

Prediction of English Major Training Model in Higher Vocational Education Based on Fuzzy Neural Network Algorithm

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Abstract

The prediction of English major training model in Higher Vocational Education Based on fuzzy neural network algorithm is the process of using a neural network to predict the future. The main function of this method is to analyze and understand the human brain and its characteristics. This method can be used as an effective tool for predicting or analyzing any kind of data, such as finance, economics, psychology, medicine etc. In addition, it can also be used for understanding people's behavior and their reactions towards various situations. Higher Vocational and technical education, the importance of talent planning in Higher Vocational and technical education has become increasingly prominent, The premise of each higher vocational and technical talent planning is to make a reasonable prediction of each higher vocational and technical talent and professional training. Fuzzy neural network can effectively deal with nonlinear and fuzzy problems, and plays a great role in intelligent information processing. Therefore, this paper studies the prediction of English professional training model in Higher Vocational Education in fuzzy neural network algorithm.

Keywords: Talent training forecast Higher vocational and technical Fuzzy neural prediction

Introduction

Facing the fundamental change of economic growth mode, the economic structure is also facing strategic adjustment. The quantity and quality of highly skilled talents cannot meet the needs of industrial structure transformation and upgrading, and the knowledge and skills of graduates do not match the job needs. In recent years, the graduation rate of domestic vocational college students is more than 99% and the employment rate is more than 80%, but the overall quality of students, the satisfaction of employers and society are not high. Higher vocational colleges are the cradle and important position for cultivating high skilled talents. The quality of talent training is related to their survival and development [1]. Therefore, colleges should have the problem of teaching quality, feel the urgency of survival crisis, and have a clear quality consciousness and the standard and power of quality construction. To correctly evaluate the teaching quality of higher vocational colleges, the author believes that while paying attention to "quantity" and "rate", we should pay more attention to "quality". The teaching quality directly affects the employment quality and social recognition [2]. Through the ways to improve and monitor the teaching quality in the process of training high skilled talents, form a perfect quality management mechanism, promote the training of high skilled applied talents, and give full play to the role of Vocational Education in industrial upgrading.

With the rapid development of international trade, higher vocational English continues to grow and deepen. At present, English majors are developing towards professional quality management and discipline establishment and improvement, realizing the high-quality quantification of professional talents, positioning and curriculum system, and then improving the value of English majors. Based on the talent training model of English major in Higher Vocational Education in fuzzy neural network algorithm, English major in higher vocational colleges can continuously improve curriculum evaluation, teaching team, teaching conditions and quality monitoring, improve the development level of business major in Higher Vocational Colleges and improve the quality of talent training [3]. In order to meet the sustainable development of English major, higher vocational colleges need to actively strengthen the training mode of professional talents, and realize the high-quality development of business English Major Based on the needs of social talents and the current situation of industry development.

People are the core elements of national development. Talents are the strategic resources to promote national economic development, and the cultivation of talents depends on education. In recent years, the scale of personnel training in Higher Education in China has been continuously expanding, and now it has entered the stage of popularization of higher education. The expansion of talent training scale makes the quality of education and training become the focus of social attention. In September 2016, the research results conference of Chinese students' development core literacy was held in Beijing, which defined the personality qualities and key abilities that students should have, and put forward new requirements for talent training. The cultivation of students' core literacy is mainly realized through the education and teaching of various disciplines. English, as one of the necessary professional skills under the background of economic globalization, has attracted much attention for its educational and teaching quality [4]. At present, most of the researches on the core competence of English discipline focus on the curriculum setting and textbook development, and lay particular emphasis on basic education. Few articles combine the core competence of English discipline with the cultivation of College English majors from a macro level. Under this background, the author was inspired and decided to choose the topic of "Research on the prediction of training mode of Higher Vocational English Majors Based on fuzzy neural network algorithm" to explore the training mode of College English Majors under the background of subject core quality based on fuzzy neural network algorithm.

Fuzzy Neural Network

Fuzzy Theory

As another focus of this paper, fuzzy neural network will be used to establish the network operation situation awareness model. As for the study of fuzzy neural network learning algorithm, in 1993, JYH Shing and Roger Fang proposed an adaptive fuzzy neural network model that uses gradient descent and least square method to learn parameters; A. In 1999, ntimberger et al. Proposed a reinforcement learning algorithm and improved the learning algorithm of sub parameter learning; Buckley et al. Proposed a hybrid learning algorithm combining BP algorithm and genetic algorithm to learn the parameters in 1996. In recent years, a large number of scholars have used some non derivative learning methods as algorithms, such as genetic algorithm and particle swarm optimization algorithm. Some researchers at home and abroad are also constantly using improved GA and improved psof to learn the network parameters and improve the performance of fuzzy neural networks [5]. Most of the improved ideas of the hybrid learning algorithms designed in these studies are to use different algorithms to realize the learning of nonlinear antecedent parameters and the learning of linear antecedent parameters, and fix one parameter to learn the best value of another parameter. The gradient descent method and the partial least square method are used to learn the rules. The researchers improved the fuzzy neural algorithm based on genetic algorithm and proposed an improved crossover operator; which can simultaneously optimize the structure and weight parameters of the fuzzy neural network [6].

Fuzzy neural networks (FNN) is a kind of neural network which combines fuzzy information processing. The first research began in 1987 when B. Kosko introduced the idea of neural network into the fuzzy system. Since then, many scholars have continuously studied and improved this field, including various improvements in the structural design of fuzzy neural network and the output principle between layers. This paper will briefly explain the principle and concept of FNN.

Fuzzy neural network has the advantages of fuzzy theory and neural network. It can not only complete the processing of fuzzy information, reflect the uncertainty of characteristics, but also use the structure of neural network to complete the learning and adaptation of models.

Each basic unit of the fuzzy neural network is composed of fuzzy neurons, and the following fuzzy neurons are included in the fuzzy neural network:

1. Fuzzy neuron: this kind of fuzzy neuron is used to convert the determined value into the fuzzy output value:

$$y = \mu(x) \quad (1)$$

In the above formula, X is the input of the determined value, y is the output of the fuzzy value, and U (.) is the membership function.

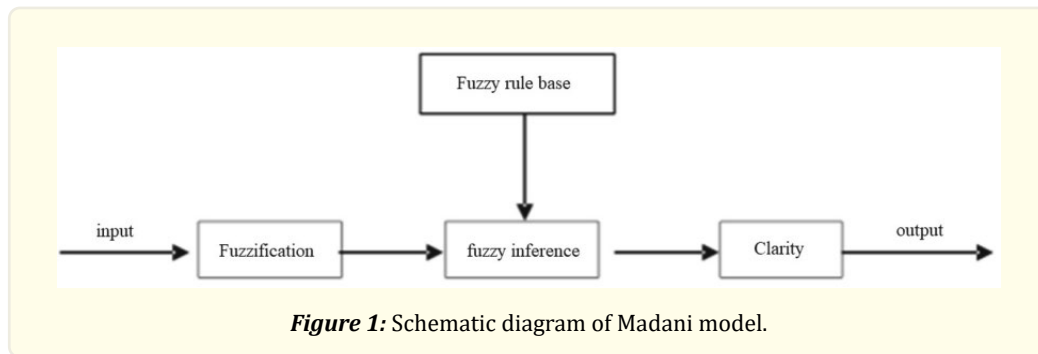
2. Defuzzification neuron: this type of neuron is similar to the former type in form but has the opposite effect, which is to transform the fuzzy value into

The defuzzification relationship is expressed as:

$$y = f(x_1, x_2, \dots, x_n) \quad (2)$$

At present, the widely used models are T-S model and Mandani model.

1. T-S model. When dealing with linear data, T-S model has unique advantages. It divides variables into independent individuals. In logical reasoning, the rules are simple and the matching speed is fast. However, when the nonlinear characteristics of data are obvious, T-S model will produce a large number of fuzzy rules, which greatly affects the operation efficiency of the algorithm and increases the difficulty and complexity in the reasoning process [7].
2. Mandani model. The core of the model is fuzzy rule base and fuzzy inference engine. The input data is fuzzified through membership function, then the rules in the rule base are matched, and the fuzzy inference engine performs logical reasoning. Finally, the results are clarified and output. The working principle of Mandani model is shown in Fig.1.



Fuzzy Neural Network Type

Fuzzy theory and artificial neural network together constitute fuzzy neural network. According to different combination methods, the types of fuzzy neural network are different, which are mainly divided into the following five types:

1. *Indirect connection type*: each independent part is responsible for its own work, which is not directly related in the overall network model, that is, when processing data, the part that can be expressed by fuzzy logic is processed by fuzzy theory; The parts that cannot be processed by fuzzy theory are expressed by neural network. This network model structure only uses the two

methods to deal with different data, and does not carry out intelligent fusion. It can not give full play to the advantages of the two algorithms at the same time, and it is easy to cause large data deviation during operation, which affects the accuracy of the overall structure [8]. The type of fuzzy neural network is shown in Fig. 2 below.

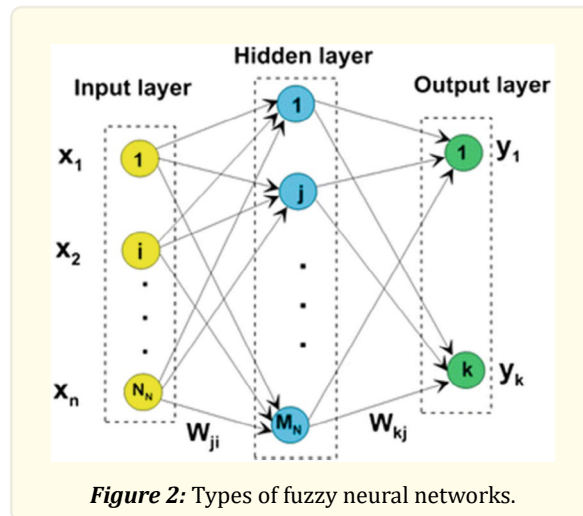


Figure 2: Types of fuzzy neural networks.

2. *Series type*: the fuzzy system is used as the input (output) of the network model, and the neural network is used as the output (input) of the overall network model. Compared with the non direct connection type, this connection method has a great improvement in system efficiency and accuracy. First, the data is processed through one technology, and then output and expressed through another technology. Compared with the non direct connection type, The series type ensures the advantages of the two algorithms at the same time.
3. *Parallel type*: take the fuzzy system and neural network as the input and output of the overall network model at the same time, so that the two methods can process the input data and output results in parallel. This model can process data more accurately, give full play to the reasoning advantages of fuzzy system, and ensure the learning efficiency of neural network.
4. *Network type*: the neural network is introduced into the fuzzy reasoning system to learn and control the fuzzy rules through the neural network, determine the corresponding membership function and adjust the error, so that the overall network model has the ability of self-learning and self-adaptive.
5. *Equivalence*: in fuzzy neural network, all neurons are fuzzy neurons, and all nodes have fuzziness. They participate in the process of learning and error adjustment. They are more suitable for intelligent reasoning of complex data and have been widely used in the field of fault detection.

According to the different functions of fuzzy neural network, it is divided into three types: logic type, arithmetic type and hybrid type. The logical fuzzy neural network mainly performs logical calculation and transforms the rule matching reasoning process into logical addition operation or logical multiplication operation. At this time, the neuron is fuzzy neuron [9]. The input processing and output expression of data are realized by fuzzifying and defuzzifying the data. Its learning algorithm is the same as that of artificial neural network; Arithmetic fuzzy neural network is mainly used for arithmetic operation of two kinds of input signals, real number and fuzzy number respectively; Hybrid fuzzy neural network is the most used network model in research and application at present. Its network topology is adjusted according to practical application and is suitable for any data type. The commonly used network models are t-s-based model and fuzzy modular model, which solves the problem of a large number of rules when T-S fuzzy reasoning model deals with nonlinear data.

Training Model of English Majors in Higher Vocational Education Based on Fuzzy Neural Network Algorithm

Research on Talent Training Prediction Model System of Higher Vocational and Technical Education

The reform of talent training mode in higher education is one of the hot topics in recent years. However, what is the talent training mode? What does it include? There is still no unified conclusion on these issues. According to the interpretation of modern Chinese dictionary, "mode" refers to the standard form of something or the standard form that people can follow. The "training mode" was first proposed in China in 1994 in the "reform plan of teaching content and curriculum system of higher education for the 21st century" comprehensively launched and implemented by the former State Education Commission. However, the "training mode" was not defined at that time. In 1998, the Ministry of Education issued the opinions on deepening education reform and cultivating high-quality talents to meet the needs of the 21st century, The talent training mode is expressed as: "The structure of knowledge, ability and quality built by the University for students, as well as the way to realize this structure. It fundamentally defines the characteristics of talent training and embodies the educational thoughts and concepts. Scholars also have different views on how to define the talent training mode. Zhou Yuanqing believes that the so-called talent training mode refers to the talent training objectives, training specifications and basic training methods. It embodies higher education in a concentrated way The basic characteristics of the trained talents are determined by the educational thoughts and educational concepts of the University. Song Huiling believes that the "talent training mode" is "a standard structure style and operation mode formed by designing the whole process of talent training activities around the center of talent training objectives with a certain educational ideology as the soul, higher education talent training activities as the ontology or prototype." Thus, the talent training mode is a stable education and teaching structure organized by the school to achieve the training objectives [10].

From the definition, we can see that the talent training mode is an educational and teaching structure composed of different parts. Gong Yizu believes that the talent training mode includes three parts: training objectives, training process and operation mode; Zhou Yuanqing believes that the talent training mode is composed of training objectives, training specifications and training methods; Bian Jing thinks that the talent training mode is an organic combination of educational ideas, educational concepts, curriculum system, teaching methods, teaching means, teaching resources, teaching management system, teaching environment, etc. This study draws on the views of various scholars and believes that the training mode is composed of three parts: training objectives, training process and training evaluation. The training process specifically involves three parts: curriculum setting, teaching form and student management.

Based on the diversity and dynamics of training types and educational levels of higher vocational education talents, the interpretability and quantifiability of training higher vocational education talents are constantly changing with the passage of time and the change of environment, and the collectability of data This paper qualitatively analyzes the influencing factors of talent training in Higher Vocational and technical education from the four aspects of science and technology environment.

1. *Social environment.* The talent training of higher vocational education will be affected by national policies, regional social development level, population status and national education level. This topic selects the total population at the end of the year, the natural growth rate of population, the number of students in Colleges and universities per million population and the national financial expenditure on education as the measurement indicators,
2. *Economic environment.* Based on the measurement of the impact of economic development on the talent training of higher vocational education, the main indicators of the most direct impact of economy on the talent training of Higher Vocational Education under the market-oriented environment are as follows:
Industrial structure: different industries cultivate higher vocational education talents with different material *capital scale*: material capital scale is the basis of economic development, and its changes lead to different cultivation of higher vocational education talents. Economic aggregate and quality: economic growth can promote the promotion and improvement of the total amount and structure of higher vocational education talents.
3. *Foreign related economy.* With the acceleration of economic globalization and integration, the exchanges between countries in economy, science and technology are becoming closer and closer. Therefore, the economy outside Saudi Arabia covers a wide range. Considering the collectability of data and the quantification of indicators, this topic mainly analyzes the impact of for-

eign-related economy on Higher Vocational educators from three aspects: foreign-funded enterprises, foreign economy and import and export Impact measure of talent training.

4. *Science and technology environment.* In the information age, the development of science and technology not only promotes the development of economy, but also shortens the knowledge renewal cycle and speeds up the training of Higher Vocational and technical education talents in emerging industries or industries, which has a great impact, especially on the training of Higher Vocational and technical education talents.

Research on Fuzzy Neural Network Model

On this basis, this paper proposes to apply the fuzzy logic evaluation method to the network situation evaluation, and analyze the types of characteristics. The specific method is to divide each feature of the data into multiple fuzzy types, calculate the probability that the feature belongs to each type, obtain the fuzzy relationship matrix, obtain the fuzzy evaluation result through fuzzy operation, and then calculate the network operation situation value by synthesizing the weight of the feature itself.

The fuzzy comprehensive evaluation method is a comprehensive evaluation method that makes use of fuzzy logic to fuzzify certain characteristics. The method steps for calculating the situation value by the fuzzy comprehensive evaluation method are as follows:

- a) Determine the characteristic domain of network situation $u = \{u, UZ, \dots, UN\}$, i.e. n indicators to be evaluated; And determine the modulus.

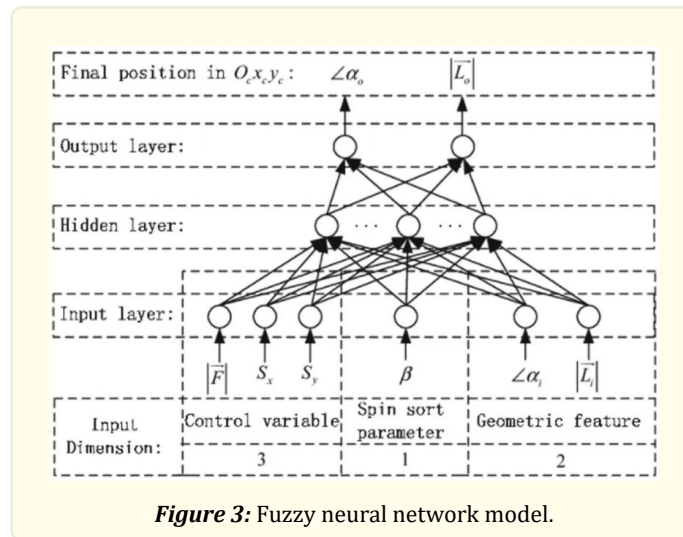
The hierarchical domain of fuzzy evaluation, i.e. the number of fuzzy subsets $v = \{V, VZ, \dots, VM\}$ J ;

- b) Determine the membership function U_{ij} of each fuzzy subset ($i = 1, 2, \dots, N$; $J = 1, 2, \dots, m$);

The membership function U_X represents the degree of membership of the i th evaluation index in the j -th hierarchy. The expression of the membership function U_X is often obtained by fuzzy statistical method or direct empirical assignment method. This paper proposes a method to obtain the number of membership functions m and the expression U_G through clustering for network perception. The type number and function formula of membership functions will be discussed in detail in 3.3.2.2.

- c) The membership degree of each feature on each fuzzy subset is calculated.

The fuzzy neural network, which combines the fuzzy system and the neural network, combines the advantages of the two in terms of characteristics. On the one hand, it can be used to deal with the related problems of fuzzy information, construct and imitate the fuzziness of human thinking judgment, and on the other hand, it can imitate the principle of neural network to complete the analysis of a large amount of data information and establish an independent learning model. From the previous evaluation methods of network situation awareness in this paper, the fuzzy neural network is very suitable for establishing the network situation awareness learning model, further solving the consistency and stability problems in situation awareness, and completing the function of situation analysis and prediction in the network situation model, as shown in Fig. 3.



The higher vocational technical education in the fuzzy prediction model has the talent training influence factor XI, and we can obtain its value $x = (x_1, x_2, \dots, x_n)$ for m consecutive years; The time series value $x = (x_1, x_2, \dots, x_n)$ of the impact factor XI is structured according to the following model:

$$E(t)\dot{x}_{d+1}(t) - E(t)\dot{x}_{k+1}(t) = E(t)\Delta\dot{x}_{k+1}(t) = f(t, x_d(t)) + B(t)u_d(t) - f(t, x_k(t)) - B(t)u_k(t) = f(t, x_d(t)) - f(t, x_{k+1}(t)) + B(t)\Delta u_{k+1}(t) \quad (3)$$

$$\begin{cases} E(t)\dot{x}_d(t) = f(t, x_d(t)) + B(t)u_d(t) \\ y_d(t) = C(t)x_d(t) \end{cases} \quad (4)$$

Prediction of Training Mode of English Major in Higher Vocational Education

The core literacy indicator system for the development of Chinese students developed by experts organized by the Ministry of education also includes foreign language literacy, and defines foreign language literacy as “being able to realize understanding, expression and communication in other languages through oral or written language forms according to one’s own wishes and needs”. This definition breaks through the “instrumental” definition of language. As the most widely circulated language in the world, the cultivation of English core competence has also attracted the attention of many scholars at home and abroad.

One of the eight core qualities stipulated by the European Union is the use of foreign languages for communication. This accomplishment is defined as “the ability to learn oral and written expression, to use foreign languages to explain concepts, ideas, feelings, attitudes and facts in different social and cultural situations, and the development of cross-cultural understanding skills”. It covers knowledge, skills and attitude. In Australia’s core literacy framework, English courses are mainly responsible for the cultivation of cross-cultural understanding literacy, requiring students to use cross-cultural understanding and create a series of texts, that is, to present diverse cultural perspectives and identify with people and things of various cultural backgrounds. In China, scholars Zhang Lianzhong and others have divided the core literacy of English into three levels. The first level is the basic literacy of English, including listening, speaking, reading, writing and vocabulary; The second level is the literacy that can be acquired through English courses, including cross-cultural communication ability, international career, interpersonal communication ability, etc.; The third level is the ability that is vital to the development of foreign language students, including innovative ability and critical thinking. On the basis of fully absorbing and drawing on the theoretical and practical achievements of the core competence and the core competence of the English discipline at home and abroad, the revised English curriculum standard for senior high school (Revised Version) classifies the core competence of the English discipline into four aspects: language ability, cultural character, thinking quality and learning ability. This is also the commonly recognized classification of core competence of English subjects in China. The core competence model of

College English professionals in this study is based on this.

Specifically speaking, language competence is the most important part of the core competence of English discipline, which includes not only basic language skills such as listening, speaking, reading and writing, but also language understanding, language awareness and communicative identity awareness. According to the existing literature, this paper divides language competence into three parts: language knowledge, language cognition and language application.

In the aspect of “cultural character”, the goal of cultural character has significantly enhanced the educational value of English curriculum. Cultural character accomplishment not only refers to understanding Chinese and foreign cultural phenomena and values, but also emphasizes the evaluation of cultural traditions and social cultural phenomena. In this paper, it includes three parts: cultural identity, cultural discrimination and cross-cultural communication ability.

Thinking quality is a quality that is easy to be neglected in traditional English disciplines, but it is a dimension that is closest to the development of the core quality and personality of English majors, and is closely related to the fundamental task of “cultivating morality and cultivating people”. The thinking quality is manifested in the level and characteristics of students’ logical criticism and creativity through discrimination, generalization, inference and analysis. In this paper, it is divided into three indicators: understanding, inference and creativity.

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Citizens in the 21st century must have the consciousness of lifelong learning and the ability of self-learning. Learning ability is essential for every discipline. Learning ability in English core competence is not limited to learning methods and strategies, but also includes understanding and attitude towards English and English learning, specifically including active learning ability, cooperative learning ability and deep learning ability. To sum up, the training mode prediction of English Majors in Higher Vocational Colleges Based on fuzzy neural network algorithm is shown in Fig. 4.

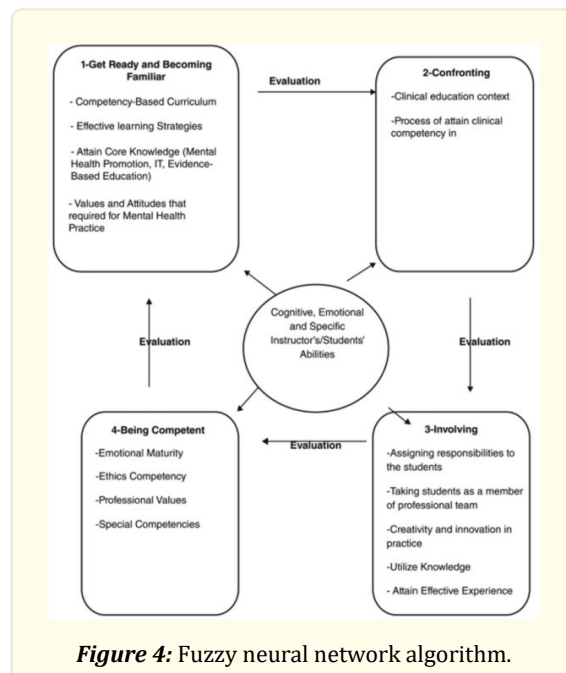


Figure 4: Fuzzy neural network algorithm.

Conclusion

Based on the prediction of talent training of Higher Vocational and technical education in China, most of the research still stays at the enterprise level. Market oriented specialty setting and adjustment are imminent. The premise is to carry out scientific and reasonable prediction research on talent training of socialized higher vocational education. Fuzzy neural network model structure. Aiming at the problem of network situation awareness, this paper constructs a running situation awareness model based on fuzzy neural network. In the model structure design, a nonlinear output activation layer is added to improve the expression ability to form an improved FNN. At the same time, an initialization method that is consistent with the actual problem is proposed. According to the survey results of core competence of English Majors in higher vocational colleges, the development level of English Majors' learning ability is the highest, but among the three indicators of learning ability, cooperative learning ability is the worst. This is related to the students' learning habits and normal teaching forms. In order to improve students' cooperative ability, teachers should consciously adopt the methods of group discussion and cooperative inquiry in teaching. Teamwork is one of the most important abilities in contemporary society. It is not only an essential skill in the undergraduate stage, but also in the workplace.

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