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RESEARCH ON SPATIOTEMPORAL DYNAMIC LOAD PREDICTION OF SMART GRID ELECTRIC VEHICLES BASED ON DEEP LEARNING

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Abstract: Electric vehicles have strong spatiotemporal randomness during the charging process, which increases the difficulty of power grid control and affects the quality of electric energy. This article proposes a deep learning based spatiotemporal dynamic load prediction method for electric vehicles to address this challenge. A quantile regression model based on air dynamic causal convolutional neural network is established to accurately predict the charging load. This model uses neural network algorithms to enhance network learning ability, preprocesses data based on factors such as changes in peak morning and evening passenger flow, holidays, and unexpected situations during the charging process of electric vehicles, and improves prediction accuracy. And compared with the QRLSTM and QRNN models through experiments, the experimental results show the scientificity of the model.

Keywords: Deep learning; Load forecasting; Smart grid

1 INTRODUCTION

A smart grid is a system that synchronously transmits information and energy, and is an important means of achieving power automation. According to the development trend of automobiles, electric vehicles are the mainstream of development. With the large-scale integration of electric vehicles into the grid in the future, the load distribution it brings has uncertain characteristics such as intermittency, volatility, and randomness in time and space [1], which will change the power load curve [2] and have an undeniable impact on the operation, planning, and control of the entire power grid [3]. Therefore, it is necessary for us to accurately predict the charging load of electric vehicles in advance, in order to better guide the power system's power generation, distribution, scheduling and other work, and to eliminate and protect harmonic pollution problems that pose a threat to the power grid [4-5]. Generally speaking, the establishment of electric vehicle load forecasting models is relatively complex and is influenced by factors such as user usage habits, transportation infrastructure conditions, equipment characteristics, the number of electric vehicles, and the distribution of charging pile infrastructure. With the steady increase in the penetration rate of electric vehicles, more accurate load forecasting of electric vehicles is needed. However, the prediction methods and model selection mentioned in the above literature have many shortcomings, such as: the establishment of prediction models is relatively idealized, resulting in poor universality; Without a large amount of charging data as support, its prediction parameters are difficult to determine, and there is a significant deviation in the accuracy of the prediction. Therefore, it is necessary to study a new algorithm model, which is a self-learning model that uses deep learning algorithm technology to fit its distribution on the basis of data. The key technologies include optimizing the structure of deep learning models and researching training algorithms for deep learning.

2 RESEARCH STATUS

At present, electric vehicle load forecasting can be mainly divided into two categories. One is to use mathematical models to simulate the charging behavior of electric vehicles and obtain the predicted value of electric vehicle load. The other is to use statistical learning models based on historical data for forecasting.

2.1 A Monte Carlo based Mathematical Model for Load Prediction of Charging Stations

The Monte Carlo method is a method based on the theory of probability and statistics, which treats the problem to be solved as a probability of a random event. After determining the probability model of the problem, a computer is used to take a random number from the probability model to obtain an approximate solution to the problem. The data mainly refers to some basic parameters obtained from studying the influencing factors of charging for various purposes of electric vehicles, including vehicle types (taxis, buses, private cars), distribution of starting charging capacity and starting time during charging periods, etc. Firstly, these data types are classified and processed to determine the probability model of vehicle owners' traffic habits, including charging habits and formal habits, Establish a mathematical model with random probability characteristics. Then, Monte Carlo principles are used to predict the charging location/time and load demand of the car in the future period. Reference [6] proposes a method for predicting the charging load of electric vehicles based on the travel chain of electric vehicles and considering the charging frequency. Based on the survey and statistical data of household vehicle travel, the purpose of household vehicle travel is divided into five categories. Simple and complex travel chains are constructed, and factors such as temperature, traffic conditions, and holidays are comprehensively considered. The distribution of electric vehicle travel is classified and modeled, and the results of electric vehicle load prediction are obtained.

These methods all use mathematical formulas to simulate charging behavior for charging station load prediction. Reference [7] considers establishing a dynamic fluid dynamics model based on transportation to predict the charging load of charging stations in the context of fast charging stations at high-speed exits. The experiment shows that the model can effectively predict the dynamic charging demand of fast charging stations on highways in terms of space and time. Reference [8] used the BCMP queuing network model to predict the charging demand of plug-in electric vehicles, and the model was validated with traffic flow data from New York, achieving good prediction results. Reference [9] proposes a method based on Monte Carlo method to predict charging load, using Monte Carlo to randomly simulate the selected starting state of charging, charging method, starting point of charging battery, etc. Then calculate the actual charging time to obtain the charging load. Finally, it is predicted that electric vehicles in China will have a significant impact on the power grid by 2030. Based on a large amount of data, reference [10] establishes a model for the behavior habits of electric vehicles, including driving trajectories, charging habits, etc., and calculates the total load of electric vehicles based on the road network structure ball. Reference [11] proposes an electric vehicle load forecasting method based on energy equivalence, which converts the fuel sales of gas stations into electric vehicle charging loads through the energy equivalence method, taking into account two modes of charging facilities: decentralized and centralized. Finally, obtain the maximum load for both modes.

2.2 Statistical Learning Method for Charging Station Load Prediction Based on Historical Data Background

The traditional load forecasting methods for electric vehicle charging based on power load forecasting include regression analysis, similar day method, etc; Modern prediction methods include wavelet analysis based prediction, neural network-based prediction, and Support Vector Machine (SVM) prediction. SVR [12-14] (Support Vector Regression), Grey Model, and Wavelet Neural Network [15], etc. The Monte Carlo model method is a method based on probability and statistics. Reference [16] used a Monte Carlo model to simulate the charging process of electric vehicles and derived a mathematical relationship for the optimal usage conditions. The SVR model based on GA-PSO adopted in reference [17] has a good effect on the charging load of electric vehicles. However, the kernel function in SVR cannot be applicable to all situations, and selecting the appropriate kernel function requires some experience. Reference [18] used three models, namely grayscale model, RBF (radial basis function) neural network, and BP neural network, to predict the charging load of electric vehicles, and compared the prediction results. The grey model is widely used in power load prediction, and the GM (1, 1) prediction model is the most commonly used grey model based on first-order differential equations. This model requires a small amount of data and is easy to calculate, but it is difficult to achieve the desired prediction results for more complex data. The short-term prediction performance of RBF neural network and BP neural network models for electric vehicle charging load is similar. For medium - and long-term predictions, RBF neural networks are generally more accurate. Reference [19] proposes a big data based method for predicting the

charging load of electric vehicles. Using big data technology to introduce electric vehicle charging demand prediction models and real-world traffic distribution data and weather data. Specifically, the prediction model is based on big data technology that integrates collection, storage, and management, where the data is based on historical traffic distribution data and weather data from South Korea. Analyze through the following steps: (1) Cluster historical traffic allocation data with high similarity into clusters using clustering analysis; (2) Identify the impact of weather data on traffic patterns using correlation analysis; (3) Develop classification criteria for the relationship between traffic clusters and weather influencing factors using decision trees. Finally, use this classification standard to establish a predictive model for predicting the charging load of electric vehicles. Reference [20] mentions a short-term charging station load prediction model based on time series distance measurement method, which predicts the charging load based on the distance measurement between the load series and time series.

The past statistical learning methods for predicting the charging load of electric vehicles only considered the time dimension. However, the charging load of electric vehicles also includes complex spatiality. Only by comprehensively considering the dual dynamic changes of load time and space can better spatiotemporal dynamic prediction be made. Therefore, it is necessary to study and establish a deep learning model for high-precision prediction of spatiotemporal dynamic loads of electric vehicles based on historical data.

3 DESIGN OF DEEP LEARNING MODELS

3.1 Selection of Factors Affecting the Operation Status Of Charging Stations

With the rapid development of the electric vehicle industry, the impact of charging loads during the charging process on the power grid will become increasingly significant. The factors that affect the charging and discharging status of charging piles have complex characteristics, such as regional development differences, population density differences, differences in the number of electric vehicles owned, user schedules and charging and discharging habits, holidays, etc. Therefore, this article selects characteristic variables from three aspects to characterize the influencing factors of the operating status of charging stations: a) Power parameters of charging stations, which are the most intuitive parameters for expressing the network, obtained through information perception; b) Spatial factors require quantitative transformation of qualitative descriptions and merging them into the input feature vectors of the model; c) The time factor highlights factors such as changes in peak morning and evening flow, holidays, and unexpected situations. Due to different feature data and different dimensions, it is necessary to preprocess the data based on empirical knowledge, mainly including correlation analysis, data noise cleaning, and input data normalization.

3.2 Model Design

The concept of deep learning originated from the study of artificial neural networks. The model structure is an LSTM (Long Short Term Memory) neural network proposed by Hochreiter and Schmidhuber in 1997, which can effectively solve the problem of long-term dependencies in sequences. Its main structure is shown in Figure 1, and LSTM can be represented as a chain structure by time expansion. There are four neural network layers in the repeating module of LSTM.

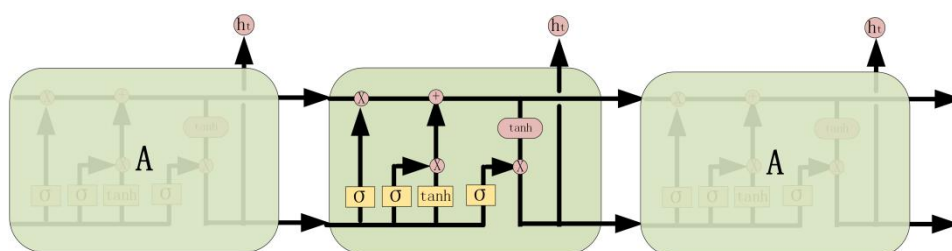


Figure 1 LSTM Structure

Figure 1 is called a cell, and LSTM has four gates. The first layer of neurons is the sigmoid control layer of the forget

gate, as shown in Equation (1).

$$f_t = \sigma(W_f \bullet [h_{t-1}, x_t] + b_f) \quad (1)$$

The second and third layers are input gates and tanh layers, respectively, as shown in equations (2) and (3). The sigmoid layer of the input gate determines which information to update; The tanh layer creates a new candidate value that may be added to the cellular state.

$$i_t = \sigma(W_i [h_{t-1}, x_t] + b_i) \quad (2)$$

$$\tilde{C}_t = \tanh(W_c [h_{t-1}, x_t] + b_c) \quad (3)$$

Update the old state of the cell to, as shown in equation (4).

$$C_t = f_t * C_{t-1} + i_t * \tilde{C}_t \quad (4)$$

Finally, by using an output gate containing a sigmoid layer as shown in equation (5), equation (4) is passed through a tanh layer (such that the output value is between -1 and 1), and then multiplied with the output gate, the forgetting and memory parameters are substituted to the final output.

$$O_t = \sigma(W_o [h_{t-1}, x_t] + b_o) \quad (5)$$

$$h_t = O_t \tanh(C_t) \quad (6)$$

Among them, W_f and b_f Representing forget gate weights and biases; W_i and b_i Represents the weight and bias of the input gate; W_c and b_c Represents the weight and bias of updated values; W_o and b_o Indicates the weight and bias of the output gate; $\sigma(g)$ Representing the sigmoid activation function, $\tanh(g)$ Represents the hyperbolic tangent activation function. \bullet Representing matrix multiplication; $[h_{t-1}, x_t]$ Merge columns representing matrices or vectors with equal rows; $*$ Representative point multiplication.

Faced with massive charging data, data mining techniques are used for classification, organization, and data partitioning. A learning model is designed to automatically discover common features from unlabeled monitoring data to describe the samples. Then, a labeled dataset is trained by manually labeling only a small number of samples (load state determination output) as input to the prediction classifier, ultimately forming a model that can be used for actual prediction. Combining quantile regression with deep learning, a deep learning quantile regression probability density prediction method is proposed, which is the Quantile Regression Dilated Causal Convolution (QRDCC) neural network quantile regression model. The model framework is shown in Figure 2.

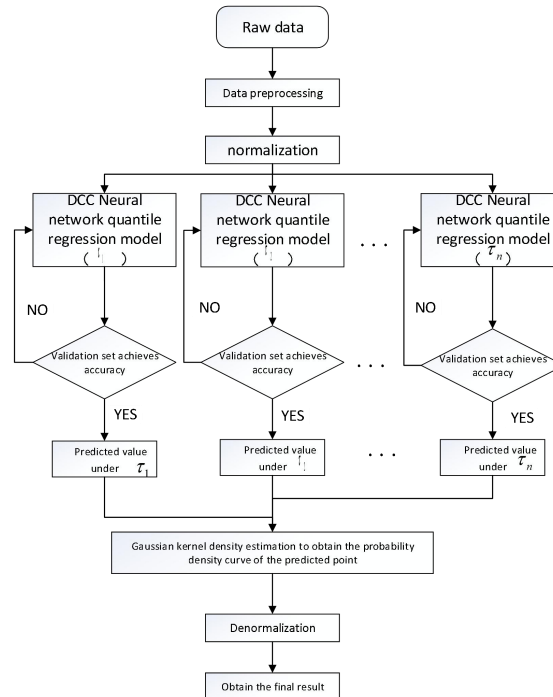


Figure 2 QRDCC program flowchart

4 EXPERIMENTAL SIMULATION AND CONCLUSION

Experimental environment:

CPU: Core i7-7700, Memory: 16GB, GPU: 1080Ti 11GB,

Experimental data: Charging load data of charging piles inside Huazi Charging Station in Changsha City (30 days),

Experimental platform: Keras

The experiment was tested from two aspects. Firstly, the channel for QRDCC charging load prediction under a certain range of built-in reliability was compared, with confidence values of 85% and 80%, respectively. The accuracy of QRDCC regression prediction mode was better than that of QRLSTM and QRNN modes. The prediction results of QRDCC mode were basically consistent with the original data, and the verification results are shown in Figure 3. Secondly, the first test was conducted to predict the probability density of the time point. The QRDCC model test results were generally consistent with the true values, while the QRLSTM test results were significantly higher than the test data values. The experimental results are shown in Figure 4.

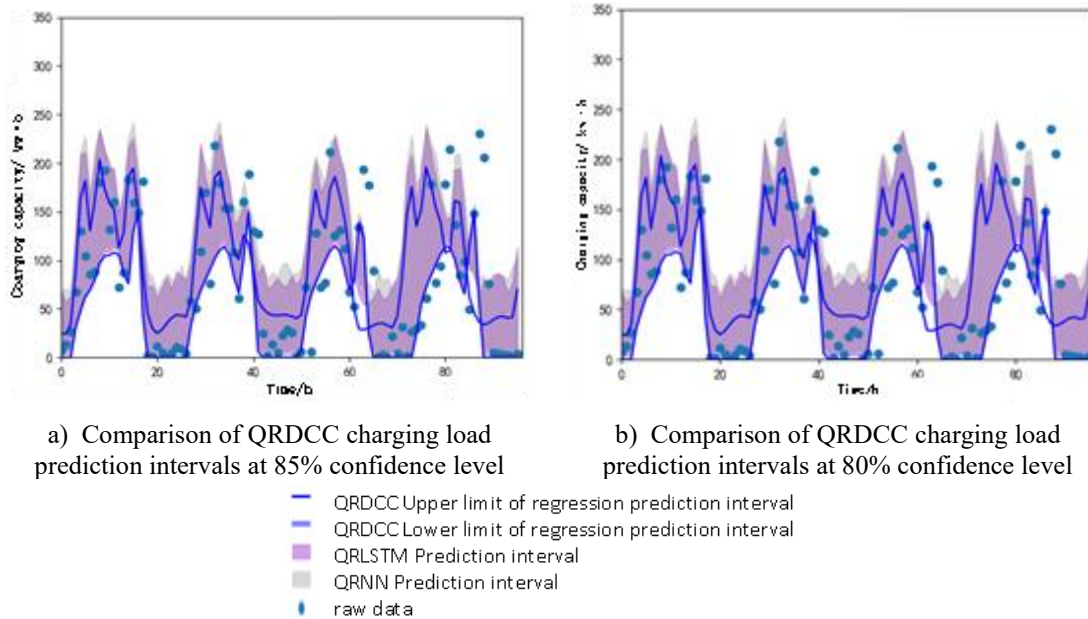


Figure 3 Probability prediction results of electric vehicle load

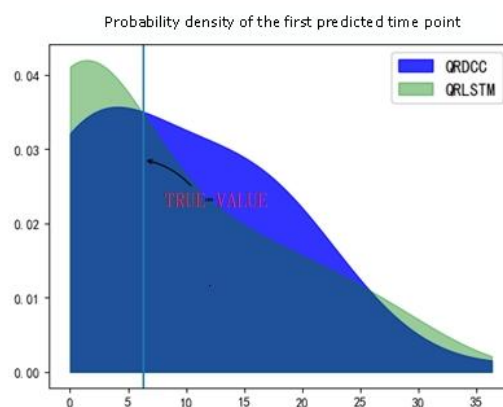


Figure 4 Probability density map of charging load prediction at the first time point

Based on the experimental analysis in Figures 3 and 4, it is evident that the model proposed in this paper outperforms traditional power load prediction models. This is because this model uses non parametric kernel density charging load interval probability prediction models - the air causal convolutional neural network quantile regression model and the LSTM neural network quantile regression model - to estimate the parameters of the air causal convolutional neural network under different quantile conditions, Then, the predicted values under different quantiles are obtained, and the

KDE method is used to predict the probability interval of charging load, which can effectively predict the fluctuation range of charging load within a certain range. According to the structure of the spatiotemporal causal convolutional neural network, it is known that it can learn long-term historical patterns well without significantly increasing parameters. Estimating the charging load prediction interval using Gaussian distribution kernel function resulted in better reliability and sensitivity compared to QRLSTM and QRNN.

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COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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CULTIVATION OF MODERN BUSINESS SPIRIT IN ART MANAGEMENT PROFESSIONAL EDUCATION

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Abstract: Commercial consumption is a basic link in art management, art planning, media communication, etc. The era of commodity economy has given rise to the development of commercial culture, and commercial culture needs the support of the business spirit in society. In the current period of socialist market economy, national policy guidance and the rapid development of modern enterprises have objectively prompted self-entrepreneurship to gradually become a common orientation for college students' future employment. This requires full attention to the inheritance, promotion and innovation of our country's business spirit, and the art management major It has the dual attributes of artistry and commerce. While emphasizing the improvement of humanistic spirit, it is also urgent to cultivate students' modern business spirit.

Keywords: Art management, Business, Spirituality, Cultural industry, Independent entrepreneurship

1 INTRODUCTION

Improving the country's cultural soft power has risen to the national strategic level, which requires the joint improvement of cultural and artistic innovation capabilities and industrial operation capabilities, and the formation of a healthy business ecosystem with the support of modern business spirit. The artistic and commercial nature of the art management major determines that while conducting arts and humanities education, it is necessary to cultivate students' business spirit to adapt to the future living environment. It is also necessary to implement the national cultural development strategy and implement the Ministry of Education's recommendations on promoting innovation in colleges and universities[1]. An important part of entrepreneurship education reform.

2 SELF-EMPLOYMENT HAS GRADUALLY BECOME THE MAINSTREAM EMPLOYMENT FOR STUDENTS MAJORING IN ART MANAGEMENT

At present, self-employment has gradually become the future employment orientation of students. On the one hand, the country's strategic adjustments encourage students to start their own businesses; on the other hand, the individual inherent attributes of artistic creativity and planning provide the basis for self-employment[2].

First, the country's structural adjustment provides opportunities for independent entrepreneurship. In 2014, the State Council issued the "Several Opinions of the State Council on Promoting the Integrated Development of Cultural Creativity and Design Services and Related Industries", which raised the promotion of the deep integration of cultural creativity and design services and other industries with the real economy to the level of national strategy, which requires The development of the cultural industry must not only improve artistic originality capabilities, but also enhance conversion capabilities with related industries[3]. It should be noted that in the process of growing marketization, the healthy development of modern enterprises is needed. The transformation of artistic creativity into related industries requires a large number of entrepreneurs and managers with modern business spirit to promote and practice it.

Then, in 2015, Premier Li Keqiang proposed the "mass entrepreneurship and innovation" concept at the 9th "Summer Davos Forum". As one of the "dual engines" of economic development, it mobilized individual entrepreneurship With the enthusiasm for innovation, small and micro enterprises and large enterprises jointly participate in market competition[4]. The rapid development of modern enterprises inevitably requires the support of a business spirit that encourages competition, respects the market, and promotes development in society. Currently, our country is undergoing a series of reforms of public institutions and promoting the process of legalization, which provides a guarantee for further promoting the healthy development of the market. Students will face a healthier market-oriented employment environment.

In 2015, Premier Li Keqiang proposed the formulation of an "Internet +" action plan at the third session of the 12th National People's Congress, which brought new opportunities for the development of the cultural industry. At present, the rapid rise of the Internet celebrity economy fully illustrates the transformation of the economic model, and from this we can see the feasibility, inevitability and necessity of independent entrepreneurship. Independent innovation and self-employment have gradually become employment trends, and the individual characteristics of artistic creativity have become the guarantee for self-employment capabilities[5]. For example, according to the 2016 China Internet Celebrity Ranking, Papi Jiang, the number one Internet celebrity, has been

confirmed to have received 12 million yuan in financing, and has a personal valuation of almost 300 million yuan. The short videos produced by individuals quickly became popular on the Internet and led to the intervention of the capital market. The rise of the Internet celebrity economy has also led to the transformation of related industries. For example, the generation of stars has changed from the traditional film and television + star-making model to the network incubation company model, presenting a new business model[6].

Second, relevant national policies have guided the trend of self-employment. First of all, the transformation of colleges and universities into application-oriented universities places more emphasis on entrepreneurship education, paving the way for independent entrepreneurship. The trend of developing applied and vocational education is to fully realize the goal of a well-off society and adapt to market needs. Prime Minister Li Keqiang once again emphasized the importance of vocational education at the symposium on promoting the modernization of vocational education held on December 2. Colleges and universities have gradually begun to pay attention to practical teaching and strengthen entrepreneurship education. To start a business, you must face the market, understand the market, and ultimately go to market, therefore, to start a business you need to have a business spirit. The state has adopted a series of supporting policies for independent entrepreneurship. In 2011, the Ministry of Finance and the State Administration of Taxation issued the "Notice on Tax Policies to Support and Promote Employment" to provide various preferential policies for graduates to start their own businesses. Lin Huiqing, Vice Minister of the Ministry of Education, talked about the support policies for college students' innovation and entrepreneurship during the two sessions[7]. First, the state has guaranteed loans for entrepreneurship. Second, special funds for college students' innovation and entrepreneurship have been established in many colleges and universities. Entrepreneurial students can apply to their schools; third, Some entrepreneurial projects can attract social capital support such as angel funds and venture capital through market financing. On November 30, Chen Baosheng, Secretary of the Party Leadership Group and Minister of the Ministry of Education, once again emphasized the need to promote independent entrepreneurship among college students at the 2017 National Online Video Conference on Employment and Entrepreneurship of General College Graduates. The innovation of independent entrepreneurship by Shenzhen universities has attracted much attention. In order to increase the participation of college graduates and other talents in innovation and entrepreneurship, the Shenzhen Municipal Human Resources and Security Bureau and the Municipal Finance Committee issued and implemented the "Notice on Expanding the Scope of Self-Employment Support Subsidy Objects and Raising the Subsidy Standards", which included ordinary universities and vocational schools in Shenzhen. , full-time technical college students who take leave of absence to start start-up companies are included in the category of self-employed entrepreneurs, and enjoy the city's current self-employment support subsidies.

This structural adjustment and the release of a series of policies, as well as the development of the market economy and the transformation of business models, will inevitably lead students to start their own businesses.

Third, the individuality of artistic innovation provides the possibility of independent entrepreneurship. Artistic innovation is based on the cultivation and exploration of personal creative ability, and this individuality becomes the basis for independent entrepreneurship. The diversification of market demand provides multiple possibilities for commercialization for the diversification of artistic innovation. Full marketization and individualization of artistic creativity are interdependent and mutually supportive. In this sense, every artistic hobby of students has the potential to develop into a career. The ultimate exit path of ancient my country's sage education of "teaching without distinction" is to learn and excel to become an official. In the future, teaching students in accordance with their aptitude is to cultivate students' interests and develop them into future careers. As students majoring in art management, they will face an increasingly active and diversified cultural and art market, and the path to self-employment will also become broader.

3 IN ORDER TO ADAPT TO THE DEVELOPMENT OF THE SOCIALIST MARKET ECONOMY, STUDENTS MAJORING IN ART MANAGEMENT NEED TO POSSESS MODERN BUSINESS SPIRIT

With the advancement of global economic integration, my country's market economic system is undergoing profound changes. While attaching importance to enhancing economic strength, improving cultural soft power has become an important part of the country's structural adjustment. Inheriting historical legacy in the field of culture and art The commercial spirit and making it modern have become the spiritual driving force for economic development in the field of culture and art.

In the Economic Manuscripts of 1857-1858, Marx divided social forms into pre-capitalist society based on the natural economy, modern society based on the market economy, and communist society based on the product economy. The market economy is the economic foundation of the second largest social form, and the business spirit is the product of the market economy. Max Weber proposed in "Protestant Ethic and the Spirit of Capitalism" that the commercial spirit promotes the development of capitalist economy. Hayek further pointed out the role of businessmen in economic and social development in "The Application of Knowledge in Society". He believed that, compared with general scientific knowledge, mastering the specific knowledge of the industry based on the local environment and special circumstances Knowledge is more conducive to making plans to promote

economic and social development, and experienced businessmen who are specifically engaged in business management are good at using and disseminating this knowledge.

Currently, our country is under the socialist market economic system, and cultivating modern business spirit is of great significance to adapt to the healthy development of the market economy. With the advancement of national economic reform, private enterprises have developed rapidly, which is of great significance in improving the socialist market economic system. It is particularly urgent to cultivate a modern business spirit that adapts to the modern economy. Jiang Ruxiang proposed, "In the next few decades, I think The historical mission of Chinese enterprises will be to enlighten business rationality, that is, to face up to the peasant mentality in each of us, to establish a business culture with independent personality in China, and to transform from farmers who are dependent on the political power and land into professional businessmen with independent personality. "In order to adapt to the development of future society, modern business spirit is needed to build a socialist market economy with Chinese characteristics and truly promote the construction of spiritual civilization in our country.

Business spirit is a dynamic concept. Cultivating modern business spirit is both a cultural inheritance and a need for cultural innovation. There is no standard definition of what business spirit is. Each era will give it new connotations based on the values and ethics of the time. Although Max Weber once concluded in his book "Confucianism and Taoism" that Confucianism in China is not conducive to the growth of business spirit, there is no shortage of business spirit in our country's history. As early as in the "Book of Changes Qian Gua", it was mentioned that "righteousness is the harmony of benefit". The understanding of righteousness and benefit in traditional Chinese culture constitutes the traditional Chinese business spirit. In particular, the late Qing Dynasty experienced the budding of capitalism and gave birth to Shanxi merchants, Huizhou merchants and other business groups. The overall characteristic is that they all have a Confucian spirit. This article is not dedicated to studying the pros and cons of Confucianism on the business spirit. However, in Chinese history There is a unique business spirit, which is formed based on the nation's own ethics and values. It is an important cultural heritage that needs to be passed on by us. In today's era of economic globalization, a modern business spirit is even more needed to support business culture, that is, a business spirit with Chinese characteristics. Hu Ping said in "On Business Spirit", "I believe that doing business for all people is the awakening of the Chinese nation" and "understanding the business spirit is very valuable to transform society and build the country." He also proposed that we should build a city with "Chinese characteristics". The socialist business spiritual education must be oriented to the future and adapt to the development of society. Today, with the rapid economic development, business plays a decisive role in the development of the socialist economy and the construction of spiritual civilization. We are surrounded by business culture, and the art management major is It is a new major established to meet the needs of the cultural and artistic market. Therefore, art management professional education urgently needs to cultivate and strengthen students' modern business spirit.

In vocational education, entrepreneurship is often mentioned. Entrepreneurship spirit refers to those pioneering thoughts, concepts, personality, will, style and quality in the subjective world of entrepreneurs. However, what needs to be noted is that only by understanding the market can we talk about entrepreneurship. In other words, entrepreneurship faces the market, so we must first understand the market. The market must follow the rules and have its own inherent business spirit. This requires having a business spirit corresponding to the market and starting an independent business based on one's own strengths. Konosuke Matsushita, known as the "God of Management", when talking about business concepts, believes that "the correct business philosophy is rooted in the correct outlook on life, society and the world. From here can the correct business philosophy arise. The correct life The outlook on society, society and the world must conform to the laws of social development and the laws of nature." It can be seen that the business spirit itself contains the pursuit of interests, and it also emphasizes business ethics. In the era of commodity economy, people are abstract existences, and the relationship between people is determined by the number of possessions, which gives rise to money worship. Currently, the bottomless behavior of network anchors is to attract fans and expand their popularity. , the practice of improving one's own economic value directly affects the healthy development of the network economy. Therefore, in the Internet age, cultivating business spirit has become more urgent.

4 THE PROFESSIONAL ATTRIBUTES OF ARTS MANAGEMENT DETERMINE THE NEED TO CULTIVATE STUDENTS' MODERN BUSINESS SPIRIT

The art management major has the dual attributes of artistic and commercial nature, which determines that while cultivating students' basic literacy in the art field and enhancing their humanistic spirit, it must also pay attention to the cultivation of commercial spirit.

Humanistic spirit is a kind of literacy, while business spirit focuses on the cultivation of survival ability. Humanistic care is the origin of business, which is also the root cause of the culture and art industry's ability to drive related industries, while business spirit is the driving force that makes this transformation work. Both are indispensable. However, it is obvious that there is little promotion of business spirit in current humanistic education. In fact, students' confusion and fear about the future are largely due to doubts about their own viability.

Due to the lack of understanding of the current social situation, and at the same time, to a certain extent, they lack the recognition of the business spirit in our country's history, which directly affects The understanding of current society makes it difficult to position oneself. Therefore, the cultivation of humanistic spirit and modern business spirit cannot be neglected.

The close integration of art and business requires students majoring in art management to possess a modern business spirit. The improvement of China's cultural soft power requires a large number of entrepreneurs and managers who create value. The development of the cultural industry is inseparable from the growth of art management. The art management major cultivates compound talents who understand art and the market. They must have basic artistic literacy and certain management capabilities. To train students as future entrepreneurs and managers, we must first understand the market and possess leadership and organizational skills, which requires the support of a modern business spirit. Only by cultivating the business spirit of the younger generation can we truly realize independent entrepreneurship, promote the formation of a healthy cultural market environment, and lay the foundation for jointly creating a good business culture and market environment in the future. This is an important foundation for realizing the country's goal of improving cultural soft power and an important support for promoting the construction of socialist spiritual civilization.

Business spirit is of great significance to revitalizing the art industry chain. On the one hand, it can promote the activity of artistic creation. For example, during the Renaissance, the commercial spirit played an important role in promoting artists to achieve the peak of artistic creation; my country's drama creation also penetrated into the commercial spirit earlier, such as the "Lu Family Class" in the Tang Dynasty "It is my country's first folk opera troupe. It is responsible for its own profits and losses and performs mobile performances based on the needs of the audience. Movies, TV and online games that rely on modern technology need to consider the audience's aesthetic taste and market effects from the beginning of their creation. Therefore, in a sense, the return and construction of the commercial spirit in art management activities is also the return of the audience's right to comment, and is a creation based on respect for the market; on the other hand, the revitalization of the cultural industry chain and the promotion of related industries The role must be realized through art management activities, during which cultural industry practitioners with commercial spirit must be realized.

In short, our country is a socialist market economy, but it has not built a corresponding business spirit. In the context of intensified international competition in the economy and the rapid development of modern enterprises, it is necessary to have the support of modern business spirit. As a kind of value concept and ethics, business spirit is an inevitable requirement for current business development and an important guarantee for the healthy development of the cultural and art industry. At the same time, under the pressure of the current employment situation, we need to change our thinking, re-understand the environment for employment and entrepreneurship, increase entrepreneurship education, train students as future entrepreneurs, and strengthen the cultivation of business spirit.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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AN INVESTIGATION INTO THE INFLUENCE OF MASS MEDIA ON THE PSYCHOLOGY AND BEHAVIOR OF TEENAGERS

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Abstract: In the Internet+ environment, mass media continues to have a significant impact on young people's values, worldview, and outlook on life. What impact will the mass media have on the psychology and behavior of young people? We conducted a survey on this through questionnaires and online surveys. After rigorous analysis of the methods and the data obtained, it can be concluded that without correct guidance, mass media will bring more negative effects. Therefore, this article mainly analyzes the impact of mass media on the behavior and psychology of young people. and hopes to lead young people to view mass media correctly and benefit from it.

Keywords: Mass media; Influence; Young People; Survey

1 INTRODUCTION

With the development of Internet+, a new social environment has been formed, and mass media serves as a very critical carrier[1]. It continuously provides a series of guiding social public values for the development and progress of the entire society, and then spreads a series of social public interests needed by the public in a wider social space. Therefore, the media environment is another very important social environmental factor after the economic environment, political environment, cultural environment and natural ecological environment. Among the various propositions for thinking about youth growth, the influence of contemporary media on youth has become very profound. At the same time, mass media is essentially a product of the commodity economy and cannot escape the control of market mechanisms. Managers often put their own interests first. The development of mass media will be more or less negatively affected, and the news it brings tends to be commercial[2]. The accuracy of information is greatly reduced, and the thoughts and behaviors of young people are vulgarized. The mass media loses its original intention and runs counter to the original concept of bringing beneficial influence to people[3].

2 ANALYSIS OF THE CURRENT SITUATION OF THE INFLUENCE OF MASS MEDIA ON TEENAGERS

2.1 Impact on Adolescents of Different Ages

Compared with adults, children have poor discernment and weak self-control, and are easily influenced by mass media. But children are more malleable and more sensitive to information. Teenagers in middle school and high school are more mature than children, but they still lack the ability to distinguish right from wrong. With the diversification of mass media, media information is mixed, and some vulgar and even wrong ideas are also spread throughout it. Young people can easily be misled into blind obedience and impulsive behavior[4]. For college students whose values are in the process of being formed, they have the characteristics of a group that is active in thinking and easy to accept new things, and they are full of curiosity about media culture. However, the information is diverse and complex, and the good and the bad are mixed. College students who are not deeply involved in the world cannot identify the truth, goodness and beauty in it in a timely and effective manner. Undoubtedly, the influence of popular culture on college students has two sides[5].

2.1.1 The influence of mass media on urban and rural teenagers

Through mass media, rural teenagers can learn more about urban culture, laying a good foundation for them to enter urban development. At present, the mass media is more willing to provide better information services to areas with prosperous economy and culture, and often ignores the information requirements of areas with general development. This leads to problems in rural and urban areas in terms of information dissemination speed, information content and number of public information platforms[6]. Certain differences. Urban teenagers obtain more information at a faster speed through mass media. However, rural teenagers have relatively narrow access to information and their information is lagging behind. Most rural teenagers often only understand the bustling and lively side of cities through the media due to differences in living areas; some superficial and false impressions can cause rural teenagers to have wrong perceptions and even lead them to establish wrong values and outlook on life. Therefore, mass media has a greater impact on rural teenagers[7].

2.1.2 Differences in the impact of different media on young people

Traditional media include: print media, broadcast media, television media, etc. Compared with new media, traditional media has less false information and has a certain degree of accuracy and professionalism. The information teenagers receive is more realistic and has positive meanings. As a new communication medium, the Internet is loved by teenagers because of its convenience and speed. However, there is a huge amount of information on the Internet, and they are faced with the problem of how to choose the information correctly[8]. There is a widespread lack of control over information on the Internet, such as a large amount of false information published by non-real-name website users. This false information will affect young people's views and judgments on things; it will make young people unwilling to think about problems and search for answers from the Internet, limiting their ability to imagination and logical thinking ability.

3 THE CORRECT ORIENTATION OF MASS MEDIA TO YOUNG PEOPLE

3.1 Mass Media has Become an Important Way for Young People to Cultivate and Develop their own Interests and Hobbies

3.1.1 In learning

Modern mass media can mobilize young people's eyes, ears, hands and brains to enhance learning. The audio-visual integrated communication media improves the learning efficiency of young people and achieves the best learning results. This is consistent with the lively and active character of teenagers. In the face of modern mass media, young people can choose the time, content and method of learning according to their own circumstances, further study the content they are interested in, and repeat the study of the content they do not understand. Freely control the learning progress and eliminate scruples and fears. Modern mass media will point out mistakes at any time, guide children to receive standardized training, and cultivate their ability to handle problems independently.

3.1.2 In the way of thinking

Modern media represented by the Internet+ have unique working principles and functions. Its use exercises the logical thinking ability of teenagers, forcing them to observe the information displayed by modern mass media from an overall perspective, and in a rigorous way Study and solve problems with a scientific attitude. On the other hand, the operating environment on the Internet is mostly English-based, which requires them to concentrate their efforts, comprehensively and meticulously observe and analyze the information changes reflected in modern mass media, and solve problems through different channels and methods. to the problem. This will go a long way in cultivating young people's spirit of continuous exploration and progress and overcoming difficulties.

3.1.3 Leisure and lifestyle

Modern mass media integrates watching, listening, and playing. Some complicated and difficult common sense of life can be vividly presented to young people through modern mass media; young people can enjoy various life services without leaving home, and the Internet also makes young people's lives more vivid. Communication has changed dramatically. For teenagers who are in a special period physically and mentally, making friends and chatting online is one of the main ways for them to relieve stress. Some experts pointed out that the design of the game integrates some advanced scientific and technological knowledge, and teenagers will be influenced by some subtle influences when playing games and learn some scientific knowledge. Therefore, teenagers must control a certain degree of online entertainment.

3.2 Education Departments use Mass Media to Improve the Quality of Education and Teaching

Diverse learning forms mobilize learners' enthusiasm and strengthen their initiative. However, the rapid increase in the amount of knowledge and the convenience and easy availability of information may also become hidden dangers in our education. The educated lack the ability to distinguish right from wrong and are easily confused by some unhealthy things. The easy availability of knowledge makes it easier for the educated to The students become tired of learning and do not want to make progress. The education department's response measures:

- (1) Change traditional educational ideas and absorb new educational concepts. Educators should innovate traditional education methods, express their own views and opinions, absorb successful experiences, and improve the quality of teaching.
- (2) Grasp the control of communication and be a good information agent. School education is the foundation of all education. The information sources of mass media are diversified. The education industry must do a good job in checking and have absolute control over communication in school education.
- (3) Make full use of changes in the mass media environment to provide us with conditions for developing new teaching models. We advocate research-based learning, so educational methods and models must have a good teaching situation.

4 CONCLUSION

With the further development of Internet+, the network system of mass media is not perfect enough to filter information. There are problems of varying degrees, and there are differences in the information obtained in different regions. Mass media come in various forms and have different effects on young people. They have two sides. Research needs to grasp the latest developments in real time, have a comprehensive and in-depth understanding, and explore effective ways to solve the impact of mass media on young people . Improve corresponding laws and regulations, and popularize and promote adaptation in daily life.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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EFFECT OF FAMILY-CENTERED HEALTH EDUCATION ON INDIVIDUALS DIAGNOSED WITH CORONARY HEART DISEASE

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Abstract: Objective To explore the impact of family-centered health education model on family functions and quality of life of patients with coronary heart disease in the community. Method Selection June 2017 - In April 2018, 80 patients with coronary heart disease in a community health service center in Tianjin were selected as the research subjects. They were divided into a control group and an observation group according to the random number table method, including 43 cases in the control group and 37 cases in the observation group. The control group was given a routine coronary heart disease health education model, while the observation group was also given a family-centered health education model for patients and their caregivers. The intervention time for both groups was 3 months. The family function and quality of life scores of the two groups of patients were compared. Results Before the intervention, the quality of family life was compared between the two groups, and the difference was not statistically significant ($P > 0.05$); after the intervention, all dimensions and total scores of family functions of the patients in the observation group were lower than those in the control group, and the difference was statistically significant ($P < 0.05$); the quality of life score of the observation group was (110.25 ± 32.04) points, and the score of the control group was (92.88 ± 23.39) points, the difference was statistically significant ($t = 12.32, P < 0.01$). Conclusion The family-centered health education model can effectively improve the quality of life of families of patients with coronary heart disease and is worthy of reference in community work.

Keywords: Family; Coronary heart disease; Family function; Quality of life

1 OBJECTS AND METHODS

Coronary atherosclerotic heart disease (coronary heart disease) is a disease with high incidence and high mortality, and it is also a common disease. Its occurrence, development and recovery process are all affected by psychological factors [1]. Coronary heart disease is a chronic disease with high prevalence and high cost. Due to the disease, patients' daily activities are restricted and the family's financial burden is increased. It also affects the quality of life of other family members of the patient. A sudden coronary heart disease has a physical and mental impact on patients and their families. The harm cannot be ignored. Health education is the top priority in the current diagnosis and treatment of coronary heart disease. Health education can help with issues related to the occurrence, self-rescue and treatment of coronary heart disease. However, traditional health education is passively accepted by patients and has limited effect on prognosis. The family-centered health education model treats the patient's family as a whole, emphasizes the importance of family education [2], and uses relevant theories to formulate a feasible health education intervention model. Using the intervention theory of the family as a whole, a "family support team" was established to improve the quality of life of families of patients with coronary heart disease through the family care support model and the education model of medical staff. The results are as follows.

1.1 Object

Select 2017 Year 6 Month - 2018 Year 4 80 patients with coronary heart disease in a community health service center in Tianjin each month were the subjects of the study. Inclusion criteria: Comply with WHO (1997) diagnosis, that is, meet any of the following conditions: (1) Typical angina symptoms, except aortic valve disease; (2) History of old myocardial infarction; (3) Diagnosed acute myocardial infarction history. Able to communicate; Permanent resident; Sign informed consent form. Exclusion criteria: Heart function class IV; patients with severe arrhythmia, neurological diseases and acute myocardial infarction; patients with other major systemic diseases and malignant tumors. Inclusion criteria for families of patients with coronary heart disease: (1) Relatives living together; (2) Caring about the physical and mental needs of patients; (3) Voluntary participation.

1.2 Method

1.2.1 Grouping method

The patients are coded according to a group of three adjacent random numbers in the random number table, and random cards are made and placed in opaque envelopes. During the intervention, the envelopes were opened, and the participants were divided into the control group and the observation group according to the odd and even numbers on the cards.

1.2.2 intervention methods

(1) The control group implemented routine community health education for patients. Including regular distribution of coronary heart disease health education manuals, voluntary health consultation at community health service centers; holding a monthly lecture on coronary atherosclerotic heart disease; every 1 to 2 Prepare 1 issue of health education electronic bulletin board every month. (2) The observation group consists of patients and their main family members, and a family education-centered approach is adopted in the form of education and follow-up. The measures are as follows: ① Systematic assessment: By chatting with the patient and his family members and observing the patient's living habits, systematically assess the psychological and physiological conditions of the patient and his family members, the family's basic situation and the importance they pay to understanding coronary heart disease, and find the entry point for health education to formulate individualized health care. Educational Programs. Establish a trusting doctor-patient relationship, listen to the medical needs of patients and their families, and provide timely and effective answers to improve their cooperation and compliance. ② Formulate health education goals and content: Based on the above assessment, discuss the patient's current problems with family members in detail, mobilize family strength to the greatest extent, provide physical and mental support to the patient, and encourage family members to jointly supervise the patient's living habits. Based on the actual understanding of patients and their families about coronary heart disease, a targeted health education goal, content and education method are formulated. At the same time, based on the comprehensive evaluation results, patients and their families are guided to improve the fine-tuning standards and choose the optimal health education plan. ③ Family follow-up: Communicate face-to-face with patients and their families to understand their understanding of the causes of coronary heart disease and self-treatment, provide guidance on precautions in daily life and correct medication use to achieve a consolidated effect, and retell health education knowledge in stages. Through retelling, patients can be identified Existing misunderstandings, blind spots and missing content should be corrected, improved and supplemented in a timely manner to achieve a consolidated effect. ④ Check-up and feedback: Check patients and their families every week on their implementation of healthy lifestyles such as medical compliance, healthy physical and mental status, and provide feedback based on the check-up results. ⑤ Psychological guidance: The occurrence of coronary heart disease is obviously related to the patient's emotion, psychology, personality model, etc. Therefore, psychological guidance to the patient is particularly important. In addition, the long course of coronary heart disease may require patients to take long-term medication, which will cause a heavy psychological burden and may easily cause irritability, anxiety, or even discontinue treatment on their own. Therefore, we are required to detect patients' psychological fluctuations in a timely manner, provide targeted psychological guidance, and encourage patients to improve compliance. The general intervention time is 3 months.

1.3 Tool Evaluation

1.3.1 Baseline Information Questionnaire

The research team developed content: gender, age, marital status, education level, family history, medical history, smoking history, drinking history, type of coronary heart disease, and the presence of other comorbidities (hypertension/diabetes, etc.).

1.3.2 Family function

Using Epstein The Family Function Assessment Scale (FAMILY Assessment Device, FAD) [3] compiled by , emotional involvement AI, behavioral control BC and total functional GF). Scale items range from 1 to 4 Point scoring system, the higher the score, the more unhealthy the family function of the respondent is. In this study, the Cronbach's coefficient (Cronbach's α) of this scale was 0.86. 1.3.3 quality of life SF-36 The scale [4] is a brief health questionnaire developed by the Boston Health Research Institute in the United States. It is currently the most widely used questionnaire in the world for measuring health-related quality of life. It can be used for both the general population and patients. It has good reliability and validity [5-6] and is the "gold standard" in quality of life research. This scale contains a total of 36 items, which can be divided into 8 dimensions. The 8 dimensions can be divided into two modules, namely the "Physical Health General Evaluation" module and the "Mental Health General Evaluation" module. The physical health general evaluation includes: physiological functions, physiological functions, physical pain and overall health 4 Dimensions, the overall mental health assessment includes: vitality, social functioning, emotional functioning and mental health, SF-36 The higher the score, the better the patient's quality of life.

1.4 Statistical Processing Data

Used SPSS 21.0 The software processes and analyzes the measurement data in $x \pm s$ is represented by t test, and the count data is represented by n Expressed using χ^2 Test, $P < 0.05$ means the difference is statistically significant.

2 RESULT

2.1 Comparison of Baseline Data between the Two Groups of Patients

Comparison of baseline data between the observation group and the control group is shown in Table 1.

Table 1 Comparison of baseline data between the observation group and the control group

Project	Control Group (n= 4 3)	Observation Group (n= 37)	χ^2/z Value	p Value
gender male	26	20	0.3 34	0.56 3
female	17	17		
nationality Han nationality	37	30	0.36 0	0.54 8
minority	6	7		
Education level Junior high school and below	20	18	0. 1 9 0	0.9 1 0
High school/ technical secondary school	17	13		
University and above	6	6		
Cardiac Function Class I	18	19	1.39 4	0.4 9 8
Level II	15	13		
Class III	10	5		
History of interventional therapy	8	10	0. 80 9	0.36 8
none	35	27		
Disease classification Myocardial ischemia	13	16	2. 1 4 6	0.34 2
angina pectoris	15	13		
myocardial infarction	15	8		
Course of disease < 5 years	11	12	1.0 82	0.5 82
5~ 10 years	27	19		
> 10 years	5	6		
family history have	12	10	0.0 0 8	0.9 30
none	31	27		
Smoking history have	15	19	2.2 0 7	0. 1 37
none	28	18		
Comorbidities have	13	11	0.0 1 6	0. 89 9
none	30	27		

2.2 Comparison of Baseline Data of Patients' Family Members between the Two Groups

There were 93 family members of patients in the two groups, including 46 in the control group. Person, age 20~ 73 years old, average (47.56±9.48) years old; of which 30 are spouses People, children 8 people, parents 2 People, other 6 People; education level: 3 people are primary school and below, 4 people are middle school Person, high school/technical secondary school 1 0 People, college degree and above 2 9 people. Observation Group 4 7 Person, age 18~ 7 3 years old, average (4 3.7 2 ± 10.33) years old; including 28 spouses and 12 children Person, parent 1 person, others 6 People; education level: 5 people are in primary school or below, 8 people are in middle school, 8 people are in high school/technical secondary school, and 26 people are in college or above. There was no statistically significant difference in the baseline data of the patients' family members between the two groups ($P>0.05$).

twenty three Comparison of family functions between two groups

FAD of patients in the control group before intervention Total score (78. 1 2 ± 5.4 1) points, observation group FAD Total score (7 2.33± 7.4 6) points, the difference is not statistically significant ($t= 1.0 7 5$, $P= 0. 1 6 7$). FAD in the observation group after 3 months of intervention The score was significantly lower than that of the control group, and the difference was statistically significant ($P< 0.05$), Table 2.

Table 2 Comparison of family functions (average score of item pool) between the observation group and the control group after intervention ($\bar{x}\pm s$, points)

Dimensions	Control Group (n= 4 3)	Observation Group (n= 37)	t Value
Problem solving PS	2.58± 0.6 2	1.82± 0.3 8a	3.6 6
Communication CM	2.35± 0.4 1	1.7 2 ± 0.35a	5.7 9
Role RL	2.53± 0.32	1.99± 0.2 8a	6.0 5
Emotional response AR	2.7 4 ± 0.4 4	1.86± 0.3 1 a	5.2 1
Emotionally involved AI	2.6 1± 0.2 2	1.75± 0.2 8b	4.10
Behavior ControlBC	2.45± 0.30	2. 1 7 ± 0.2 2 b	2. 1 4
Total function GF	2.37± 0.2 9	1.87± 0.19a	3.0 5
total score	2.52± 0. 1 3	1.9 4 ± 0. 1 5b	5.4 4

Note: compared with the control group, a $P<0.05$; compared with the control group, b $P<0.01$

2.3 Comparison of Quality of Life between Two Groups

Before intervention, the total score of quality of life (SF-36) of patients with coronary heart disease in the control group was (85.42 ± 28.77) points, the observation group patients had SF - 36 The total score is (87.22 ± 30.61) points, SF - 36 The difference in total scores was not statistically significant (t= 0.973, P= 0.315). Intervention 3 After one month, the scores of each dimension and the total score of the quality of life of the patients in the observation group were significantly higher than those of the control group, and the difference was statistically significant (P< 0.01), see Table 3.

Table 3 Comparison of quality of life scores between the observation group and the control group after intervention (x±s, points)

Dimensions	Control group (n= 43)	Observation group (n= 37)	t value
Physiological function PF	21.20 ± 7.12	24.52 ± 6.23a	2.17
physiological function RP	5.32 ± 2.08	7.44 ± 2.31a	4.33
Somatic pain BP	6.98 ± 2.33	8.31 ± 2.97a	1.96
General health statusGH	15.31 ± 5.63	20.89 ± 7.32a	8.94
Energy VT	13.10 ± 4.81	16.35 ± 5.10b	5.23
social function SF	7.11 ± 2.01	8.32 ± 3.73b	1.24
Emotional function RE	4.62 ± 1.33	7.52 ± 1.51b	3.05
Mental HealthMH	18.52 ± 10.64	23.74 ± 11.26a	4.32
total score	92.88 ± 23.39	110.25 ± 32.04b	12.32

Note: compared with the control group, aP<0.05; compared with the control group, bP<0.01

3 DISCUSS ARGUMENT

3.1 Family-Centered Health Education Model can Improve Coronary Heart Disease

Patient's family functioning The family-centered health education model was proposed by American scholars in the context of the transformation of the medical model to "bio-psycho-social" [7] This model requires medical staff to place patients in families and communities, and patients are part of the social environment. As the incidence of coronary heart disease increases, medical staff are required to focus on coronary heart disease Health education for patients after they return to their families, communities and society. The mode The intervention is carried out using individualized health education methods and is targeted at each patient. Key issues that exist, discussed with the patient and their primary carer and develop individualized health education measures. This will not only encourage medical staff to Establish a good relationship of mutual trust with patients and their families, and also provide patients with Creating a better physical environment and giving full play to the supervisory role of family members can improve Family functioning in patients with coronary heart disease. Studies have shown that for patients with coronary heart disease, After being given a family-centered health education model, the families of patients in the observation group The functional dimensions and total scores were higher than those of patients in the control group, and the differences were all There is statistical significance. Analysis of possible reasons: family-centered health The education model contributes to family harmony, utilizes family strength, and helps patients with coronary heart disease Provide psychological counseling to patients, which is beneficial to the physical and mental development of patients and is conducive to good health Develop good habits. Secondly, coronary heart disease has a familial genetic tendency. Members often share common living habits, and studies have confirmed that "family history" is a potential risk factor for coronary heart disease. Patients with coronary heart disease When providing health education, patients' families can also gain information about coronary heart disease. related knowledge and also played a positive role in the health of patients' families. These All help to improve the family functions of patients with coronary heart disease.

3.2 Family-Centered Health Education Model can Improve Coronary Heart Disease

patient quality of life Research shows that the quality of life of patients with coronary heart disease is of great value to their treatment and prognosis. Coronary heart disease is a common chronic disease that often relapses due to various triggers. Patients may have multiple attacks or be hospitalized. Coronary heart disease causes angina pectoris, restriction of physical activity, increased financial burden, and patients' concerns about prognosis. It not only reduces patients' physiological functions, but also causes a series of psychological problems, significantly reducing their quality of life and significantly lower than domestic norms. Perfect health education is of great significance in the management of diseases. Because patients with coronary heart disease in my country are more likely to use surrender or avoidance in their coping styles, patients can still control their negative emotions on their own. However, the ability to manage many bad habits and daily life management is relatively weak, including quitting smoking, limiting alcohol, eating healthily, and doing moderate exercise based on heart function. The reason may be that patients have the concept of "emphasis on treatment and neglect of prevention" in their consciousness, and are not sure about the effect of non-drug treatment. In

addition, the patients in this study were older. Elderly people have weakened energy, weak learning ability and adaptability. These directly hinder patients' enthusiasm and possibility to participate in daily life management. In response to these problems, we choose low-cost, effective treatment and rehabilitation programs for patients based on their interests and the premise of ensuring curative effect, and implement a family-centered health education model. We not only focus on solving the main problems of patients, but also provide care and support to patients. Caregivers explain knowledge about coronary heart disease prevention and treatment. Pay attention to the participation and management of family members, provide high-frequency teaching, and use family ties as the hub to help patients improve their vitality (VT), social function (SF), and role restriction (RE) due to emotional problems. The score was significantly higher than that of the control group, which suggests that the family-centered health education model for patients and their families (primary caregivers) is conducive to achieving better results in health education, enabling patients to have firm beliefs, helping patients reduce external risks, and ultimately improve Quality of life. According to this study, the family-centered health education model can significantly improve the family functions of patients with coronary heart disease in the community, help improve the quality of life of patients, and the application effect is significantly better than general conventional health education, and it is worthy of promotion and application in community work.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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BOOK REVIEW: RHETORIC AND COMPOSITION STUDIES

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Abstract: Essential rhetorical strategies help writers to enhance both the art of their language and the effectiveness of their communication in particular sociocultural contexts. In the Western world, Composition-Rhetoric has been considered as an independent discipline for decades, in which significant scholars exert tremendous influences upon this field. In China, however, few people clarify a clear definition of rhetoric, not to mention providing monographs that specifically contemplate the interconnections between rhetoric and writing. This is problematic, in that ignoring the humanistic factors and rhetorical strategies, which are rooted in thousands of years of tradition and behind the language, Chinese EFL learners make many mistakes in their writing, which perplexes native speakers and fail to achieve the intended communicative purpose. Fortunately, the monograph *Rhetoric and Composition Studies* edited by Donghong Liu and Keith Lloyd, fills the gap in this field in China. This article provides an evaluative review of this monograph, hoping to recommend it for Chinese EFL writing instructors and students, as well as researchers dedicated to composition studies.

Keywords: Rhetoric; Composition studies; Second language writing; EFL instruction; Audience awareness

1 INTRODUCTION

Rhetoric is universally perceived as the “parenting theory” of Western humanities[1], with a dramatically long history of over 2000 years from Aristotle’s era till today. Because of its indispensable role, rhetoric exerts great influences upon various realms in the world of liberal arts, such as political science, communications, journalism, and composition studies, etc. In particular, writing is inseparably interconnected with rhetoric. Through the long-term efforts of rhetoricians and writing researchers, Composition-Rhetoric has become an independent discipline, which utilizes rhetoric as a fundamental theory to conduct composition studies[2]. Studies have found that rhetorical knowledge assists student writers in situating themselves within intricate social, political, and cultural frameworks in their writing, constructing logical arguments with persuasive language, structuring these arguments in the most influential sequence, presenting them in a manner resonant with the intended audience, shaping the perceptions or beliefs of others, and ultimately directing actions to attain intended communicative purpose[3]. Therefore, preparing students with adequate knowledge of rhetoric and writing paves the path for generating well-rounded and responsible citizens with critical thinking and argumentative skills in society. However, although Composition-Rhetoric flourishes in Western countries led by America, and is widely known in academia, few scholars in China are acquainted with this very discipline as an independent one, and neither devote particular efforts to studying or developing it. One possible cause might be rooted in the Chinese traditional but narrow definition of rhetoric, which simplistically takes it as figures of speech used for amplifying the beauty of language[4]. This interpretation fails to delve into the social, cultural, and persuasive nature of rhetoric, so it is no wonder that Chinese researchers tend to ignore the interconnections between rhetoric and other fields. Another point is that English writing instruction and research in China put too much emphasis on basic language skills and mechanics, rather than cultivating students’ rhetorical and critical thinking capability through written representation. For these reasons, there exist approximately no courses or textbooks involving Composition-Rhetoric in Chinese college-level English majors for students and teachers to take advantage of. It appears that second language writing and rhetorical studies in China are sharply separated from each other. Consequently, English majors in China are frequently criticized for lack of critical thinking, creative awareness, and persuasive strategies in their academic writings[3]. Gratefully, an academic research-based textbook, *Rhetoric and Composition Studies* edited by professor Liu Donghong and Keith Lloyd, who are both significant scholars in rhetoric, second language writing, and cross-cultural studies, creatively and retrospectively fills the gap in China’s educational and research context[5]. This book makes an organic combination of core ideas in rhetoric with second language writing theories. Most importantly, it is the first academic monograph regarding Composition-Rhetoric in China, which provides academic resource support and constructive guidance for its intended audience, Chinese EFL instructors, researchers, and learners. Given the information above, this article justifies an evaluation on this monograph, which presents an outline summary in the first place, followed by an evaluation from two sides in detail. In the end, this article intends to reiterate the evaluative positions and provide final thoughts on this book.

2 OUTLINE SUMMARY OF THE BOOK

This book includes ten chapters, which are logically and thematically interrelated with each other. The first chapter defines the concept of “rhetoric” from a generally acknowledged perspective, and specifically introduces the branching term “Composition-Rhetoric”, together with the discrepancy between rhetoric in ancient and modern times. It then mentions a series of distinguished ideas in Western rhetoric, and finally articulates how rhetoric benefits human beings

in real circumstances, varying from everyday life to academic contexts[1]. Chapter 2 is chronologically organized, and briefly reviews the history of rhetoric from the classical age to the contemporary era, demonstrating the evolution of people's comprehension of rhetoric, transitioning from a deliberate strategy for persuasion and eloquence to an indispensable mode of communicative thinking and a humanistic attribute that permeates all facets of individuals' lives[5]. Chapter 3 is arranged by a similar token to the previous chapter, while it poses particular attention to the spectrum of Composition-Rhetoric, which highlights its origin, crisis, and basic theories, and then elaborates on its extension and application to process-oriented writing pedagogy[5]. Chapter 4 discusses style and figures of speech, which are defined as "persuasive or extraordinary uses or arrangements of language" by ancient rhetoricians[6], with a plethora of illustrative examples in both English and Chinese to demonstrate the precise application of each rhetorical device to the audience. In Chapter 5, Aristotle's intrinsic rhetorical appeals are underscored, consisting of *logos* (logical appeal), *pathos* (emotional appeal), and *ethos* (ethical appeal). As extraordinary rhetorical strategies in Aristotle's Classical Rhetoric, the three appeals are artistic and powerful methods by which a speaker or writer can enhance the effectiveness of his or her speech or writing contents to persuade the audience[5-6]. They are widely resorted to in all fields, including whereas not limited to public orations, debates, government reports, writing, and even advertising. This makes sense since to make a convincing and effective argument, rhetors (speakers or writers) rely on clear logic (*logos*). This aside, they must prove themselves credible (*ethos*) to the audience, and even attempt to affect the emotions (*pathos*) of the audience. Considering their crucial role in rhetoric, the authors dedicate an entire chapter to the introduction, and also add common logical fallacies by presenting definitions and instances in English and Chinese. Chapter 6 fixes on the structure of argumentation or persuasive writing, analyzing predominant theories in relation to discourse structure[5]. This chapter first gives relatively a detailed introduction to Toulmin's argumentation model, which is a complicated extension of Aristotle's syllogistic reasoning[6]. Toulmin model evolves from the initial version that is merely comprised of ground, warrant, as well as claim to a revised version containing six components, with backing, rebuttal, and qualified added in Toulmin's process of reasoning. Subsequently, the authors provide comments on its strengths and weaknesses, demonstrating an objective picture of this theory. This chapter also mentions Van Eemeren's argumentation structure, which divides arguments into five types, Rhetoric Structure Theory, which is famous for text span and rhetorical relation, along with other structures of persuasive discourse. Chapters 7-9 cover three branches of rhetoric, which are contrastive rhetoric, intercultural rhetoric, and comparative rhetoric. Respectively, contrastive rhetoric draws on the use of L1 rhetorical strategies to address problems in L2 writing; intercultural rhetoric uncovers the accommodative nature of rhetoric among different cultures in actual use; comparative rhetoric is characterized by its discussion of the commonalities between different figures of speech while acknowledging linguistic and cultural diversity. The final chapter, Chapter 10, returns to the discussion of writing research and teaching, and introduces three basic frameworks of writing teaching and research. They are text-oriented, to writer-orientated approach, and then to reader-oriented approach, which "focus on text, writers, and readers respectively"[5], naturally accentuating the progression of composition studies from the text level, to transforming attention to the author, and eventually to consider the audience. This order also implies the cognitive, communicative, and sociocultural functions of Composition-Rhetoric in essence.

3 EVALUATION

This book is an authoritative teaching and learning material for teachers, students, and researchers of second language writing in China thanks to its incomparable merits. Firstly, the language used in this book is audience-friendly, which in itself demonstrates sufficient audience awareness. This credit should be given to the appropriate language complexity and style that fit the cognitive development, knowledge, and comprehensive level of Chinese EFL learners. Thereby, the book's intended audience can read and grasp the contents fluidly, instead of impeded by abstruse word choice or sentence patterns. What's more, taking into account the social and cultural background of its audience, the selection of examples is also localized. Specifically, Chinese examples of literature, advertisement, and poems are widely provided for better understanding of Style (Chapter 4), Rhetorical Structure Theory (Chapter 6), and ideas in comparative rhetoric. These exemplifications can positively affect Chinese EFL learners to combine what they have in mind with rhetorical theories. Additionally, the whole book is coherently structured, which sets a wonderful example of good writing. Going through the arrangement, it is evident that chapters are thematically organized together, as is mentioned in the summary part of this article. To specify, the first two chapters give a macro picture of rhetoric and its history, and from Chapter 3 on, the authors dig into branches of composition-rhetoric, arranging the contents from general to specific. Also, looking at the arrangement of the content in each chapter in a micro way, it can be found that the content of each chapter also starts from an overview, and then goes to the description and interpretation of details. This organization pattern is very scientific and welcome, because it conforms to the deductive characteristics of English writing[5]. Most significantly, this book consciously cultivates its users' critical thinking and analytical capabilities. This purpose is achieved by designating ample questions and exercises that are relevant to what has been covered in each chapter, and by adding further readings ranging from extensions on the theories to empirical studies that implement the theories into practical research backgrounds. These reading and learning materials help the textbook users consolidate what they capture from the texts, and also potentially formulate academic literacy for their future research and teaching, and learning journey.

For all its undeniable advantages, admittedly, the book does not prevent itself from some issues. Take instance the five canons of rhetoric in classical rhetoric, including invention, disposition, style, memory, and delivery[5]. This part is

interpreted in detail in the fourth section “Great ideas in western rhetoric” of Chapter 1, Introduction. While in Chapter 2, History of Rhetoric, it is mentioned again briefly. This arrangement is slightly inappropriate. The reason is that the beginning chapter is more like a bird-eye’s view of the entire book, and therefore it is supposed to present a general overview of the book’s contents instead of detailed explanations. If any, the second chapter should spend more words on the five canons in rhetoric comprehensively. Therefore, this article believes that the arrangement here can be improved to reach a balance. Another limitation is that some of the connections and transitions between subsections can be expressed more naturally. A typical example occurs in Chapter 5. The authors introduce Aristotle’s three appeals of persuasion before enumerating logical fallacies. The problem is that before the explanation of this part, there is no natural and reasonable transition to lead the topic to the explanation of logical fallacies, which makes the lead-in here inadequate and slightly blunt. In addition, the previous three appeals are mentioned in the order of logos, pathos, and ethos. But obviously, logical fallacies occur whenever arguments do not prove a claim logically, which indicates that this section should be followed by logos (logical appeals), and therefore the order here should be adjusted to be logical. At the same time, it cannot be ignored that some small errors such as pronoun references should be edited to maintain language accuracy. However, these issues do not outweigh the merits of the book. As the first academic textbook on Composition-Rhetoric in China’s teaching context, its pioneering nature and its wonderful content are also worthy of careful reading by EFL learners, instructors, and scholars.

4 CONCLUSION

Generally speaking, the book *Rhetoric and Composition Studies* not only covers the key contents and insightful ideas of Composition-Rhetoric, but also puts into practice the rhetorical strategies, humanistic literacy, and communicative purposes of writing itself. This book possesses its theoretical value and simultaneously offers resources for Chinese EFL students’ writing, instructors’ professional training, as well as their teaching philosophy’s updating. This article also advocates that more monographs like this will spring up in the future, which can enrich the domestic academic resources of rhetoric in China, but also contribute to generating well-rounded foreign language talents with rhetorical and critical thinking abilities as well as high foreign language levels.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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A STUDY ON THE APPLICATION OF ROLE-PLAY TEACHING IN INTERMEDIATE ORAL CHINESE TEACHING

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Abstract: This paper analyzes the feasibility and practical significance of applying role-playing in teaching Chinese as a foreign language from the current situation of teaching Chinese as a foreign language at the intermediate level, focusing on the problem of inappropriate teacher input and learner output in the speaking classroom, and based on the theoretical study of role-playing, combined with the elements and principles of classroom activity design. In this paper, we have designed a role-playing classroom teaching practice, which effectively enhances teacher-student interaction, improves learners' classroom participation, and greatly increases students' output in the classroom, with a view to providing references for other Chinese teachers' oral teaching classroom design, as well as useful ideas or valuable discussions for the reform of oral Chinese language teaching.

Keywords: Role-playing; Intermediate Chinese language; Oral language teaching

1 INTRODUCTION

After the reform and opening up, with the gradual increase of China's discourse power in the international society and the rapid development of foreign economic and cultural exchanges, Chinese language learning has become a global trend, and the cause of teaching Chinese as a foreign language has been thriving, and the importance of theoretical research and practical exploration of teaching Chinese as a foreign language has become more and more prominent. The importance of theoretical research and practical exploration in teaching Chinese as a foreign language is becoming more and more prominent. Among them, more and more people have begun to pay attention to theoretical research and practical exploration in teaching Chinese as a foreign language because it is most directly related to international students' communicative competence. In the process of intermediate oral Chinese teaching, even though foreign students have a certain foundation of oral language, it is difficult to change the rules of language learning, and it is easy for them to encounter the "plateau" of learning, so how to "teach" is an important issue.

The author tries to introduce role-playing activities in intermediate oral Chinese teaching. By using a lot of materials such as Chinese movie clips, Chinese picture books, Chinese songs, etc., the author constructs a fictional language environment, groups international students into groups according to their different levels of speaking, and assigns them corresponding oral communication tasks. In the process, each international student has to perform different roles using the corresponding language knowledge and communication strategies. While completing the communication tasks, it not only increases the interaction and communication between teachers and students, but also experiences the communication patterns and cultures of different scenarios, which can better help the students to master the vocabulary, grammar, sentence patterns and other knowledge points, but also provides a lot of opportunities for international students to express themselves, which greatly mobilizes their interest in active learning.

2 REVIEW OF RELEVANT RESEARCH

Since the 1980s, Chinese as a Foreign Language (CFL) teaching has gradually become an independent subject, playing an important role in mobilizing foreign students' interest in learning Chinese and improving their oral communication skills. In recent years, many experts and scholars have explored the various aspects of oral language teaching and conducted in-depth researches with fruitful results. However, most of these results are focused on elementary and advanced oral language teaching, and not many of them are based on theoretical research to guide practical exploration, especially the theoretical aspect of intermediate oral language teaching is even weaker[1].

At present, the teaching of spoken Chinese at the intermediate level has made great progress, but there are still some problems that need to be solved urgently, such as: single teaching method, students' low motivation in learning spoken Chinese, and the teacher's excessive power of discourse in the classroom. Therefore, it is particularly important to introduce new teaching activities and redistribute classroom power in the spoken Chinese classroom.

Domestic research mainly introduces the theory and practice of role-playing activities in foreign language teaching, and discusses the teaching of role-playing activities in combination with communicative teaching method, while some propose the idea of using role-playing activities for teaching English or Chinese as a foreign language in China, but most of these researches are theoretical, and comprehensive and systematic researches as well as practical researches are less common. Therefore, there is still much room for research on role-playing activities in the practice of teaching Chinese as a foreign language, and it is of some value[2].

3 RESEARCH DESIGN

"S(Stimulate)-R(Representation)-T(Trait) is the theoretical basis of role-play teaching. Stimulation" mainly refers to the fact that the designer prepares specific scenarios (i.e., introduction of materials) and sets certain tasks (grouping, writing and performing scripts, etc.) according to the assessment purpose, and the participants play the corresponding roles according to the requirements and their own understanding [3]; "Representation" mainly refers to the fact that the participants play the corresponding roles during the role-playing process. Characterization" refers to the comprehensive performance of the subjects' interaction with the "assistants" during the role-playing process; "Traits" refers to the evaluator's evaluation based on the assessment elements of the role-playing (e.g., Chinese language proficiency, movement and expression, and emotion during the performance, etc.). "Trait" refers to the evaluator's assessment of the traits of the subjects based on the elements of the role-play (e.g., Chinese language proficiency, gestures, emotions, etc. during the performance, and linguistic errors during the performance). The process is mainly "grouping, selecting materials, and experiencing".

Role-play teaching creates a relaxed and favorable oral communication atmosphere for Chinese language learners in the Chinese as a Foreign Language classroom. In the role-play activities, students can develop their oral communication skills in an immersive manner, express what they want to express as accurately as possible, and communicate with each other and discuss with each other, which greatly improves the learners' communicative competence in Chinese.

Reality of the situation :In the speaking classroom, Chinese teachers use role-playing as a form of intercultural teaching. The main purpose of role-playing is to give each student an opportunity to participate in the speaking classroom and to experience and try to solve the typical communicative problems or dilemmas that they encounter in their lives. Because role-playing is meaningless if it is divorced from communicative reality, students can only be interested in oral learning if they understand it clearly. Authenticity of feelings :Teachers should role-play the dilemmas of culture clashes, as this is the most direct, simple and effective way to give the most realistic experience[4]. Clarity of instructions:To ensure the accuracy and consistency of the role-play, the role instructions need to contain the necessary constraints, e.g., "Please act as an elementary school teacher," "You are now an elementary school student"etc.Importance of clustering:Teachers should form groups in a targeted way, taking into account the learning foundation, motivation, age, personality and other factors of the international students, to ensure that there is complementarity among the members of the group, so that the tasks can be assigned to the right international students and the efficiency can be maximized.

In the teaching of spoken Chinese, teachers can introduce clips of Chinese movies and TV programs with suitable themes, appropriate roles, more dialogues, and contents matching the teaching objectives, so as to incorporate the knowledge they want the students to master into them and stimulate the international students' interest in using Chinese to express themselves. This will create a pleasant classroom atmosphere; In oral Chinese teaching, teachers can introduce the story contents of Chinese picture books, and then group students according to their learning bases and motivation to rehearse the Chinese picture book stories in different roles; In teaching spoken Chinese, teachers can introduce Chinese songs with easy-to-understand lyrics, rich in storytelling and pictures, and frequently used by students in their daily lives, so as to arouse the enthusiasm of international students in learning Chinese and to promote their memorization of Chinese. The process mainly includes group singing and song solitaire[5].

4 CONCLUSION

Compared with most teachers relying on multimedia courseware or adopting the traditional teaching mode, the introduction of role-playing activities has changed the traditional teaching mode of simple memorization and mechanical training, which is centered on the concept of "preview-listening-practice-review"[6]. It has changed the traditional teaching mode of simple memorization and mechanical training, and can give better play to the subjective initiative of foreign students, so that they can take the initiative to learn and lay a good foundation for Chinese language learning. At the same time, it solves to some extent the problem of inefficiency caused by individual differences (including learning foundation, motivation, age, personality, etc.) in the classroom.

Every student has the opportunity to participate in the speaking class, and give full play to their subjective initiative to stimulate their interest in learning spoken Chinese, so that the foreign students can effectively grasp the key sentence patterns of the lesson and increase the students' output in the classroom. To a certain extent, it promotes the change of the traditional mode of teaching spoken Chinese.

Since the author does not have rich teaching experience and has not studied and explored the theoretical knowledge of intermediate Chinese and role-playing deeply enough, the teaching program designed by the author is still not perfect and has many problems and deficiencies. This teaching research is only a guideline, and there is still a huge space for research and development of role-play teaching, which needs to be explored, researched and practiced. At the same time, the author hopes to make continuous improvement in the future teaching practice, so as to contribute to the research on second language teaching and better serve the teaching of Chinese as a foreign language.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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INTEGRATION OF BIM5D TECHNOLOGY INTO THE TEACHING REFORM AND INNOVATION OF "CONSTRUCTION ORGANIZATION AND MANAGEMENT" COURSE

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Abstract: Against the backdrop of intelligent construction technology, this paper analyzes the changing demands for professional talent cultivation due to industrial upgrading. It also summarizes the current state of the core course "Construction Organization and Management" in vocational colleges of architecture, including issues such as lack of supporting resources for the course, low integration of BIM technology, and shallow integration of industry and education. Therefore, it proposes major reforms and exploration paths for integrating BIM5D technology into the curriculum. These include using BIM innovation design competition projects to promote learning through competition, leading professional main courses with BIM5D practical training, and forming BIM student interest groups to carry out project-based practical services, aiming to enhance the effectiveness of course teaching and improve the quality of student practical training.

Keywords: Intelligent construction; BIM5D technology; Construction engineering; Construction organization management; Teaching reform

1 INTRODUCTION

With the development of computers and the internet, society has now entered an era of interconnected information. Consequently, new disciplines have emerged in the field of architecture and civil engineering. Modern intelligent construction technologies, based on intelligent development, are increasingly receiving close attention from scholars both domestically and internationally. The national housing and urban-rural development departments have also pointed out the need to vigorously promote intelligent buildings and popularize intelligent applications. The upgrading of industries will further increase the requirements for the cultivation of talents in architectural engineering specialties at vocational colleges. However, there is a widespread shortage of qualified teachers and a lack of practical teaching equipment and venues at most institutions, as well as a deficiency in research on practical teaching methods. Therefore, although BIM course teaching is gradually getting on track, it has not yet been integrated with courses like "Construction Organization Management" in actual teaching processes, which still poses certain developmental obstacles. It is necessary to initiate some curriculum teaching reforms and research, starting from actual engineering cases, to better integrate BIM5D technology into core professional courses, with the aim of enhancing teaching effectiveness and improving the quality of student practical training.

2 THE IMPORTANCE OF BIM5D TECHNOLOGY

Currently, China's construction industry is at a critical period of reform, transformation, and development, with digital technology driving the industry's transformation and upgrading. As early as 2017, the Ministry of Housing and Urban-Rural Development has called for accelerating the adoption of Building Information Modeling (BIM) technology, promoting intelligent and prefabricated construction, and increasing policy support. In September 2020, the Ministry also proposed advancing intelligent construction technologies and accelerating the deep integration of new industrialized construction with high-end manufacturing. In January 2022, the Ministry of Housing and Urban-Rural Development pointed out the need to accelerate the coordinated development of intelligent construction and new industrialized construction, promote the application of BIM technology throughout the entire process in general contracting projects, and emphasize the delivery and application of digital results throughout the entire construction process[1]. Therefore, the upgrade of the construction industry will further raise the requirements for the training of talents in architectural engineering majors at vocational colleges.

Intelligent construction fully utilizes intelligent technology and related technologies to establish and apply an intelligent system for the construction process, enhancing the level of intelligence in the construction process[2]. Compared to traditional extensive construction methods, intelligent construction has advantages such as higher product quality, higher construction efficiency, and less resource consumption. The application of information technologies such as BIM, big data, cloud computing, and the Internet of Things, along with new processes, materials, technologies, and methods, have accelerated the renewal and learning improvement of practitioners. This has also raised higher demands

for the quality of professional talent training in the construction field, necessitating the cultivation of more laborers who possess a spirit of model workers and craftsmen, and who are knowledgeable, skilled, and innovative—qualities that are increasingly needed in the civil construction field in the new era. BIM5D technology centers around the integrated platform of BIM models, integrating multiple specialties such as civil engineering, installation, and mechanical and electrical through a three-dimensional model data interface[3]. It integrates information on safety, quality, progress, processes, costs, materials, and equipment during the construction process onto a unified platform, providing real-time interactive information on schedule progress, resource consumption, quality, and safety management for project construction processes. It also allows for timely adjustments and corrections, achieving refined and real-time project management, and effectively advancing project progress.

In order for students in vocational colleges to truly and quickly take up practical positions after graduation, it is essential that professional skills training be a part of their on-campus practical teaching. However, currently in the field of education, various construction and civil engineering professionals lack background and experience in intelligent construction. Many institutions are facing a shortage of qualified teachers and a lack of practical teaching facilities and equipment. Due to limitations in training spaces and teaching resources, our school's "Construction Management" course has found that the effectiveness of practical training sessions is average at best, with students not showing significant improvement and often completing tasks in a perfunctory manner. It is necessary to integrate BIM5D technology into this course, based on actual engineering projects, to achieve educational reform and enhance the quality and effectiveness of teaching. Therefore, under the backdrop of intelligent construction, it is very important to integrate BIM5D technology into the curriculum reform and exploration of various professional courses in the field of building engineering.

3 ANALYSIS OF THE CURRENT STATE

The "Construction Organization and Management" course is a core subject offered by Zhejiang College of Security Technology for the major in Engineering Safety Assessment and Supervision. It serves as a follow-up to courses such as Building Construction and Drawing, Introduction to Engineering Supervision, and Laws and Regulations of Construction Projects. The course requires students to possess basic capabilities in construction organization and management. Its purpose is to align with the professional talent training objectives, targeting positions such as engineering supervisors, quality control managers, and construction organization technicians. It aims to cultivate students' abilities in construction enterprise management, engaging in the organization of construction projects, and other related practical engineering skills.

Additionally, the course establishes a knowledge, technical, and methodological framework necessary for managing the organization of construction projects, fostering students' fundamental abilities to identify, analyze, and solve practical issues in project organization management. However, in the actual teaching process, the content on standard engineering quality, progress, and safety is too theoretical and does not integrate with the current professional trends in intelligent construction and industrialization of building. Although BIM5D technology could be incorporated into the curriculum, it is currently not well integrated into the classroom [4]. Upon analysis, it is common for most institutions to face issues such as insufficient course resources, low integration of BIM5D technology, and a shallow level of industry-education collaboration.

3.1 Insufficient Supporting Resources for the Course

The main content of this course involves the research objects of construction organization, tasks, and project construction procedures, objectives of construction management, preparation for construction work, investigation and collection of original data, site preparation for construction, project structure, and basic knowledge of controlling construction objectives. Teaching can be carried out based on diversified teaching organization forms and principles of information technology. However, this course lacks practical engineering training sites, and real experience cannot be guaranteed. Based on the current major trend of intelligent construction, students will mainly use information management tools to engage in construction project management, project bidding and tendering management, project data management, and business management after employment. They also need to combine BIM5D technology for project cost consulting, project management consulting, target control, full-process project management, and maintenance. The practical training resources provided by the course cannot meet the actual job requirements of the industry in the future.

3.2 Low-Level Integrated BIM5D Technology

Currently, the traditional "Construction Organization and Management" course uses textbooks and teaching cases that have not effectively integrated BIM5D technology, and the degree of integration in some textbooks is also not high. In chapters such as progress management, quality management, and safety management, if a dynamic management model established using BIM5D technology is adopted, the theoretical explanations and practical training sessions of the course will be more efficient in ensuring that students can smoothly understand and master the material. Students can clearly understand that refined and comprehensive management methods can improve the efficiency and quality of project management. In response to the industry's requirements for practitioners to be proficient in "understanding drawings, knowing technology, and being skilled in management," schools should consider focusing on cultivating

students' BIM5D collaborative project management capabilities during the learning phase [5]. This also lays a solid foundation for students to obtain the "1+X" Building Information Modeling (BIM) vocational skill level certificate and prepares them for future work related to BIM positions.

At present, the "Construction Organization and Management" course covers content such as progress management, three-dimensional site layout modules, collision detection modules, contract information management, and construction organization design, with an emphasis on the explanation of theoretical knowledge. The results presented are also traditional paper-based textual materials, but these contents are basically covered in the BIM platform. However, during the "BIM 3D Modeling" teaching process, BIM5D technology does not import information according to different teaching needs, and more often only involves simple functional demonstrations. This results in the "Construction Organization and Management" and "BIM 3D Modeling" courses having intersections but remaining independent of each other. Therefore, the practical training segment of the "Construction Organization and Management" course has not established an intrinsic connection with BIM5D technology, resulting in a low degree of integration and generally average practical training effects. Reforms and improvements need to be carried out.

3.3 Low Integration Level of Production and Teaching

Vocational colleges have high requirements for training labs. If the focus is primarily on theoretical teaching, it does not truly harness the students' abilities to think and act practically. Due to limitations in school facilities during the practical training phase, adopting actual construction engineering projects as the task axis to carry out project-based case training throughout the classroom is a pedagogical design concept that encompasses the entire lifecycle of a project. However, this approach is nearly impossible for most institutions to implement. On one hand, student training lacks case reliance; on the other hand, there is a shortage of professionals who can proficiently master BIM5D technology. Additionally, many collaborations between colleges and enterprises are superficial, preventing students from effectively participating in the actual ongoing engineering projects of partner companies. Furthermore, improper curriculum design in professional talent training programs, irrational course sequencing, and a lack of specialized BIM faculty in higher education institutions are also significant factors affecting the effective integration of BIM5D technology into the industry-education collaboration [6]. Therefore, the current "Construction Management" course falls short in terms of the depth of its industry-education integration.

4 BIM5D TECHNOLOGY INTEGRATION AND IMPLEMENTATION STRATEGIES

4.1 Promote Learning through Competition

Our school has previously organized key teachers to lead teams in participating in the BIM Innovation Design Competition within this field, and has completed many case models, such as the F track of the Ninth National University BIM Graduate Design Innovation Competition: the BIM design of Building 7 of a certain shared property rights project in Beijing (as shown in the figure 1). This project integrates Guangsha building structure CAD software, REVIT, BIM-FILM, Glodon BIM construction site layout software, and conventional office software to complete the virtual practical operation of a certain prefabricated concrete building and steel structure building component factory production, procedural construction; individual structure design of Residential Building 7; assembly node and component split design for floors 3 to 14 (standard layers); detailed design of precast components; construction organization and simulation of the case project.

Based on this engineering case, students can have hands-on contact with the project, achieving the goal of promoting learning and teaching through competition. The abilities of students in basic knowledge mastery, BIM software operation, and teamwork are all improved through the assessment of the competition. Later on, our school used the competition topics as practical training teaching cases, closely integrating the teaching content of progress plan formulation, construction site layout, and construction scheme formulation from the "Construction Organization Management" practical training segment with it, achieving the migration of case application in the teaching process, truly reaching the goal of promoting learning through competition, and providing rich teaching resources for the practical training segment of the course.

4.2 Articulated Core Courses

Currently, teachers of various courses generally design teaching cases based on their own teaching experience. The teaching cases for each course are essentially independent, lacking a process of mutual integration and joint lesson preparation. However, the professional courses involved in "BIM 3D Modeling" are numerous, ranging from design, construction, target control, to project management. These professional knowledge areas are interconnected and progressively spiral. By selecting different cases, the BIM knowledge students acquire becomes fragmented and unsystematic [7]. Such a teaching method may be successful for a particular course, but it is not successful for the overall process of talent cultivation, nor does it reflect the progressiveness and coherence of BIM5D case teaching.

The core course "Construction Organization and Management," which incorporates BIM5D technology, actively promotes teaching reform. In the process of building the curriculum system for talent training programs, it can accumulate important data information for the practical training segment. Based on the above case background, in the courses of "Cost Software Application" and "Construction Engineering Quantity and Pricing," the BIM modeling, rebar

quantity calculation, and pricing of the project can be completed; in the teaching of construction technology courses, using the same residential building engineering case as an example, the division of flow sections and step distances can be completed, software can be used to compile the engineering progress plan, and double-coded time-scale network diagrams can be drawn; BIM construction site layout software can be used to establish three-dimensional models of the construction site layout at various stages of the project; in the "Engineering Economics" course, based on the division of construction sections and flow sections of the teaching building, material requirements are extracted according to different classification methods, combined with the schedule, to estimate the funding needs at each stage. That is to say, with BIM5D technology at the core, a series of core courses are connected, centered around a specific engineering case, to promote teaching reform in a series of professional core courses. This not only improves teaching effectiveness but also accumulates teaching materials for subsequent practical training courses in "Construction Organization and Management," realizing the integration of a series of core courses based on BIM5D practical training. Thus, a variety of blended teaching methods are realized, effectively enhancing the overall teaching effect and quality.



Figure 1 Schematic diagram of BIM design and BIM5D model for prefabricated buildings

4.3 Establishing Student Interest Groups

Organize the establishment of a BIM (Building Information Modeling) student interest group, integrating resources from off-campus partner enterprises to create a dual-teacher teaching team composed of full-time faculty from the school's engineering field and industry mentors from the intelligent construction sector[8]. Based on the BIM modeling needs of architectural engineering projects involved by enterprises, the enterprises "pose problems," and the interest group "solves them." With a foundation of certain basic knowledge and practical skills, the BIM student interest group can carry out project services under the guidance of instructors, with the results of these services being utilized for enterprise requirements. By conducting actual engineering project services through the established BIM student interest group, not only are the work needs of enterprises met, understanding the application value of BIM technology at various stages of project construction organization in current industry enterprises, but also important bases are provided for the teaching reform and research of related courses, the inspection of talent training links, and the optimization and enhancement of training programs.

5 CONCLUSIONS

At present, BIM technology has matured and is widely applied to the full lifecycle management of intelligent construction. By integrating BIM5D technology with the teaching content of the "Construction Organization and Management" course, we carry out curriculum teaching reforms and innovative explorations. This approach significantly enhances student participation in practical training classes to a certain extent, aiding students in better mastering the transfer and application of theoretical and practical knowledge, thus improving the effectiveness of course teaching and the quality of student practical training. The proposed solutions such as BIM design competitions, BIM practical training serial courses, and BIM student interest groups can further optimize the current teaching status of management courses, enhancing students' abilities to manage the full lifecycle informatization of project construction when they move towards their future work positions. Consequently, this significantly improves the effectiveness of practical training teaching and enhances the quality of talent cultivation.

COMPETING INTERESTS

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EXPLORATION OF ONLINE TEACHING MODE OF CHINESE AS A FOREIGN LANGUAGE

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Abstract: This paper takes the online teaching mode of Chinese as the research object, and through the comparative analysis of online and offline teaching modes of Chinese as a foreign language, it points out the problems and shortcomings of the online teaching mode of Chinese as a foreign language, and explains and analyzes the reasons for its emergence. Combined with the actual teaching in the comprehensive classroom, we will apply relevant theories and put forward solutions and countermeasures to explore how to reform and improve the teaching system of Chinese as a foreign language in the special context of the times, so as to adapt more to the development and needs of the times.

Keywords: Online teaching; Chinese language teaching model; Teaching Chinese as a foreign language

1 INTRODUCTION

With the improvement of China's comprehensive national strength, the global trend of Chinese language learning has started, and it will be an inevitable trend for Chinese to become a common language in the world in the future. With the outbreak of the COVID-19 epidemic, the mode of teaching Chinese as a foreign language has been reformed and changed accordingly, and has rapidly migrated to online classroom teaching in just a few years. The online mode of teaching Chinese as a foreign language has transcended the limitations of time and space, and has provided a broad platform for every Chinese language learner who loves Chinese language to learn Chinese at any time and any place, and has given Chinese as a foreign language teaching a brand-new direction of development in the period of the epidemic. It has also given Chinese as a Foreign Language teaching a new direction during the epidemic, greatly promoting the popularization of Chinese language teaching worldwide [1]. While the offline classroom can have a linguistic environment, the virtual space constructed by changing the mode of teaching from offline to online loses the actual application scenario of using the learned language, which is the biggest difference between online and offline classrooms, and this change also has a greater impact on the cultivation of students' comprehensive linguistic competence. Based on the current development of the online teaching mode of Chinese as a foreign language, this paper combines the relevant literature on online teaching of Chinese as a foreign language to initially explore the teaching design of the online classroom of Chinese as a foreign language, with a view to providing inspiration for the research on the practice of online teaching of Chinese as a foreign language.

2 REVIEW OF RELEVANT RESEARCH

With the improvement of China's comprehensive national strength, the global trend of Chinese language learning has started, and it will be an inevitable trend for Chinese to become a common language in the world in the future. With the outbreak of the COVID-19 epidemic, the mode of teaching Chinese as a foreign language has been reformed and changed accordingly, and has rapidly migrated to online classroom teaching in just a few years. The online mode of teaching Chinese as a foreign language has transcended the limitations of time and space, and has provided a broad platform for every Chinese language learner who loves Chinese language to learn Chinese at any time and any place, and has given Chinese as a foreign language teaching a brand-new direction of development in the period of the epidemic. It has also given Chinese as a Foreign Language teaching a new direction during the epidemic, greatly promoting the popularization of Chinese language teaching worldwide. While the offline classroom can have a linguistic environment, the virtual space constructed by changing the mode of teaching from offline to online loses the actual application scenario of using the learned language, which is the biggest difference between online and offline classrooms, and this change also has a greater impact on the cultivation of students' comprehensive linguistic competence. Based on the current development of the online teaching mode of Chinese as a foreign language, this paper combines the relevant literature on online teaching of Chinese as a foreign language to initially explore the teaching design of the online classroom of Chinese as a foreign language, with a view to providing inspiration for the research on the practice of online teaching of Chinese as a foreign language.

Through a comparative analysis of the Chinese as a Foreign Language (CFL) classroom teaching mode and the online teaching mode in the post-epidemic era, we will explain the development of the traditional CFL teaching mode in the special context of the post-epidemic era, and explore how the CFL teaching mode can be changed to better meet the needs of the times in the current context [2].

The study will explain the basic process and concepts of the online teaching mode of Chinese as a foreign language, improve the overall framework and system of the teaching mode, make suggestions on the online classroom teaching method, online classroom teaching assessment mode, and the reasonableness and scientificity of the online classroom teaching process, and apply the concepts to the actual classroom teaching through the classroom teaching design, so as to promote the improvement of the online classroom teaching system.

3 RESEARCH DESIGN

3.1 Live Teaching Mode

Live teaching is the most common teaching mode for online teaching of Chinese as a foreign language. Using Zoom and other platform software for classroom teaching, students and teachers can instantly interact with each other and ask questions and answers, while teachers can also grasp the learning dynamics of students in real time. Through the live teaching platform, teachers can connect students to the same online classroom, which has a strong sense of classroom space and ensures that students can feel a good learning atmosphere and learning experience.

3.2 Videotaped Teaching Models

On the basis of network and multimedia equipment, videos, lecture notes, PPTs and other courseware of the teacher's teaching process are relatively integrated and post-processed to make a complete recorded class and uploaded to the relevant platforms. Students can click on the link of the corresponding platform to study the online class at any time through cell phones or computers, which is convenient and fast. The videos of the recorded lessons are richer and more interesting than those of the live lessons, and the topics are novel, allowing students to realize a fragmented learning mode, which is more helpful to consolidate the Chinese knowledge acquired by students.

3.3 Live Teaching + Recorded Teaching Mode

This is an emerging online teaching mode. Teachers send their recorded lessons to students in advance, and before the class starts, students can do the corresponding pre-study through the recorded lessons to improve the learning efficiency in the classroom. Meanwhile, at the end of the class, students can watch the recorded lessons again and again to further consolidate the knowledge they have learned and supplement the corresponding extended knowledge. The emerging online teaching mode of live teaching + video teaching complements each other, avoiding the problems of fixed time and poor control of the classroom rhythm in live classes, and at the same time solving a series of drawbacks, such as poor interactivity and difficulty in ensuring the learning efficiency of students in video classes.

3.4 Main Features

Teaching through the Internet With the rapid development of network technology, "Internet Plus" is gradually becoming one of the themes of the times, especially in the special background of the new crown epidemic, the online teaching mode has been developed rapidly, and the mode is becoming more and more mature [3]. Nowadays, online teaching has become the only way of cross-border teaching, and its teaching mode is bound to form a complete system and get rapid development. Higher autonomy Students, as the main role in the online classroom, are in the leading and core position. The online teaching mode breaks the constraints and rigidity of the traditional classroom and gives students a free learning atmosphere, which indirectly improves their learning initiative and helps them to clarify their own learning goals and directions, choose courses they are interested in, and ultimately improve the efficiency of Chinese language learning.

4 CONCLUSION

With the development of information technology and the influence of the post epidemic era, online teaching of Chinese as a foreign language has become more and more common and normalized. The development of information technology has accelerated the pace of Chinese language to the world, which is both an opportunity and a challenge for online teaching of Chinese as a foreign language. Compared with offline classroom teaching, the biggest difference between online and offline classroom teaching is the change of the teaching place (from offline to online), which directly leads to the lack of real language communication atmosphere in the classroom, so whether the lack of language atmosphere in online teaching can be compensated for through reasonable classroom teaching design is one of the focuses of this thesis. Based on the learning motivation theory and distance education theory, this paper analyzes and explores the problems of online teaching mode, such as the lack of student participation, low classroom efficiency, and the lack of fairness in assessment, in order to provide a new research idea for the development of online teaching mode of Chinese as a foreign language [4].

This paper mainly discusses the current situation of the development of online teaching of Chinese as a foreign language, existing problems and how to better construct online classroom teaching, but due to the relationship between academic ability, energy and time, there are many shortcomings in the collection of materials, understanding of the

teaching target, reading the teaching content and more reasonable design of the teaching process, which will be further implemented in the future exploration.

Undoubtedly, there are still a lot of problems to be solved and improved in this study. Teachers need to try different teaching methods in the process of online teaching, give full play to the advantages of online teaching of Chinese as a foreign language, integrate the advantages of offline teaching of Chinese as a foreign language and apply them to online classroom teaching[5]; at the same time, it is necessary to reflect and summarize the process of teaching and learning to gradually improve the quality of classroom teaching and improve the teaching system; the research points of online teaching of Chinese as a foreign language are not only in the part of the design of teaching and learning, but also in the online platform of teaching and learning, online teaching method, online teaching content and so on, all of these issues are worth exploring.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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STUDY ON THE DEVELOPMENT OF INNOVATIVE AND ENTREPRENEURIAL BUSINESS TALENT TRAINING MODELS IN HIGHER EDUCATION INSTITUTIONS IN FRONTIER ETHNIC REGIONS

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Abstract: This paper addresses the current challenges in the business education of higher education institutions in frontier ethnic regions, such as limited educational resources, misalignment between talent training models and market demands, and an imperfect system of innovation and entrepreneurship education. Based on the "Four Integrations and Four Transcendences" theory, this study proposes an innovative model for cultivating business education talents that integrates industry and education, disciplines, cultures, and innovation and entrepreneurship. Specific implementation paths and safeguard mechanisms are also presented.

Keywords: Frontier ethnic regions; Business education in universities; Innovation and entrepreneurship education

1 INTRODUCTION

The frontier ethnic regions, due to their unique geographical positions, ethnic cultures, and economic development statuses, hold a significant place in national development strategies. With the advancement of China's "Belt and Road" initiative and the growing developmental needs of these ethnic regions, universities in these areas are tasked with a critical mission to cultivate business talents who possess international perspectives, innovative capabilities, and entrepreneurial spirits. Significance of the Research: Universities in the frontier ethnic regions play a crucial role in the economic development of these areas. By establishing the "Four Integrations and Four Transcendences" model for innovative and entrepreneurial business talent training, high-quality talents capable of adapting to and leading regional economic transformations can be effectively nurtured, injecting new vitality into the economic development of the frontier ethnic areas.

2 ANALYSIS OF THE CURRENT STATE OF BUSINESS EDUCATION IN UNIVERSITIES IN FRONTIER ETHNIC REGIONS

Business education in universities located in frontier ethnic regions is characterized by significant cultural diversity and unique economic development features. This diversity is not only reflected among the student body but also in the content and methods of instruction, providing a unique cultural perspective and resources for business education. The economic development status, industrial structure, and market demands of the frontier regions differ from those in the inland areas, which necessitates that business education pays more attention to the actual needs of local economic development, emphasizing the integration of industry features and regional characteristics, and cultivating students' international perspectives and cross-cultural communication skills. Due to relatively lagging economic development, there is a heightened need to focus on fostering students' innovative and entrepreneurial qualities to drive local economic growth. The main existing challenges in business education at frontier ethnic region universities include limited educational resources, a disconnect between talent training models and market demands, and an incomplete innovation and entrepreneurship education system [1].

2.1 Limitations in Educational Resources

Universities in frontier ethnic regions face challenges such as insufficient faculty strength, outdated infrastructure, and information blockages in business education.

It is difficult for these areas to attract and retain high-quality teaching and research personnel, which compromises the quality of education.

The internationalization level of the faculty and their practical experience are also relatively deficient, affecting students' global perspectives and practical abilities.

Compared to inland universities, those in the frontier regions invest less in teaching facilities, laboratories, and library resources, which impacts students' learning experiences and research capabilities.

Although the development of the internet has alleviated some issues with information asymmetry, there are still obstacles in accessing international business information and the latest business research findings, affecting the cutting-edge nature and timeliness of instructional content.

2.2 Disconnect Between Talent Training Models and Market Demands

The talent training models in business education at frontier ethnic region universities are out of sync with market demands, primarily reflected in rigid course settings, a lack of practical components, and difficulties in balancing local features with a global vision.

Some university courses struggle to meet the rapidly changing market demands, especially in emerging fields such as the digital economy and cross-cultural management.

Graduates often find it challenging to quickly adapt to the work environment due to insufficient operational abilities and problem-solving skills.

While there is an emphasis on cultivating talents with local characteristics, some universities fail to effectively integrate a global perspective, putting students at a disadvantage in global competition.

2.3 Imperfections in the Innovation and Entrepreneurship Education System

The system for innovation and entrepreneurship education in business schools of frontier ethnic regions is lacking, with insufficient entrepreneurial resources and lack of substantial support for students.

The innovation and entrepreneurship efforts often do not go beyond the business plan stage due to a lack of angel investment and inadequate information about industry trends and market needs.

The small scale of local enterprises, typically at the lower end of the industry chain, and the scarcity of cooperative resources between schools and businesses result in a limited variety of cooperative forms, which hinders effective integration of education and industry production.

3 "FOUR INTEGRATIONS AND FOUR TRANSCENDENCES" TALENT TRAINING MODEL OVERVIEW

3.1 Definition and Connotation of the "Four Integrations and Four Transcendences" Model

The "Four Integrations and Four Transcendences" talent training model is an innovative strategy for business education, designed to adapt to the new economic context and market demands. This model aims to create a high-quality, composite talent cultivation system through interdisciplinary integration of educational concepts and practices. It emphasizes the integration of industry and education, academic disciplines, cultures, and innovation and entrepreneurship ("Four Integrations"), combined organically with the transcendence of boundaries between schools and businesses, theory and practice, domestic and international contexts, and across different disciplinary areas ("Four Transcendences"), to cultivate business talents with a spirit of innovation and practical capabilities.

Industry and Education Integration refers to the deep integration of educational processes with industrial practices, through collaborations between schools and enterprises and internships, enabling students to learn and practice in real industrial environments, thereby better preparing them for future career demands.

Disciplinary Integration encourages the crossover of different academic disciplines, breaking down traditional barriers through interdisciplinary course design and project-based learning, to develop students' comprehensive qualities and their ability to solve complex problems.

Cultural Integration involves incorporating diverse cultural elements into talent training, enhancing students' cultural identity and cross-cultural communication skills.

Innovation and Entrepreneurship Integration means incorporating innovative thinking and entrepreneurship education into the talent training system, through innovation labs and entrepreneurship incubation platforms, to foster students' innovative ideas and entrepreneurial skills.

Transcendences include:

School-Business Transcendence: through school-business collaboration models, achieving a complementarity of educational and industrial resources.

Theory-Practice Transcendence: combining theoretical knowledge with practical application to enhance students' practical application skills.

Domestic-International Transcendence: incorporating international elements in talent training, such as international exchange programs, to cultivate talents with a global perspective.

Inter-Disciplinary Transcendence: promoting the exchange of knowledge and skills between different disciplines, to develop composite talents.

The implementation of the "Four Integrations and Four Transcendences" model aims to effectively utilize both educational and industrial resources, strengthen the integration of theory and practice, and enhance students' international vision and cross-cultural capabilities, ultimately achieving high-quality training of business talents to meet new societal and economic development needs.

3.2 Theoretical Foundation of the Four Integrations and Four Transcendences Model

The theoretical foundation of the Four Integrations and Four Transcendences model includes theories of industry-education integration and cross-boundary integration.

Industry-Education Integration Theory emphasizes the close connection between education and industry to meet the needs of social and economic development. It focuses on tailoring educational content and curriculum systems to the actual demands of industry growth, ensuring that the talents cultivated meet practical market needs. Educational

institutions and businesses collaborate in course development, internships, and skill certification, sharing resources and complementary advantages.

Cross-Boundary Integration Theory concentrates on the crossover and integration between different fields, industries, or disciplines to foster innovative thinking and the ability to solve complex problems. Key elements include multidisciplinary integration, industry crossover, cultural exchange, and technology synthesis. Encouraging permeation and integration among various disciplines, through interdisciplinary learning and research, cultivates students' comprehensive qualities and interdisciplinary problem-solving skills.

By adopting these integrated approaches, the model not only enhances the practical and innovative capabilities of students but also prepares them to effectively contribute to and lead in the global business environment.

4 CONSTRUCTION OF THE "FOUR INTEGRATIONS AND FOUR TRANSCENDENCES" MODEL IN BUSINESS EDUCATION AT UNIVERSITIES IN FRONTIER ETHNIC REGIONS

4.1 Industry and Education Integration Strategy

In the strategy for integrating industry and education, exploring school-enterprise cooperation models and establishing enterprise training bases are key aspects aimed at enhancing students' practical work skills and innovative capabilities to better meet future career demands [2]. Here are detailed implementation strategies for these two aspects:

4.1.1 Exploration of school-enterprise cooperation models

Universities and businesses collaborate in course development to ensure that teaching content aligns closely with actual work requirements, combining theoretical knowledge with practical skills [3].

Professionals from businesses are involved as part-time instructors, providing real industry case analyses which enhance students' practical experiences.

Encourage joint technical research and product development projects between universities and businesses to solve real problems, improving innovation and teamwork skills.

Jointly build innovation and entrepreneurship incubation platforms for students, providing guidance and technical support for entrepreneurship [4].

4.1.2 Establishment of practice teaching and enterprise training bases

Establish training bases according to industry standards and real business needs, equipped with professional equipment and resources to simulate real working environments for high-quality vocational skills training.

Use a workshop-based teaching model to simulate business operations processes, organizing students in groups to complete all stages from market research and product design to manufacturing and marketing [5].

Regularly organize skill competitions at the training bases to encourage active participation in practical learning and to showcase skill levels, while also providing a platform for businesses to discover talents.

4.2 Disciplinary Integration Strategy

The strategy for disciplinary integration aims to break down the barriers between traditional disciplines through interdisciplinary course design and project-based learning, fostering students' comprehensive abilities and innovative thinking. Here are the specific methods implemented:

4.2.1 Construction of interdisciplinary course systems

Integrate resources to design courses that cover both depth and breadth, with team members including teachers from various disciplinary backgrounds.

For instance, a "Data Analysis" course combining business and computer science not only teaches data processing techniques but also explores the application of data in business decision-making.

Encourage student participation in course design through surveys and forums to collect their interests and needs for interdisciplinary learning, enhancing the attractiveness and practicality of the courses [6].

4.2.2 Project-based and case study teaching applications

Introduce real business projects in cooperation with enterprises as case studies for teaching.

Students apply their knowledge in interdisciplinary teams to devise solutions for specific business projects, such as designing marketing strategies for local businesses, requiring not only marketing knowledge but also insights from data analysis, psychology, and other disciplines.

Regularly organize project showcases, inviting business representatives, teachers, and other students to review and provide feedback.

Enhance students' practical experience and establish connections between students and businesses, providing a platform for future employment and entrepreneurship.

After projects conclude, organize sessions for students to reflect and summarize their experiences, with teachers providing professional feedback.

Through the implementation of these strategies, students deeply appreciate the value of interdisciplinary knowledge in solving real-world problems, preparing them for future professional careers. These strategies not only equip students with the necessary skills and perspectives required for today's diverse and dynamic work environments but also foster a proactive and innovative approach towards business challenges.

4.3 Cultural Integration Strategy

In the business innovation and entrepreneurship talent training programs at universities in frontier ethnic regions, the cultural integration strategy plays a pivotal role [7]. This strategy not only helps to preserve and pass on ethnic cultures but also provides students with unique perspectives on entrepreneurship and opportunities for international collaboration. Here are detailed introductions to the two main aspects of this strategy:

4.3.1 Combining ethnic culture with entrepreneurial education

Offer specialized courses that explore how to transform ethnic cultural resources into entrepreneurial projects. Analyze the potential commercial value and entrepreneurial opportunities within various ethnic cultures, such as handicrafts, ethnic attire, and traditional cuisines.

Develop practical projects that encourage students to use ethnic cultures as the backdrop for creating specific entrepreneurial ventures. Students can conduct in-depth market research within ethnic communities to uncover entrepreneurial opportunities and then, with guidance from instructors, develop business plans and even attempt to launch their own startups.

4.3.2 Integrating international perspectives with local practices

Actively establish international exchange and cooperation projects, such as student exchanges and international seminars, allowing students to encounter diverse cultural backgrounds and broaden their global perspectives while introducing local culture to international peers.

Introduce bilingual teaching in certain courses, especially those involving international business and cross-cultural communication, to enhance students' foreign language skills and their understanding of international markets and cultural differences.

Through these specific implementation strategies, cultural integration not only promotes the preservation and transmission of ethnic cultures but also provides students with unique perspectives on entrepreneurship and practical opportunities, thereby enhancing their competitiveness on an international level.

4.4 Innovation and Entrepreneurship Integration Strategy

The innovation and entrepreneurship integration strategy is a crucial component of higher education, particularly in business education, aimed at igniting students' innovative spirits and entrepreneurial abilities, providing opportunities and support for practicing innovation and launching entrepreneurial projects. Here are the specific implementation strategies:

4.4.1 Optimization of the innovation and entrepreneurship curriculum system

Build a comprehensive curriculum system covering innovative thinking, market analysis, business models, and financial management. Encourage cooperation between different disciplines to foster interdisciplinary education in innovation and entrepreneurship. For example, business students could collaborate with peers in engineering, design, and other fields to enhance creativity and innovative thinking.

4.4.2 Incubation and support for student innovation and entrepreneurship projects

Establish on-campus entrepreneurship incubators or innovation and entrepreneurship centers to provide necessary office space, entrepreneurial guidance, legal advice, and other support services. These incubators could also host regular entrepreneurial talks, workshops, and competitions to provide platforms for showcasing and exchanging ideas on student entrepreneurial projects.

Create a one-on-one mentorship system, assigning experienced mentors to each entrepreneurial project to offer personalized guidance and support. Mentors could come from the business, investment, or academic sectors, whose practical experience and networking resources are crucial for the success of student projects.

Establish collaborations with external entrepreneurship platforms, investment institutions, and industry associations to provide broader resource access and market expansion opportunities for student projects.

Through the implementation of these innovation and entrepreneurship integration strategies, students' innovative and entrepreneurial capacities are effectively fostered, providing comprehensive support from idea generation to actual business creation, thus promoting the innovative development of business education in universities and enhancing students' entrepreneurial skills.

5 IMPLEMENTATION PATHWAYS AND ASSURANCE MECHANISMS

To realize the "Four Integrations and Four Transcendences" model for innovative and entrepreneurial business talent training, key pathways to success include reforms in the educational system and curriculum content, updates to the teaching staff and methodologies, and comprehensive enhancement of student capabilities and qualities [8].

5.1 Implementation Pathways

5.1.1 Educational system and curriculum content reforms

Design courses that are closely aligned with industry needs, incorporating new fields such as innovation and entrepreneurship, intercultural communication, and digital technology applications.

Offer interdisciplinary elective courses that encourage cross-disciplinary learning.

Increase the proportion of experiential learning, such as case studies, practical training projects, and corporate internships, to ensure students can apply theoretical knowledge to solving practical problems.

Continuously update course content with a rapid response mechanism to adapt to industry developments and technological advancements, ensuring the relevance and applicability of teaching materials.

5.1.2 Updating teaching staff and methods

Focus on enhancing teachers' abilities through regular training to elevate their professional level and modern teaching skills, especially in areas such as innovative entrepreneurship education and intercultural communication.

Incorporate industry experts and entrepreneurs into the curriculum as guest instructors to share the latest industry trends and practical experiences, providing role models and career guidance for students.

Innovate teaching methods by adopting project-based learning, flipped classrooms, and open online courses to increase interactive learning and efficiency.

5.1.3 Comprehensive enhancement of student abilities and qualities

Emphasize the development of innovative and entrepreneurial skills through courses, competitions, and incubation platforms that spark students' interest in entrepreneurship and cultivate innovative thinking and entrepreneurial abilities.

Strengthen intercultural communication skills using international exchange programs, foreign language studies, and intercultural workshops to enhance students' abilities to communicate across cultures and collaborate internationally.

Focus on cultivating students' soft skills, including ethical education, psychological health, and teamwork, to holistically improve their overall qualities.

5.2 Assurance Mechanisms

To ensure the effective implementation and continuous optimization of the "Four Integrations and Four Transcendences" business innovation and entrepreneurship talent training model, establishing a comprehensive set of assurance mechanisms is crucial. Here are the specific measures:

5.2.1 Policy support and financial security

National and local governments should provide clear policy documents that support educational innovation and entrepreneurship, including guidelines for educational reform and talent cultivation objectives, to provide a legal and policy basis for these initiatives.

Schools should develop specific support policies, such as incentives for teachers and entrepreneurial support for students, to define clear tasks and goals and create a conducive atmosphere for educational reforms.

Government departments should provide special funding for educational reforms and innovative and entrepreneurial education projects, including infrastructure construction, teaching reforms, and incubation activities. Schools must allocate educational investments wisely to ensure sufficient operational funds for innovative and entrepreneurial education projects.

5.2.2 Quality control and evaluation system

Establish evaluation metrics based on the goals of the "Four Integrations and Four Transcendences" model, including teaching content, methods, student satisfaction, and employment rates [9].

Conduct regular quality assessments and reviews of projects, involving experts from both within and outside the institution, to ensure the quality of teaching activities and innovative and entrepreneurial projects.

5.2.3 Continuous improvement and feedback mechanism

Establish feedback channels from students, teachers, and corporate partners to collect suggestions on course content, teaching methods, and project implementation.

Regularly hold discussions and communication meetings with teachers and businesses to directly gather feedback and understand issues in teaching and project execution.

Develop a rapid response mechanism for feedback, making timely adjustments to teaching content, methods, and project management based on collected insights. Specify detailed improvement plans and schedules with designated responsibilities to ensure effective execution of improvements.

By implementing these assurance mechanisms, the "Four Integrations and Four Transcendences" model can adapt to new societal and economic development needs, continuously improve educational quality and outcomes, and cultivate a higher caliber of business innovation and entrepreneurship talents.

6 CONCLUSION AND RECOMMENDATIONS

This study has thoroughly explored the strategies and pathways for implementing the "Four Integrations and Four Transcendences" model for innovative and entrepreneurial business talent training at universities in frontier ethnic regions. Through reforms in the educational system and curriculum content, updates to the teaching staff and methodologies, and comprehensive enhancement of student capabilities and qualities, this model effectively fosters students' innovation abilities and entrepreneurial spirits, enhancing their practical skills and international competitiveness. Additionally, suggestions for assurance measures such as policy support and financial backing, quality monitoring and evaluation systems, and continuous improvement and feedback mechanisms provide specific implementation plans and strategies for advancing innovation and entrepreneurship education in higher education institutions.

6.1 Policy Recommendations and Implementation Suggestions

Governments should introduce more supportive policies for innovation and entrepreneurship education in higher education institutions, including financial support and tax incentives, and encourage school-enterprise cooperation to foster the development of such educational programs. Universities should formulate specific implementation plans for the "Four Integrations and Four Transcendences" talent training model, clearly defining the goals, content, and measures of educational reforms, and establish a comprehensive system for monitoring and evaluating educational quality.

Strengthen faculty development by recruiting teachers with industry experience and enhancing their capabilities for innovative teaching. Increase support for student innovation and entrepreneurship projects by establishing incubators, providing guidance, financial investment, and market expansion support. Enhance students' international perspectives by initiating international exchange and cooperation projects, thereby improving their cross-cultural communication abilities and international competitiveness [10].

6.2 Future Research Prospects and Limitations

Future research could further explore the application of the "Four Integrations and Four Transcendences" model across different disciplines and specializations to assess its applicability and effectiveness in various educational contexts. Explore how digital technologies and online educational resources can be utilized to enhance the efficiency and reach of innovation and entrepreneurship education.

This study primarily focuses on theoretical analysis and strategic recommendations, lacking long-term tracking and evaluation of practical application effects. The research is based on the context of universities in frontier ethnic regions, which may not be entirely applicable to other educational and cultural backgrounds.

By implementing the "Four Integrations and Four Transcendences" model for business innovation and entrepreneurship talent training, universities in frontier ethnic regions are expected to cultivate more business elites with international visions, innovative spirits, and entrepreneurial skills, contributing to the socio-economic development of the region. Continuous research and practical exploration will provide significant theoretical and practical support for the innovative development of higher education.

COMPETING INTERESTS

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RESEARCH ON THE INTEGRATION OF CHINESE TRADITIONAL MARTIAL ARTS CULTURAL INTO TEACHING CHINESE AS A FOREIGN LANGUAGE

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Abstract: This paper will take the integration of traditional Chinese martial arts culture into Chinese language teaching as the research object. This paper takes the integration of traditional Chinese martial arts culture into Chinese language teaching as the object of research, uses the literature collection method to sort out and analyze domestic and international studies on the integration of traditional Chinese martial arts into Chinese language teaching, and explores the importance and feasibility of integrating traditional Chinese martial arts culture into Chinese language classroom teaching from the perspective of the world's understanding of traditional Chinese martial arts in the future with a view to broadening the ways of dissemination of traditional Chinese martial arts culture internationally and discussing the feasibility of integrating traditional Chinese martial arts culture into Chinese language classroom education in the future. In order to broaden the dissemination channels of Chinese traditional martial arts culture in the international arena, we explore the feasibility of integrating Chinese traditional martial arts culture into Chinese language classrooms for foreigners in the future.

Keywords: Chinese traditional martial arts culture; Classroom teaching design

1 INTRODUCTION

As China's international status continues to rise and cultural exchanges between China and foreign countries become more and more frequent, the excellent traditional culture of the Chinese nation has gradually gained the recognition and affection of international friends. In recent years, the learning of Chinese language in the world has been on the rise, and the number of Chinese language learners has been increasing year by year. International students from all over the world come to China to learn Chinese language with passion and dreams. With the increasing number of learners, the requirements for teaching Chinese as a foreign language have become higher, and how to better spread Chinese culture in the teaching of Chinese as a foreign language has become particularly important.

Chinese Wushu is a form of national culture stripped and highlighted from Chinese traditional culture, rooted in China's unique historical tradition and cultural and psychological soil, and it has its own unique content and national cultural characteristics in addition to general cultural characteristics [1]. On the one hand, it reflects the society, history, politics, culture, economy, religion, customs and psychology of the Chinese nation from different angles and sides; on the other hand, as a form of sports, it has great fitness value. On the other hand, as a form of sport, it has a great fitness value. It records the development history of the Chinese nation and reflects the specific contents of the development of the Chinese nation, and wushu is full of the wisdom of the Chinese people. In the struggle against nature and man, wushu has developed and progressed in the fields of philosophy, mechanics and medicine. Wushu is not a mere technique. Each school has its own history, founders, inheritors, and the way it has been passed down, all of which are part of a culture. Wushu is not just a simple movement, but the soul of a nation, the mind of a nation, the wisdom of a nation, the culture of a nation. Wushu is an oriental culture with the imprint of the oriental spirit, which can best reflect the spirit of the nation. "Teaching Chinese as a foreign language is a kind of cross-cultural teaching. Understanding and mastering the culture of the target language, and then forming the ability to adapt to the culture, is an important part of the communicative competence of the target language [2]. Therefore, introducing the knowledge of traditional Chinese martial arts to students can help them have a deeper understanding of China, a deeper understanding of Chinese culture, and then a deeper understanding and learning of Chinese language.

2 REVIEW OF RELEVANT RESEARCH

Booming development of Chinese as a foreign language education in China: In recent years, with foreign students studying Chinese in higher education institutions in China, Chinese as a foreign language education has begun to take shape and gradually developed into a new discipline in China's higher education, and has gradually become an important channel for the internationalization of higher education.

The rapid development of Confucius Institutes and Chinese language education classrooms abroad: Confucius is a typical representative of traditional Chinese culture and the founder of Confucianism, whose thoughts and theories have had a profound influence on future generations in the past 2000 years. In 2004, the Hanban of China established the first

Confucius Institute in Seoul, South Korea. Up to now, there are 465 Confucius Institutes and 713 Confucius Classrooms in 123 countries and regions around the world, and the number of students has exceeded one million [3]. In the past ten years, China has sent more than 50,000 teachers and volunteers to assist countries in Chinese language education, and the number of learners of the Chinese language has increased from ten years ago to more than ten years ago, thanks to the impetus of the Confucius Institutes. Under the impetus of the Confucius Institutes, the number of Chinese language learners has rapidly increased from more than 30 million ten years ago to more than 100 million now.

Many scholars at home and abroad have conducted some research on Chinese traditional martial arts: by 2019, a search of the Primo Centre Academic Resources Index (PRI) using "Martial Art" as the keyword yielded 135481 records; a search of the Primo Centre Academic Resources Index (PRI) using "Wushu" as the keyword yielded 23697 records. By 2019, a search of the Primo Centre Scholarly Resources Index for the keyword "Martial Art" yielded 135,481 records; a search of the Primo Centre Scholarly Resources Index for the keyword "Wushu" yielded 23,697 records. Searching "Media Compendex" with "Martial Art" as the keyword, we got 32404 records; searching "Media Compendex" with "Wushu" as the keyword, we got 32404 records; searching "Media Compendex" with "Wushu" as the keyword, we got 32404 records. The keyword "Wushu" is searched in the library of "Media Reports", and 1013 records are obtained. A search of the "Media Research Knowledge" database yielded 11,620 records.² The number of views of the #Kungfu topic on TikTok has reached 37.2 billion [4].

3 RESEARCH DESIGN

3.1 Linguistic Dismantling to Analyze the Spirit of Martial Arts

A large number of Chinese characters that contain information about martial arts culture are a very good carrier for teaching martial arts culture. In the course of teaching, teachers can analyze the characters that contain such information, or select some representative examples of characters, organize and collect them, and then analyze and interpret the information and culture and the spirit of wushu contained in their characters in the classroom.

3.2 INCORPORATING Culture Related to Martial Arts in Teaching and Learning

In any culture, its formation and development do not come from nothing, but are deeply rooted in the soil in which it is located, and are inextricably linked to events and people in its historical development. Traditional Chinese martial arts culture is distinctly humanistic, with a certain regularity in geography and a discursive and logical connection with geographical and historical factors. "As the connotation of the geographic factor complex changes, it will lead to differences in the geographic characteristics of martial arts culture between or within countries, regions, and tribes, and as a result, the martial arts cultural system will eventually be formed." [5] In the teaching of Chinese as a foreign language, the geography of martial arts has been introduced in detail in the form of pictures and video clips.

3.3 Incorporate Idiomatic References Related to Martial Arts in Your Instruction

Idioms and allusions are usually associated with historical events, characters and stories, which contain a great deal of cultural knowledge. They are the essence of the Chinese language, and their expressions are simple but vivid, often expressing complex and difficult meanings in simple language, so they are welcomed by many people and are widely used. Therefore, how to perfectly integrate them in teaching becomes a very important step. In the classroom, idioms can be taught by explaining their origins and stories, analyzing their meanings, and teaching the words and culture together. By teaching these idioms, foreign students can have a better understanding of the Chinese language, improve their intercultural communication skills, and enhance their overall knowledge and understanding of traditional Chinese culture [6].

3.4 Incorporating Martial Arts-Related Films and Videos into Your Teaching

Watching Chinese movies and films is also a very good way to learn Chinese, just as we learn English. By watching English movies and films, we can not only exercise our listening skills, but also learn about Chinese culture, environment and customs through movies and films. Teachers should increase the explanation of the cultural connotation of martial arts, so that students can have a deeper understanding of martial arts and better comprehend its essence. For example, martial arts movies not only have magnificent moves, but also the characters in them embody a kind of spirit advocated by Chinese people, such as chivalry and patriotism, etc. These movies are very attractive in themselves. These movies and films are very attractive in themselves, and they have both propaganda and educational significance. Through the subtitles, sounds and scenes, the students can experience the use of Chinese language and the charm of Chinese culture from different angles.

4 CONCLUSION

4.1 Development of Updated Relevant Teaching Materials

Chinese traditional culture, such as martial arts, traditional Chinese medicine and food, attracts many foreigners with its own charm. Therefore, it would be a good idea to apply the results of research on traditional culture directly to the study of Chinese. Writing about martial arts and gastronomy is particularly suitable for organizing materials for teaching because the choice of materials is free (in comparison, Chinese medicine is much more difficult). Against the background of informationization and networking, and with the help of advanced media technology and means, traditional culture-driven teaching can be used to strengthen the learning of international Chinese language learners in a supportive, interested and relaxed manner [7]. To achieve this effect, the teaching content must be reasonably designed. Upon completion of the materials, learners need to be able to master a traditional technique, hundreds of words, and have some understanding of certain areas of specialized cultural knowledge and cross-cultural differences. The materials are designed to be concise and as accessible as possible to the reader.

4.2 Appropriate Integration of Martial arts and Cultural Thematic Lessons

Chinese characters are only a kind of superficial knowledge. First, we should know some simple characters and understand their meanings, and then we should remember their meanings according to their shapes, so as to understand how the Chinese people created the characters; when teaching the meaning of Chinese language, we should combine it with the corresponding cultural knowledge, which can not only enhance the interest of the teaching, but also stimulate the learning of the students with the help of students' respect for the idol[8]. This can not only enhance the interest of teaching, but also stimulate the students' learning through their reverence for the idol, and make them interested in learning, so that they can know the traditional Chinese martial arts culture in depth, understand the traditional Chinese culture, understand the Chinese martial arts from the perspective of choreography, understand the Chinese etiquette from the perspective of choreography, understand Chinese health from the perspective of choreography, and understand the way of Chinese medicine from the perspective of sports, as well as combining the theory and practice, and doing what we say at the same time, which will make students understand Chinese language and Chinese culture better. students to better understand Chinese language and culture [9].

4.3 Strengthen and Expand the Faculty

To develop the professionalism of teachers, classes can be held to train and improve the abilities of existing teachers to better master the relevant knowledge. Teachers specializing in martial arts can also be encouraged to teach abroad.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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ENHANCING WRITING ABILITIES IN CHINESE ELEMENTARY STUDENTS: AN ANALYSIS OF THE APPLICATION OF THE FOUR SQUARE WRITING METHOD

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Abstract: As globalization of education and rapid technological advancement continue, finding effective teaching methods for writing has become a crucial task for educators. This paper explores the potential application and practical benefits of the Four Square Writing Method within the Chinese elementary educational environment. Through literature review and theoretical analysis, this paper comprehensively introduces the pedagogical principles and implementation steps of the Four Square method, and deeply discusses its effectiveness in enhancing students' writing skills, organizational abilities, and creative thinking. The study shows that the structured framework of the Four Square method can significantly improve students' logical writing structure, content coherence, and language expression capabilities. Additionally, the method also helps to boost students' motivation and confidence in writing, fostering a positive attitude towards writing. This paper also discusses the adaptability of this method in different educational contexts and potential challenges, providing directions for future teaching practices and research.

Keywords: Four Square Writing Method; Elementary Education; Writing Teaching; Chinese Education System; Creative Thinking; Student Engagement

1 INTRODUCTION

In the current global educational environment, writing skills are widely regarded as one of the key abilities for students' academic success, particularly at the elementary level where it is crucial for their language development and subsequent academic pursuits [1]. However, numerous studies indicate that many elementary students face challenges with organizing thoughts, expressing ideas clearly, and thinking creatively when writing [2]. To address these challenges, educators and researchers continually explore more effective writing teaching strategies.

The Four Square Writing Method, as a widely recognized writing teaching method, uses a simple visual framework to help students organize and plan their writing. This method is particularly suitable for elementary students as it systematically guides them through the stages from conception to completion of writing. Through the Four Square framework, students can clearly see the structure of an article, understand the function of each part, and thus enhance the organization and logic of their writing [3, 4].

This paper aims to explore the potential application and benefits of the Four Square method in Chinese elementary school writing instruction. Given the background of the Chinese education system, which traditionally emphasizes exam-oriented education and rote learning, introducing the Four Square framework could not only help students improve their writing skills but also promote their creative thinking and self-learning abilities [5]. Through a literature review and theoretical analysis, this paper will delve into the pedagogical principles, implementation steps, and the adaptability and potential challenges of the Four Square framework in the Chinese educational environment.

2 LITERATURE REVIEW

2.1 Traditional Writing Teaching Methods and Challenges

In traditional education systems, writing instruction often focuses on the training of basic skills such as grammar, spelling, and syntax. In China, especially at the elementary level, teachers tend to adopt a lecture and practice mode, emphasizing error correction and adherence to formal structures, often overlooking the creative and expressive aspects of writing [6]. While this approach has been somewhat effective in helping students master the norms of written language, it also has significant limitations, particularly in fostering students' independent thinking and innovative expression capabilities.

Moreover, traditional methods of writing instruction often overlook the dynamic nature of writing. Writing is not merely a static output process but a complex activity involving multiple cognitive and creative steps. Effective writing instruction should include stages such as planning, drafting, revising, and editing, which are often neglected in many traditional teaching practices [7]. For example, students are frequently asked to write without sufficient prior thinking and planning, leading to compositions that are disorganized, lack logical coherence, and are not persuasive.

The educational environment in China further exacerbates this issue. The pressure of exam-oriented education leads teachers and students to focus more on examination scores rather than the learning process, making writing instruction more about test preparation than an educational activity that enhances language expression and thinking skills [8]. This

results-oriented approach limits students' exploration of different writing styles and self-expression, thereby stifling their creativity.

Thus, facing these circumstances, educators and researchers are calling for new methods of writing instruction that not only enhance students' language skills but also ignite their creative potential, allowing them to better express their thoughts and emotions in writing. Among these, the Four Square Writing Method, due to its unique visual framework and structured teaching steps, is considered a potentially effective alternative educational strategy, especially in environments that need to improve students' organizational and creative writing skills [9].

2.2 Principles and Applications of the Four Square Writing Method

The Four Square Writing Method, developed by Judy Gould and Evan Jay Gould, was initially designed to simplify the writing process through a visual framework that helps students better organize and articulate their thoughts [3]. The core of this method is a larger square divided into four smaller squares, which assists students in planning and organizing the structure of their writing before they begin.

In the Four Square framework, the central square is typically used to note the main theme or thesis of the essay. The surrounding squares are filled with three main points or details that support the theme, and a concluding paragraph, respectively. The advantage of this method is that it provides students with an intuitive writing template, enabling them to build a logical framework before writing, thereby enhancing the organization and coherence of their compositions.

In practice, the Four Square method is not limited to helping students organize traditional essays. Its flexibility allows teachers to adapt the framework for different writing tasks, such as narratives, explanations, or application letters. This method is particularly suitable for elementary students as it reduces the complexity of writing, allowing them to focus on developing content rather than being overwhelmed by the structure [10].

Studies show that students who use the Four Square Writing Method perform better in writing tasks, demonstrating higher organization and richer content. For instance, in a study involving multiple classes, students using the Four Square method significantly outperformed those who were taught with traditional writing teaching methods. They were able to use facts and details more effectively to support their arguments, resulting in more tightly structured and logically clear articles [11].

Furthermore, the Four Square method has also been found to increase students' writing confidence and enthusiasm. Through this structured framework, students experience less fear and frustration with writing tasks, are more willing to engage in writing, and continually improve in practice [12]. The interactivity and visual nature of this method make it a powerful tool for teachers when teaching writing skills, especially for students who struggle with writing or are reluctant to write.

The widespread adoption and application of the Four Square method showcase an innovative way of teaching writing that, by simplifying structural barriers in writing, stimulates students' interest and creative potential. With the advancement of educational technology, the application of this method is also expanding, including the integration of digital learning tools and online educational platforms, further enhancing its teaching effectiveness and universality (Figure 1).

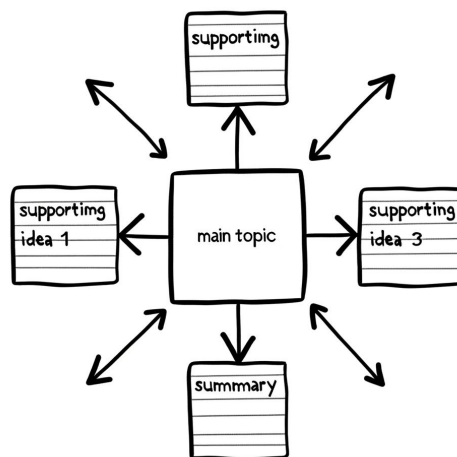


Figure 1 Schematic Diagram of the Four Square Framework

2.3 Effects of the Four Square Writing Method in Different Educational Settings

The Four Square Writing Method, due to its structured and systematic nature, has been applied in various educational environments around the world, showing significant effectiveness. Its universal applicability stems from its ability to adapt to different disciplines and age groups of students, especially in enhancing writing skills and organizational thinking.

In the United States, the Four Square Writing Method is widely used in elementary and secondary school language arts courses. Research indicates that students using this method score generally higher on the writing sections of standardized tests than those who do not use this method [13]. This success is largely due to the Four Square method's ability to help students clearly organize the structure of their essays, specify themes and supporting details in each paragraph, thereby improving overall writing clarity and persuasiveness.

In Indonesia, a study focused on whether the Four Square Writing Method could significantly impact students' ability to write descriptive texts. Results found that the method not only enhanced students' understanding of language structures but also improved their ability to transform thoughts into text. Through this structured practice, students were able to more effectively express complex ideas and achieve greater accuracy in their language use [14]. Another study in Indonesia showed that the Four Square Writing Method not only improved students' writing skills but also their classroom engagement. Students' participation in the classroom increased from 47.324% at the beginning of the first cycle to 81.25% by the end of the second cycle [15].

In Asia, particularly in China and Japan, the Four Square Writing Method has begun to be incorporated into more educational practices. These countries' education systems often emphasize rote memorization and exam skills, and the Four Square framework offers a new teaching perspective that emphasizes students' creative thinking and self-learning abilities. Research shows that through the implementation of the Four Square method, students are able to demonstrate more creativity in their writing and exhibit higher confidence and independence when tackling complex writing tasks [16].

Moreover, because of its straightforward and easy-to-understand visual framework, the Four Square Writing Method is particularly suited for digital learning environments. Online educational platforms can implement the Four Square framework through animated and interactive teaching modules, enabling remote learners to effectively grasp and apply this method. This demonstrates its wide adaptability and potential educational value across global educational technology applications.

In summary, the Four Square Writing Method has shown its wide applicability and effectiveness in improving students' writing skills across various educational environments. Whether facing students with different linguistic backgrounds or different educational cultures, the Four Square framework provides an effective tool for enhancing their writing quality, bringing positive changes to the global education field.

3 FOUR SQUARE FRAMEWORK ANALYSIS AND DISCUSSION

3.1 Theoretical Foundations and Teaching Principles

The theoretical basis of the Four Square Writing Method stems from constructivist learning theory, which emphasizes that learning is an active process of constructing knowledge, where students build new understandings through interactions with their existing knowledge [17]. The teaching principles of the method include clear structural guidance and repetitive practice, aimed at using visual and organizational tools to help students systematically understand and apply writing skills.

3.2 Enhancing Writing Skills

Through the specific Four Square framework, students receive clear guidance on organizational structure, which is crucial for the logical coherence and organization of their essays. Each square represents a core part of the essay, helping students clarify the function and content of each part. Additionally, the method emphasizes the coherence and completeness of content development, encouraging students to focus on developing their arguments and expanding on supporting details [18]. In terms of language expression, the Four Square method provides a fixed template that boosts students' confidence in expressing their thoughts, while also prompting them to pay more attention to vocabulary selection and sentence variety.

3.3 Impact on Writing Motivation and Confidence

According to existing research, the Four Square Writing Method significantly boosts students' motivation and confidence in writing [19]. When students see their writing structured and organized through this method, their interest and enthusiasm for writing noticeably increase. Additionally, the systematic structure helps students feel more confident when faced with writing tasks, as they know how to start and how to progressively build their essays. This method reduces the uncertainty in writing, lowers students' anxiety, and enhances their engagement in learning and their ability to learn autonomously.

3.4 Enhancing Student Engagement

The Four Square Writing Method, by providing a clear framework and steps, significantly enhances students' engagement in learning. Students are no longer passive recipients of knowledge but become active participants in constructing knowledge. This sense of involvement and achievement motivates students to engage more deeply in writing and other learning activities [20]. As students' capabilities increase, they are more willing to explore more

complex writing tasks and creative expression, which not only enhances their writing skills but also fosters their thinking and innovation skills in other academic subjects.

4 IMPLEMENTATION STEPS OF THE FOUR SQUARE WRITING METHOD

Implementing the Four Square Writing Method is a phased process, designed to help students systematically organize and express their thoughts through a structured writing framework. Here are the specific steps of the Four Square method to ensure teachers can effectively apply this strategy in the classroom and maximize its impact on enhancing students' writing skills.

Preparation Phase: Before formally introducing the Four Square framework, teachers need to assess students' foundational writing skills, including their grammar, syntax, and vocabulary capabilities. This stage aims to identify potential challenges students may face in writing, to provide targeted support in subsequent teaching. Additionally, teachers should introduce students to the basic concepts and purposes of the Four Square Writing Method, ensuring they understand its role and importance.

Demonstration and Guidance: The teacher should draw the Four Square framework on the board or projector and demonstrate how to use this framework for writing by filling in each square step by step with a specific example. This visual demonstration shows students how to start with a thesis and gradually add supporting details and a conclusion. During this process, the teacher should focus on guiding students on how to connect the thesis with supporting details to ensure the logic and coherence of the writing.

Student Practice: After the teacher's demonstration and guidance, students should independently complete their own Four Square charts. Teachers can provide different writing topics, allowing students to choose ones that interest them for practice. At this stage, teachers need to monitor the class and provide individual guidance on students' work, helping them adjust and improve as needed.

Peer Review and Revision: After students complete their drafts, they can engage in peer review to provide feedback to each other. This not only helps students learn from others' works but also strengthens their ability to analyze and evaluate writing. Based on feedback from peers and the teacher, students should revise and refine their works.

Presentation and Discussion: Finally, students can choose to present their works orally. This stage aims to further enhance students' confidence and oral expression skills through public presentation and discussion. At the same time, the teacher can summarize common issues and highlights from the use of the Four Square method in student writings, providing feedback and adjustments for future teaching.

Through these specific implementation steps, the Four Square Writing Method can be effectively integrated into daily teaching activities, helping students gradually enhance their writing skills, especially in terms of organizational structure and content expression.

5 CONCLUSION

The Four Square Writing Method, as an innovative writing teaching tool, has demonstrated significant educational benefits in multiple educational settings globally. By simplifying the visual framework, this method helps students clearly understand and apply effective writing structures, thereby improving their writing skills and overall learning outcomes. The success of the Four Square method lies in its ability to break down the writing process into manageable parts, allowing students to build confidence at each step and gradually master more complex writing techniques.

Additionally, the Four Square method plays a key role in enhancing students' motivation and confidence in writing. Through clear structural guidance, students experience the success of writing, which ignites their interest and passion for writing. This positive learning attitude is a crucial factor in students' academic success and a key to their future success in various career paths.

However, despite the many advantages of the Four Square method, some challenges may arise during its implementation. For example, teachers may need specialized training before using this method to ensure they can effectively guide students through thinking and writing within this framework. Additionally, considering the differences in cultures and educational systems, the application of the Four Square method needs to be appropriately adjusted based on specific circumstances.

Looking forward, the Four Square Writing Method has the potential to be further developed and optimized to meet increasingly diverse educational needs and technological advancements. For instance, integrating this method with digital tools and online learning platforms could provide greater flexibility and accessibility for remote education and international educational projects. Through ongoing research and practice, the Four Square Writing Method can continue to provide effective, interactive, and enjoyable learning experiences for students worldwide.

In conclusion, the Four Square Writing Method has proven its capability to enhance students' writing skills in various educational environments globally. With further research and innovation, this method has the potential to support more students, helping them achieve success in their academic and career endeavors.

COMPETING INTERESTS

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CHATGPT IN INTERNATIONAL CHINESE LANGUAGE EDUCATION: OPPORTUNITIES, POTENTIAL PROBLEMS, AND SOLUTION STRATEGIES

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Abstract: The emergence of ChatGPT, representing advanced AI technology, has profoundly impacted international Chinese education. It transforms teaching and learning through intelligent content creation, immersive language simulation, and adaptive learning. However, as AI deeply integrates into Chinese language education, it presents unique opportunities and challenges. This paper explores ChatGPT's technology and its applications while addressing potential challenges like content errors, overreliance on technology, privacy, and ethical dilemmas. To optimize ChatGPT's role, we propose strategies including robust data security, enhancing instructors' tech skills, empowering learners, and instituting oversight mechanisms. Our aim is to harmoniously blend technology and pedagogy in international Chinese education.

Keywords: ChatGPT; International Chinese Language Education; Chinese Language Teaching; Opportunities and Challenges; Response Strategies

1 INTRODUCTION

With the rapid development in the field of information technology, AI is showing great potential in the field of education. Chinese language international education plays a crucial role as a bridge for cross-cultural dialog and communication. At the International Conference on Chinese Language Education 2022, Vice Premier Sun Chunlan emphasized that the field of Chinese language education should embrace technological advances to create a more open, inclusive and efficient learning environment, which resonates with Chinese language enthusiasts around the world.

ChatGPT represents the convergence of cutting-edge Natural Language Processing and Artificial Intelligence, and its integration with education allows educators to reimagine the boundaries of teaching and learning. With ChatGPT, classrooms can be transformed into dynamic spaces filled with innovative teaching strategies, diverse student-centered learning methods, and rich educational content. This expands traditional learning paradigms and drives a more holistic technology-enhanced experience for learners and educators.

However, like any journey into uncharted territory, caution is a constant companion. Relying on AI-generated content raises concerns about authenticity. How do we ensure that AI-generated narratives remain faithful to the nuanced aspects of the Chinese language and culture? Additionally, achieving a seamless logical flow, ensuring deep semantic understanding, and continually enriching the foundational database of Chinese linguistic structures are challenges that educators and technologists must address together. Beyond these technical challenges, broader societal concerns, including the ethical implications of AI's role in shaping minds and the legal frameworks that should govern the integration of technology and pedagogy, also demand attention [1,2].

In navigating this complex landscape, the integration of ChatGPT into Chinese language education requires a deep understanding of the cultural and linguistic intricacies of the discipline. The mission is twofold: to use ChatGPT to enhance pedagogical approaches and to adapt its algorithms to truly align with the spirit of Chinese language instruction. This way, the intersection of ChatGPT and Chinese language education becomes not only about technology-enhanced learning but a harmonious blend that captures the essence of the language, respects its traditions, and equips learners for a globalized world hungry for Chinese linguistic expertise.

2 The Technical Aspects of ChatGPT in Enhancing International Chinese Language Education

ChatGPT, short for "Chat Generative Pre-trained Transformer," is a state-of-the-art language model developed by OpenAI [3]. Leveraging deep learning techniques and neural network algorithms, ChatGPT is tailored for natural language processing and intelligent interactions. Its technical foundations in enhancing international Chinese language education are multifaceted and transformative [4].

2.1 The Power of Large-Scale Models

ChatGPT's strength lies in its colossal neural network models, boasting 175 billion parameters and a vast training dataset [4]. These models enable ChatGPT to capture intricate linguistic structures and knowledge associations, facilitating accurate language generation, sentiment analysis, and Q&A systems. In the realm of international Chinese language education, this massive scale promises smarter and more efficient learning and teaching processes [5].

2.2 Revolutionary Transformer Architecture

ChatGPT's core architecture is based on the Transformer model, known for its superiority in model training. The self-attention mechanism within the Transformer proves invaluable for Chinese language teaching, enhancing dialogue generation, Chinese text analysis, and semantic similarity calculations. This aids learners in understanding Chinese text, ultimately enhancing Chinese language proficiency.

2.3 Symbiosis of Pre-training and Fine-tuning

ChatGPT utilizes both pre-training and fine-tuning strategies. Pre-training imparts general language patterns and semantics from a vast corpus, while fine-tuning tailors the model to specific tasks, such as Chinese language education [6]. This combination equips ChatGPT to adapt to diverse learners with varying proficiency levels and needs.

2.4 Human Feedback-Driven Reinforcement Learning

Reinforcement Learning from Human Feedback (RLHF) is central to ChatGPT, utilizing human feedback to enhance language comprehension, conversation quality, and sentiment analysis. This technology provides a realistic communication experience for learners, making language learning more interactive and enjoyable [7]. RLHF's applications extend to Q&A systems, machine translation, speech recognition, and speech synthesis, improving accuracy and naturalness in these areas [8, 9].

2.5 Prompt Engineering & Chain of Thought Innovations

Prompt Engineering and Chain-of-Thought (CoT) technology further empower ChatGPT. Prompt Engineering guides text generation by influencing content, style, tone, and logic through prompts or contexts. CoT technology enables complex reasoning and coherent text generation, facilitating logical thinking and knowledge integration in dialogues [10]. The combined application of these innovations allows ChatGPT to engage in continuous, multi-round conversations and provide personalized responses, enhancing the interactive learning experience in Chinese language education [11].

In conclusion, ChatGPT, with its robust technical capabilities, is poised to revolutionize international Chinese language education, creating a dynamic, personalized, and immersive learning environment.

3 THE CHATGPT'S EMPOWERMENT IN INTERNATIONAL CHINESE EDUCATION

ChatGPT, with its capabilities in content generation, context comprehension, and task execution, significantly supports the advancement of international Chinese education.

3.1 ChatGPT as a Tool for Enhancing Chinese Language Learning

As an intelligent language model, ChatGPT can act as learners' "AI private tutor" and "AI language partner" [2], providing learners with personalized learning support and diversified learning resources, and through the interaction with ChatGPT, learners can experience a more realistic learning environment and obtain professional guidance at any time. This kind of intelligent interaction can not only stimulate learners' motivation, but also promote the development of learners' independent exploration and practical ability, which plays an important role in improving Chinese learning ability.

3.1.1 Personalized and multifaceted learning support

ChatGPT shapes an adaptive learning system based on precise analysis of students' learning contexts, needs and knowledge levels, tailoring learning goals, planning learning paths, analyzing difficulties and providing learning suggestions. Its flexible pedagogical scaffolding and timely feedback mechanism shapes personalized learning experiences and environments for students, further improving learning efficiency [12].

3.1.2 Generation of enriching learning material

ChatGPT has the ability to generate inspiring content, which is capable of generating targeted, interesting, and multimodal learning materials. It provides Chinese learners with rich independent learning resources, which prompts learners to change from "passive learning" to "independent learning" and improves their knowledge exploration and innovation ability. For example, in Chinese writing, it can help learners draft outlines, provide inspiration for writing, and generate model paragraphs for writers' reference; by generating practice questions, learners can consolidate their learning achievements, independently assess their learning progress, and solve problems in learning.

3.1.3 Intelligent Q&A and an immersive learning experience

ChatGPT's quick response capability and automatic error correction function provides learners with powerful intelligent Q&A services. Learners can get instant answers and guidance without waiting when they encounter problems. This convenient intelligent Q&A helps to avoid interruptions and delays in learning, enabling learners to study more smoothly. At the same time, ChatGPT can also guide learners to explore on their own by answering questions and develop their problem-solving and critical thinking skills. In addition, by providing a virtual environment for Chinese

language practice, ChatGPT helps learners apply their knowledge to real-world situations and deepen their understanding and memory, resulting in a more hands-on and in-depth learning experience.

3.2 Augmenting the Abilities of Chinese Language Teachers with ChatGPT

The extensive utilization of ChatGPT brings a multitude of benefits to the field of international Chinese language education, not only enhancing educational content generation and teaching support but also elevating teachers' digital literacy. This digital literacy equips them to tackle future educational challenges, fostering sustainable innovation in the field.

3.2.1 Innovative pedagogical planning

ChatGPT facilitates innovative and personalized teaching processes, covering various tasks from pre-class preparation to knowledge presentation. Teachers receive flexible and diverse guidance at every step, promoting continuous development and innovation in international Chinese language education. The tool encourages teachers to explore new strategies, fostering open-ended, inquiry-based, and output-driven learning experiences.

3.2.2 Customized educational content generation

ChatGPT's potent language generation capabilities empower teachers to effortlessly create diverse and tailored teaching materials, from handouts to practice questions. It saves time and effort while offering customization options for teaching materials' style, difficulty, and linguistic features based on learning objectives and student needs. The analytics function aids in optimizing and ensuring the quality and applicability of materials.

3.2.3 24/7 Teaching support and high efficiency guarantee

ChatGPT doesn't only assist with content generation but also provides 24/7 emergency teaching support, ensuring a smooth teaching process. This round-the-clock support allows teachers to explore and implement innovative teaching methods, ultimately enhancing teaching quality and providing students with a more creative and engaging educational experience.

3.2.4 Fostering digital proficiency

Interacting with ChatGPT prompts Chinese language teachers to enhance their digital literacy. This includes data analysis, information evaluation, and a deeper understanding of AI technology. The tool not only familiarizes teachers with its operation but also pushes them to grasp AI's working principles. It offers a platform for teachers to practice and develop their own digital thinking and methods, ultimately boosting their confidence in tackling technological challenges.

3.3 ChatGPT: A Vanguard in Chinese Language Assessment

Assessment plays an indispensable role in the process of education and teaching, covering selection, diagnosis, evaluation and research [2]. With the help of artificial intelligence technologies such as ChatGPT, it can promote the transformation of knowledge assessment and ability assessment to process, dynamics, higher order and synthesis [13], and at the same time, it realizes the digital transformation of education assessment, and injects the power of assessment for reform into education.

3.3.1 Intelligent assessment promotes the transformation of education evaluation

ChatGPT empowers the assessment of international Chinese language education to provide a more comprehensive, flexible and personalized assessment, and promotes the learning assessment towards intelligence, precision and fairness. The traditional assessment of international Chinese language education mainly focuses on written knowledge, and lacks the assessment of oral proficiency and communication skills. ChatGPT can effectively reflect the users' speaking level and communication skills by realizing continuous human-computer intelligent conversations. Combined with speech synthesis and recognition technology, ChatGPT is also expected to be developed into a speech version to provide spoken language assessment for international Chinese education.

3.3.2 Multi-Round conversation capability supports dynamic accompanying assessment

ChatGPT's multi-round conversational capability makes it suitable for Testing by Learning (TL), which is particularly useful in complex and diverse international Chinese education. It can conduct multi-dimensional, large-sample, and long-cycle whole-process data testing, explore the blind spots of educational evaluation, reveal the logical mechanism and developmental laws of students' growth, and provide support for more accurate educational evaluation.

3.3.3 Innovative mode boosts the development of Chinese language assessment

The new version of GPT-4 is equipped with image processing capability and digital virtual human technology, realizing dynamic human-machine visual dialogues, making language communication more realistic and fuller of emotional interaction. Such an innovative model is expected to realize a revolutionary breakthrough in Chinese language assessment and bring richer and more diverse teaching experiences to international Chinese language education. Under the leadership of artificial intelligence, international Chinese education assessment will usher in a broader development space.

4 RISKS AND CHALLENGES

Although ChatGPT brings convenience to education and teaching, it is also a double-edged sword, which may cause a series of technical ethics, privacy protection and digital divide issues in the field of education, which deserves our deep thoughts and concerns [14].

4.1 Content Generation Risks

ChatGPT's content generation poses several risks. It relies on the quality and quantity of its training data, making it susceptible to producing logically flawed or irrelevant responses. These errors can mislead learners, impacting learning accuracy [15,16]. Additionally, the clarity and context of user questions influence the accuracy of ChatGPT's answers. Lengthy, ambiguous, or poorly contextualized queries can result in inaccurate responses. Furthermore, ChatGPT's proficiency in understanding and expressing Chinese text is generally weaker than in English, potentially leading to misunderstandings and affecting the learning experience for Chinese learners.

4.2 Impact on Learner Autonomy, Motivation, and Creativity

The convenience of ChatGPT can have unintended consequences on learners. While it simplifies knowledge acquisition, it may diminish students' ability to explore and make independent choices. Over-reliance on smart tools can distract learners, weaken interpersonal skills, and reduce intrinsic motivation to learn. ChatGPT's responsive answers may also lead to knowledge fragmentation, making it difficult for students to connect and organize information. Furthermore, students might misuse ChatGPT for assignments or exams, raising concerns about academic integrity [18].

4.3 Effects on the Teaching and Learning Process

The use of ChatGPT in teaching can impact both educators and students. Teachers who rely too heavily on ChatGPT for course design may face the risk of inflexible and formulaic teaching, potentially hindering their professional growth and creativity. The teacher-student interaction might be affected as well, with teaching becoming more of a one-way knowledge transfer. Students may passively receive information, diminishing their active thinking abilities. ChatGPT primarily provides paradigmatic answers, which can hinder empathetic communication and adaptability in dialogue situations.

4.4 Ethical and Legal Issues

Inappropriate use of ChatGPT can result in ethical and legal problems. It may be misused to spread hate speech, harmful information, or personal attacks. Biases in the model's responses based on user characteristics can lead to offensive or biased content. Private data from human-robot dialogues may be mishandled, causing information breaches, privacy violations, and potential losses. Moreover, the use of large-scale data sets in generative AI technology may raise intellectual property issues, posing legal risks in commercial or academic contexts [19].

In summary, while ChatGPT offers new learning solutions in international Chinese language education, it is crucial to carefully monitor its use to address inaccuracies and prevent cheating. Teachers and learners should maintain critical thinking and prioritize the development of creativity and independent thinking skills to ensure that ChatGPT's application in education is valid, reliable, and promotes effective intercultural communication education.

4 POSSIBLE STRATEGIES FOR INTERNATIONAL CHINESE LANGUAGE EDUCATION TO MEET THE CHALLENGES OF SMART TECHNOLOGY

5.1 Enhancing ChatGPT Content Quality and Student Responsibility

In the age of smart technology, optimizing ChatGPT-generated content and guiding students towards responsible usage are essential facets of effective education. To improve ChatGPT's content generation, educators should compile a diverse Chinese corpus encompassing written, spoken, and professional language styles. Additionally, focusing on key linguistic elements such as grammatical structures, word meanings, and vocabulary collocations based on linguistic theories is paramount. Clear evaluation criteria and feedback mechanisms should be established to enhance the model's linguistic accuracy. Moreover, it's crucial for educators to foster a sense of responsibility in students, emphasizing independent thinking and critical evaluation of AI-generated content. This approach encourages students to develop higher-order cognitive skills, ensuring they utilize ChatGPT as a complementary tool, not a substitute for human cognition [20].

5.2 Redefining the Role of Technology and Teachers

Incorporating AI technology like ChatGPT into education requires a balanced perspective on the role of technology and teachers. Educators should treat ChatGPT as a supplementary tool, enhancing their teaching methods rather than replacing them. By defining clear boundaries for ChatGPT's application and focusing on leveraging its strengths to improve teaching models and personalized learning, teachers can effectively harmonize human expertise with AI capabilities. Teachers play a vital role in reviewing and correcting AI-generated content to ensure its accuracy and suitability. In addition, they should emphasize their emotional and creative values, differentiating themselves from AI. Building emotional connections with students, prioritizing emotional literacy, and fostering creativity can inspire students' creativity and innovation [21].

5.3 Advancing Educators' Digital Literacy and Competence

The increasing prevalence of smart technology necessitates educators to enhance their digital literacy and competence, notably in the context of Chinese language teaching. Educators should recognize the transformative potential of AI, adapting their teaching approaches accordingly. This involves cultivating digital awareness, digital competence, and lifelong learning skills. They should become proficient in essential digital skills, master the selection of appropriate digital resources, and adeptly employ these resources to enhance teaching and learning. A commitment to staying current with evolving digital education trends is essential for teachers to deliver high-quality, personalized education services.

5.4 Safeguarding Ethical and Legal Frameworks in Smart Education

Digital ethics, data security, privacy, and bias mitigation are at the core of ethical AI application in education. As AI, such as ChatGPT, becomes more prevalent, it's critical to establish and uphold ethical guidelines and legal frameworks, especially within international Chinese language education. These frameworks should define the technology's boundaries and ethical standards, which need to be regularly reviewed and adapted to the evolving tech and legal landscape. Educators must receive training in digital ethics, privacy, and data security to ensure compliance with ethical and legal requirements. Emphasis should be placed on fairness and transparency in data usage, with a focus on preventing bias and discrimination. Collaborative efforts among educational institutions are essential to develop and maintain best practices in AI application while adhering to educational values.

5 CONCLUSION

The growing integration of artificial intelligence, exemplified by ChatGPT, holds significant promise for international Chinese language education. ChatGPT's intelligent content generation and interactive features introduce a fresh dimension to Chinese language instruction. It facilitates personalized learning, enhances teacher-student interaction, and cultivates learners' language expression and communication skills. This innovation not only equips educators with effective teaching tools but also kindles students' enthusiasm for learning Chinese.

This paper delves into the technical underpinnings, potential applications, associated challenges, and remedial strategies of ChatGPT in international Chinese language education. By dissecting the technology's application in this context, we acknowledge both its substantial potential and positive educational impact, as well as its inherent shortcomings and the issues of privacy, bias, ethics, and legal concerns stemming from improper use. Collaboration within the international Chinese language education sector is imperative to cultivate best practices, share insights, and gradually establish an ethical and legal framework adapting to evolving technology.

In summary, integrating ChatGPT into international Chinese language education represents an evolving and enhancing process. Through active cooperation, resolution of potential issues, and harnessing its intelligent capabilities, ChatGPT can empower Chinese language education, fostering an open, innovative, and progressive educational environment for students and educators alike. This dynamic approach injects new vigor and momentum into the realm of international Chinese language education.

COMPETING INTERESTS

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