}$$

where F is the known p metafunction, $a_1, a_2, \ldots, a_p$ are the parameters to be found in the F function, and ε denotes the random error.

The observations are obtained for $x_1, x_2, \ldots, x_p$, y for n observations:

$$(x_{i1}, x_{i2}, \ldots, x_{ip}, y_i) \quad i = 1, 2, \ldots, n \tag{2}$$

For each observation, the following relationships are equally relevant:

$$y_i = F\left(x_{i1}, x_{i2}, \ldots, x_{im}; a_1, a_2, \ldots, a_p\right) + \varepsilon_i \tag{3}$$

The idea of regression analysis is to find an estimate $a_1, a_2, \ldots, a_p$ of $a_1, a_2, \ldots, a_p$ that minimizes Q from the perspective of the observed data:

$$Q = \sum_{i=1}^{n}\left[y_i - F\left(x_{i1}, x_{i2}, \ldots, x_{im}; a_1, a_2, \ldots, a_p\right)\right]^2 \tag{4}$$

The minimum value of Q is obtained by substituting the estimated values of $a_1, a_2, \ldots, a_p$ into expression (4):

$$Q_{\min} = \sum_{i=1}^{n}\left[y_i - F(x_{i1}, x_{i2}, \ldots, x_{im}; a_1, a_2, \ldots, a_p)\right]^2 \tag{5}$$

The smaller the minimum value of Q, the more significant the results of the multiple regression analysis.

For the established multiple linear regression model to be valid, it must satisfy:

(1) The explanatory variables $x_1, x_2, \ldots, x_p$ are constant and satisfy $rank(X) = p + 1 \le n$.

(2) The variance of ε is held constant for all values of the explanatory variables $x_1, x_2, \ldots, x_p$.

(3) The error term is a normally distributed random variable that is independent of each other.

Let the multiple linear regression model of dependent variable y and independent variables $x_1, x_2, \ldots, x_p$ be:

$$y = a_1 + a_2 x_1 + a_3 x_2 + \ldots + a_p x_p + \varepsilon \tag{6}$$

where $a_1, a_2, \ldots, a_p$ are called the regression coefficients, ε is called the random error, y is called the dependent variable, and $x_1, x_2, \ldots, x_p$ are called the independent variables. When $p \geq 2$, then the regression model is a multiple linear regression model.

3.4 Experimental Procedures

This experiment is divided into three stages: pre, middle and post. Pre-experiment, according to the characteristics of the teaching object, determine the experimental object and the reference object, and carry out multimodal teaching and general mode teaching for the two groups of objects respectively. In the middle of the experiment, the two groups' usual scores are observed and compared. In the late stage of the experiment, after finishing a semester's experiment, the final grades of the two groups are obtained through the final examination, and the grades of the two groups are quantitatively analyzed.

4 Analysis of Experimental Results

4.1 Modal Utilization Analysis

Based on the collected questionnaire data, the selection and use of teacher modality in the international Chinese language education classroom was analyzed. The overall modality use in the classroom is shown in Figure 2. The modalities used by teachers were mainly picture, video and text modalities. Picture modality and video modality were the most used modalities in the classroom, accounting for 87.93% and 86.94% respectively, with little difference between them. Pictures are intuitive and students can understand the meaning of words immediately after seeing them, so most teachers choose to use picture modality to assist teaching. Video is also recognized by most teachers because its sound and picture combination can attract students' interest. The least used by teachers is the physical modality, accounting for 30.62%.

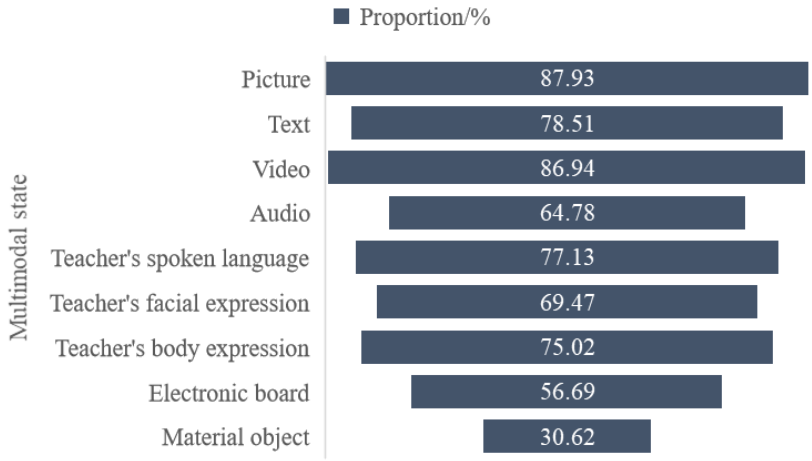

Figure 2: The Overall Modal Usage of the Classroom

The use of modality in each classroom session is shown in Figure 3. The text teaching session and the vocabulary teaching session were the two sessions in which the teacher's modals were most used, accounting for 29.97% and 30.04% respectively. The homework assignment

session used the least modal symbols, accounting for 1.58%. The reason for this is that the vocabulary teaching session and the text teaching session bear the most important teaching contents, contain the key points and difficult points, and students need to memorize the most contents, so teachers will use rich modal symbols in these two sessions accordingly. Teachers usually use PPT courseware to teach vocabulary, so that each vocabulary word is displayed on a separate PPT page, which is suitable for teachers to choose a variety of modal symbols to enrich the picture and deepen the students' impression of the words. Text teaching is mainly presented as the teaching of language parts compared with vocabulary teaching, and if only language modality is used, the text is boring and students will easily lose interest. Therefore, teachers will choose to use a variety of modal aids to enhance learners' understanding of the text.

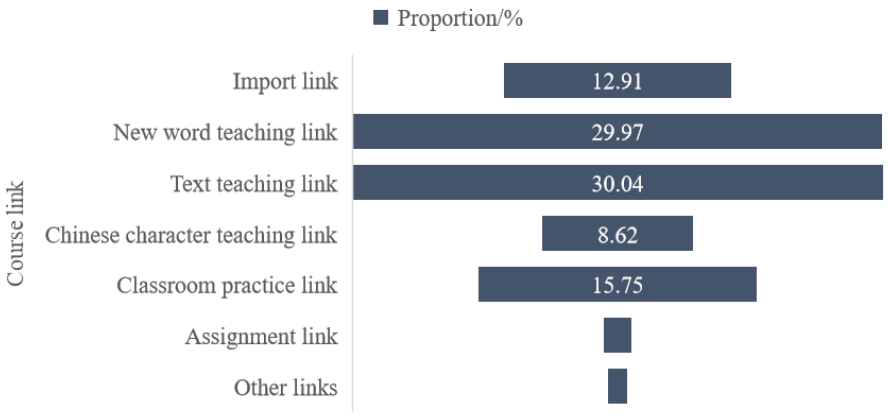

Figure 3: The Modal Usage of Each Part of the Classroom

The use of modals in the main teaching sessions of the classroom is shown in Figure 4. Teachers in the vocabulary teaching session use picture modals and teacher spoken modals most, accounting for 62.22% and 47.38% respectively. When teachers teach vocabulary words, they usually choose to use PPT to show pictures, use teacher's spoken language to explain words and ask questions to students. Teachers in the text teaching session used the teacher's spoken modality and text modality most, accounting for 60.11% and 51.46% respectively. In the Chinese character teaching session, the picture modality and text modality accounted for 47.12% and 46.73%, and the teacher's spoken modality accounted for 44.26%. Looking at the use of modality in the Chinese character teaching session, the overall modality usage rate is not high and the difference is not big. In the classroom practice session, teachers used the oral modality and body movement modality most, accounting for 62.95% and 46.77% respectively, and the video modality accounted for 43.14%. From all the classroom sessions, the teacher's oral modality was used at a higher percentage in each session, and the teacher's oral modality belongs to the language modality, which is used throughout the classroom teaching.

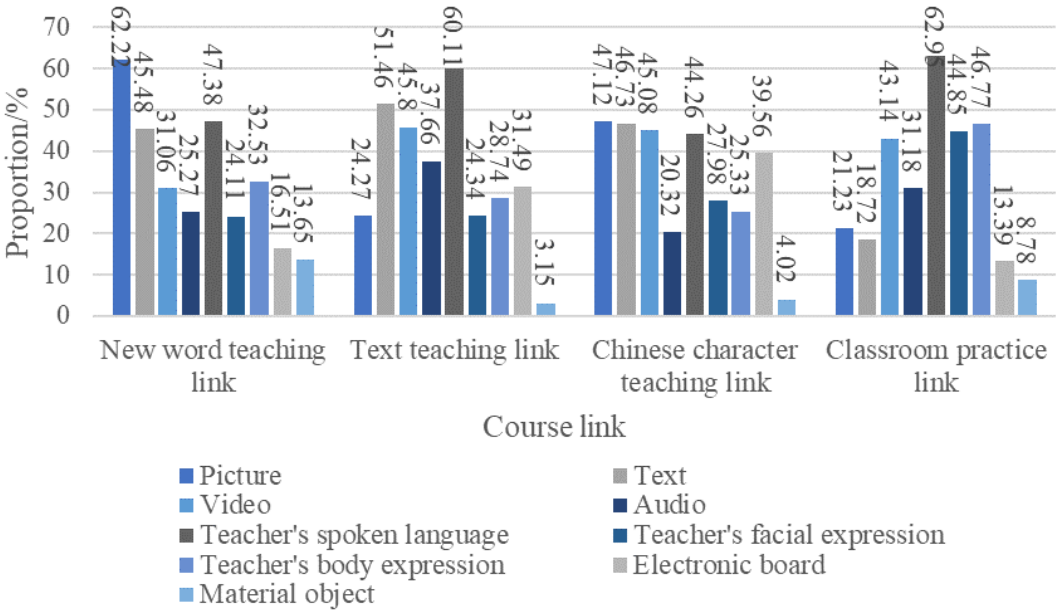

Figure 4: Use of Modal Symbols in the Main Teaching Parts of the Classroom

4.2 Analysis of Comprehensive Chinese Language Skills

4.2.1 Analysis of Mid-term Results

A comparison of the dispersion of midterm grades between the two groups is shown in Table 1. The standard deviation indicates the degree of data dispersion, with larger values indicating higher dispersion and vice versa. When the p-value is less than 0.05** or 0.01***, the two groups show a significant difference between them, and vice versa, it means there is no difference or the difference is not significant. After two months of international Chinese education learning, the two classes' levels already showed differences (P=0.022), but the differences were not significant. The standard deviation of the control class was 2.431, which was larger than that of the experimental class (2.122), indicating that the gap between the students in the control class was larger than that in the experimental class. The scores of comprehensive Chinese language skills of the two classes were 73.78 and 69.11, and the score of the experimental class was higher than that of the control class by 6.76%, and the overall level was higher than that of the control class, but the contrast was not yet too obvious. To summarize, the multimodal teaching mode shows its initial effect in a short period of time, but the effect is not yet obvious.

Table 1: The Differences in the Midterm Scores of the Two Groups

Midterm grades	Test class(N=16)		Control class(N=15)		t	p
	Mean	SD	Mean	SD		
Chinese character reading and writing ability	20.53	2.793	19.35	2.858	0.964	0.041**
Word comprehension ability	18.74	2.192	17.23	2.501	1.061	0.027**
Oral communication ability	19.46	2.235	18.26	2.927	1.019	0.032**
Chapter organization ability	15.05	2.051	14.27	2.035	1.344	0.039**
Chinese comprehensive skills	73.78	2.122	69.11	2.431	1.285	0.022**

4.2.2 Analysis of Regular Performance

The regular grade consists of three parts: attendance, classroom performance and regular assignments, with the ratio of each part being 2:3:5. The attendance score is based on the attendance of the student list, and the classroom performance includes five elements: class participation, activity, independence, attention and memory. Class participation and activity were scored based on group activities and answering questions, independence was assessed according to the degree of contribution within the group, attention was assessed through classroom observation by the teacher and answering questions, and memory was judged by students' classroom dictation. Regular assignments were in the form of writing and textbook exercises and were scored according to completion and correctness. The variability analysis of the usual grades is shown in Table 2. The usual grades of the experimental class were higher, 12.54% higher overall, with a lower standard deviation, and the usual grades of the two classes showed a significant difference (P=0.034<0.05). It indicates that the multimodal teaching mode can mobilize students' enthusiasm, students' classroom performance is better, and the overall atmosphere is good.

Table 2: Difference Analysis of Normal Grades

		Test class(N=16)		Control class(N=15)		t	p
		Mean	SD	Mean	SD		
Attendance		18.69	1.672	17.58	2.111	1.179	0.044**
Classroom performance	Classroom participation	5.08	3.029	4.22	3.208	1.282	0.029**
	Activity	4.99	2.938	4.16	3.127	1.083	0.035**
	Independence	4.36	3.197	3.92	3.517	0.809	0.039**
	Attention	4.64	2.376	3.88	2.425	0.971	0.017**
	Memory	4.85	1.519	4.37	1.708	1.236	0.033**
Normal work	Writing	20.42	2.209	17.58	2.341	0.847	0.028**
	Textbook practice	21.32	2.181	19.24	2.533	1.433	0.031**
Normal grades		84.35	2.529	74.95	3.033	1.088	0.034**

4.2.3 Analysis of Final Results

The analysis of variance of the final scores is shown in Table 3. p=0.003, which is significantly less than 0.01, indicating that the comprehensive Chinese language skills of the students in the two classes have been significantly different after one semester of study. The scores of comprehensive Chinese skills of the experimental class and the control class were 81.02 and 72.22 respectively, and the comprehensive Chinese skills of the students in the experimental class improved by 12.18%. Therefore, the multimodal teaching model is indeed effective.

Table 3: Difference Analysis of Final Grades

Midterm grades	Test class(N=16)		Control class(N=15)		t	p
	Mean	SD	Mean	SD		
Chinese character reading and writing ability	22.51	2.144	20.86	2.829	1.623	0.006***
Word comprehension ability	19.58	1.784	17.64	2.295	0.811	0.004***
Oral communication ability	21.51	1.558	18.87	2.577	1.571	0.005***
Chapter organization ability	17.42	2.014	14.85	2.169	1.203	0.002***
Chinese comprehensive skills	81.02	1.712	72.22	2.314	0.914	0.003***

4.3 Multiple Regression Analysis

The pearson correlation between multimodal teaching mode and Chinese comprehensive skill enhancement is shown in Table 4, with multimodal teaching mode as the independent variable and Chinese comprehensive skill enhancement as the research variable. There is a significant correlation ($p<0.01$) between multimodal teaching mode and the improvement of Chinese comprehensive skills, with a correlation coefficient of 0.537. Using multimodal teaching mode as the independent variable and the improvement of Chinese comprehensive skills as the dependent variable in the linear regression analysis, the multivariate regression analysis of multimodal teaching mode on the improvement of Chinese comprehensive skills is shown in Table 5. The regression equation is Y=0.537X. The results show that the coefficient of determination R^2 is 0.338, which indicates that the independent variable multimodal teaching mode can explain 33.8% of the variance of the dependent variable Chinese comprehensive skill improvement. It indicates that the explanatory power of multimodal teaching mode on the improvement of Chinese comprehensive skills is relatively high. And the standardized regression coefficient B is 0.537, which is positive. It indicates that multimodal teaching mode is a positive predictor of Chinese comprehensive skill enhancement.

Table 4: Correlation Analysis Results

	Chinese comprehensive skills
Multimodal teaching mode	0.537***

Table 5: Multiple Regression Analysis Results

Dependent variable	Independent variable	*R*	R^2	*F*	*B*	*Beta*	*t*
Chinese comprehensive skills	Multimodal teaching mode	0.524	0.338	62.243***	1.635	0.537	7.359***

5 Conclusion

In order to promote the development of international Chinese language education and the improvement of learners' comprehensive Chinese language skills, this study integrates multimodal discourse analysis theory with international Chinese language teaching and proposes a multimodal teaching model. The multimodal teaching model was applied to the international students in the School of International Education of a university to investigate the effect of the model on the improvement of learners' comprehensive Chinese language skills. The results of the study found that:

In the process of applying the multimodal teaching mode, the most frequently used modal types are verbal and visual modes, with verbal modes dominated by the teacher's oral modes and the PPT text modes, and visual modes dominated by the PPT picture and video modes. Among them, the proportion of picture, video and text modalities in the classroom is over 78%, and the teacher's oral modality is always present in the classroom of international Chinese language education.

The scores of the experimental students in both the midterm test and the final test were higher than those of the control students, and the variability gradually increased with the advancement of teaching, and the improvement of the experimental students' comprehensive Chinese language skills increased from 6.76% in the midterm test to 12.18% in the final test, and the level of significance also increased from 5% to 1%. Meanwhile, the explanatory degree of the multimodal teaching mode on the improvement of comprehensive Chinese language

skills was 33.8%. Therefore, the international Chinese education classroom applying multimodal teaching mode has better activity and learning atmosphere, and the multimodal teaching mode can promote the improvement of learners' comprehensive Chinese language skills.

International Chinese language education should make use of modern educational information technology, provide multimodal learning resources and realize multimodal online interaction with the help of multimodal online platforms, use multimodal means for teaching, fully explore the multimodal data in the teaching process to carry out multimodal evaluation and reflection, and pay attention to cultivating the multimodal competence of the students, so as to form a multimodal and media-combined online teaching mode, and to promote the continuous enhancement of the comprehensive skills of the Chinese language of the learners. In this way, a multimodal and media-integrated online teaching model is formed to promote the continuous improvement of learners' comprehensive Chinese skills.

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