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# Research on the Construction and Countermeasures of Comprehensive Ability Evaluation System of Professional Degree Postgraduates in China

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**Abstract:** With rapid development of professional degree graduate education in China in recent years, employers have higher requirements for the comprehensive quality and practical work ability of graduate professional degree graduates, which is the key problem faced by high-level applied talents. In view of the shortage of high-level applied talents required by China's local economic and social development, this paper samples, evaluates and analyzes eight training bases in Shandong, Jiangsu and Anhui Province by means of literature research and field research, and analyzes the current situation of comprehensive ability training of professional degree graduates from the aspects of ideology, politics, curriculum and practical teaching quality. Selecting the evaluation indicators that affect the improvement of the comprehensive ability of professional degree graduate students, using the analytic hierarchy process, this paper constructs a three-level analysis model for the improvement of the comprehensive ability, analyzes the order of the comprehensive weight indicators, and finds that the proportion of practical experience, divergent thinking, decision-making ability, sense of responsibility and physical quality is high. Therefore, this paper proposes that colleges and universities need to cooperate with local governments and enterprises to build a multi-level training curriculum system, build a practical platform for improving students' comprehensive ability, and establish a corresponding effect evaluation system, so as to better improve the comprehensive ability of professional degree graduate students.

**Keywords:** Professional Degree Graduate Student, Comprehensive Ability, Evaluation Index, Evaluation Model

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## 1. Introduction

General Secretary Xi pointed out that graduate education needs to pay attention to the cultivation of graduate students' innovative ability and practical ability to serve the development of economy and society. Local governments and colleges and universities need to establish a talent training system as soon as possible to speed up the cultivation of high-level talents suitable for economic and social development. At the same time, with the rapid development of professional degree graduate education in China in recent years, employers have higher and higher requirements for the comprehensive quality and practical work ability of graduate professional degree graduates, which

is the core problem faced by high-level applied talents required by China's economic and social development [1]. There are obvious differences in training methods and objectives between professional degree graduates and academic degree graduates. Professional degree graduates focus on the training of students' practical application ability, and pursue the training objective of comprehensive ability training effect [2].

The training process of professional degree graduate students' comprehensive ability in developed countries is a natural process, its endogenous system has been gradually improved, and the theoretical research is highly forward-looking. By learning from the experience of foreign professional degree graduate education and combining with

the actual situation in China, China has created a professional degree graduate education model with Chinese characteristics. Nowadays, some achievements have been made in the theoretical research and empirical analysis of professional degree graduate education, but how to better adapt to the coordinated development of China's economy and society needs further exploration. Moreover, there are still significant differences in the evaluation of the training effect of professional degree graduate students between China and foreign developed countries, and there is less research in this area. At present, there is little difference between the training system of professional degree postgraduates and academic degree postgraduates in China, especially the curriculum is basically consistent with the requirements of degree thesis, and the training of practical ability of professional degree postgraduates is less [3]. Therefore, in the process of professional degree graduate training, how to improve the comprehensive ability of professional degree graduate students and achieve the training objectives of professional degree has become a key concern of the government and colleges and universities.

## 2. Analysis of Research Status at Home and Abroad

Professional degree postgraduate education is a highly practical postgraduate training mode produced to meet the needs of economic and social development. In recent years, relevant scholars at home and abroad have carried out in-depth discussions on the development, training mode and comprehensive ability of professional degree postgraduate education, mainly from the following three aspects:

### 2.1. Research on the Development of Professional Degree Graduate Education

In the early stage, foreign scholars focused on the theoretical research of professional degree graduate education, and later on the research of practical ability. By analyzing the current situation of professional degree postgraduate training in developed countries such as Europe, America and Japan, it is found that these countries are actively encouraging colleges and universities to establish professional degree postgraduate training points, and the development level of professional degree postgraduate education in these countries is highly coordinated with regional economic and social development. Morgan a, Turner D. believes that the "vocational qualification certificate system" implemented by British higher education is the most distinctive education model in Britain. Through three links of "project introduction, enterprise practice and student evaluation", this system allows graduate students with professional degrees in Colleges and universities to participate in enterprise practice, thereby improving their professional skills, and issuing corresponding vocational recognition certificates to graduate students who successfully pass the practical examination, So as to promote the

employment of professional degree graduate students [4]. Craham investigated the expectations of American employers for the ability of graduate students majoring in agricultural extension education, and found that employers not only require master graduates of this major to have solid theoretical knowledge in the professional field, but also have high requirements for their leadership, decision-making, practical ability and team spirit. In China, the cultivation of agricultural master's degree students mainly focuses on the necessity of degree setting, curriculum system and training quality, thus ignoring the ideological and political education of students [5]. The "basic requirements for agricultural professional degrees" issued by the Ministry of education pointed out that graduate students of agricultural professional degrees need to abide by academic ethics and pay attention to the research of agricultural theory. On the basis of respecting others' academic achievements and strictly abiding by intellectual property rights, they can analyze and study others' academic achievements and make some innovations on this basis; According to the relevant requirements of promoting the transformation of the direction of graduate education in China in the guiding training program for graduate students issued by the state, China's graduate education will change from academic to applied. At the same time, graduate students with agricultural degrees also need to master and adhere to the party's principles and policies, love agriculture and animal husbandry, and be able to defy hardships, work hard, and actively innovate [6].

### 2.2. Research on the Training Mode of Professional Degree Graduate Students

Since the development of professional degree graduate education, its training mode has been deeply concerned by scholars, and has produced a lot of research results with theoretical value and practical application value. Foreign scholars mainly focus on the training system and training mode of professional degree graduate education. For example, AAU institutions in the United States have conducted in-depth research on the education and training system of professional graduate students in the country, and put forward relevant policies and suggestions. American scholars such as Mary Selke analyzed the development history of higher education and the development process of professional degree postgraduates in developed countries such as Europe and the United States, and put forward substantive suggestions for the training mode of professional degree postgraduates in the United States [7]. On the basis of analyzing the research of European and American scholars and according to China's national conditions, domestic scholars have put forward a variety of training modes and systems to strengthen professional practice links and strengthen effect evaluation. Shi Yue and others from the Institute of education of Nanjing University analyzed that in order to improve students' practical application ability, according to the nature of the professional field, they formulated a suitable training program for master's degree graduates. This program not only defined the training requirements of students' professional practice links, but also

proposed and effect evaluation system [8]. Yan Guangfen and others have established a three double model of "dual training bases, dual mentors and dual degree certificates" to solve the problem of how to cultivate professional degree graduates with rich practical experience [9]. Chendanyu and other scholars proposed a professional degree postgraduate education and training system oriented to solving "practical problems", which focuses on the improvement of students' theoretical knowledge and practical application ability, so as to meet the needs of local economic and social development [10].

### **2.3. Research on the Comprehensive Ability of Professional Degree Graduate Students**

Developed countries such as Europe, America, Japan and South Korea have done early research on the theoretical knowledge and practical application ability training of professional degree postgraduates. By combining the actual situation of regional social and economic development, they have enhanced the training of comprehensive ability of professional degree postgraduates, so that students can play a certain role in the development of the region after graduation. American scholar Groccia pointed out that colleges and universities need to focus on the cultivation of students' theoretical knowledge and professional practical ability in the process of cultivating professional degree postgraduates, such as professional course knowledge, practical ability, etc. [11]. Erydice, a British scholar, pointed out that the education and training of professional graduate students should be combined with the regional industrial situation, change the previous training mode with the completion of graduation thesis as the main task, as well as the evaluation method based on examination results, and improve the emphasis on the training and assessment of students' practical application ability [12]. Liyouguan proposed that colleges and universities need to adopt the mode of alternation between school education and enterprise practice, so that students can receive a period of classroom theoretical education, and then go to enterprises for practical application education. This education mode is guided by the actual needs of enterprises from school enrollment, specialty setting, teaching and practice, and can cultivate high-quality application-oriented talents with comprehensive ability [13]. Compared with foreign countries, the history of professional degree graduate education in China is relatively short, and a mature education system has not yet been formed, and all of them are mainly professional master's students. The comprehensive ability training of professional degree graduate students is still in the exploratory stage. Based on the analysis of the training quality of professional degree graduate students, Cheng Anlin and other scholars have constructed the corresponding training quality assurance management system, which is composed of professional degree graduate students' practical courses, practical tutor configuration, practice base construction, comprehensive ability evaluation and comprehensive ability realization. After experiments, promotion and demonstration, this scheme is highly feasible [14]. Zhang Xuemin and others

proposed that through the combination of professional curriculum theory education and application practice education, the understanding of postgraduate professional knowledge and the ability of practical application can be effectively improved; At the same time, it can also combine the theoretical knowledge of colleges and universities with the actual production activities of enterprises, so as to better improve the technical capacity and economic benefits of enterprises [15]. Li Wei and others have successfully constructed a complete training system on how to improve the comprehensive ability of professional degree graduate students from the aspects of theoretical course teaching, practical ability, thesis requirements, etc. [9].

To sum up, according to the current training situation and economic development of professional degree postgraduates in China, what training mode should be adopted, what are the main factors affecting the comprehensive ability of professional degree postgraduates, and how to measure the weight of each factor on the comprehensive ability of professional degree postgraduates? In order to improve the comprehensive ability of professional degree graduate students, the paper puts forward three research hypotheses: (1) the comprehensive ability of professional degree graduate students is mainly affected by three factors: the quality of Ideological and political education, the quality of curriculum teaching and the quality of practical training, among which the quality of practical training has the greatest impact on the comprehensive ability of graduate students. (2) In terms of the quality of Ideological and political education, the factor of responsibility consciousness has the greatest influence; In terms of course teaching quality, divergent thinking factors have the greatest impact; In terms of practical training quality, practical experience factors have the greatest impact. (3) The evaluation of the comprehensive ability of professional degree postgraduates, whose practical ability, divergent thinking ability, decision-making ability and sense of responsibility account for a high proportion, needs to be focused on training.

## **3. Analysis on the Current Situation of Comprehensive Ability Training of Professional Degree Postgraduates**

Based on the analysis of relevant literature, the paper consulted relevant agricultural experts, analyzed the comprehensive ability of Agricultural Graduate Students in an all-round and whole process, and focused on the training process of the comprehensive ability of professional graduate students. Based on the analysis of professional characteristics, training effect and effect evaluation system, it is analyzed from three aspects: training objectives, practical teaching and training quality assurance.

### **3.1. Vague Understanding of Training Objectives**

Qualified agricultural graduate students should not only be proficient in the professional theoretical knowledge of

Agronomy, animal husbandry, fisheries, food processing, agricultural development management, rural agricultural engineering, information technology and other related fields, but also have rich experience in agricultural practice and application, so as to achieve the organic combination of agricultural theoretical knowledge and practical experience. Therefore, in the education and training of graduate students majoring in agriculture, we should pay attention to the education of students' agricultural theoretical knowledge and strengthen the cultivation of students' agricultural practical application ability [16]. However, through the investigation, it is found that many teachers in the field of agriculture have some misunderstandings about the training objectives and training mode of master's degree students in agriculture, and lack a clear understanding of the training objectives of the agricultural major, which is mainly reflected in the similarities in the curriculum, teaching and training methods and practical links, so that the differences between the training system of professional and academic graduate students are small. As a result, the training effect of professional masters is poor and the predetermined training objectives are not achieved.

### ***3.2. Insufficient Teaching of Practical Courses***

The training objective of agricultural degree graduates requires that practical education be paid attention to in the training process. College teachers not only need to master profound theoretical knowledge in the field of agriculture, but also need to be familiar with the development of agriculture in China, and have rich practical application experience in agriculture. For a long time, colleges and universities have focused on the cultivation of theoretical knowledge of graduate students in teaching and scientific research, and the cultivation process is mainly carried out around the progress of scientific research projects. The evaluation and incentive mechanism of colleges and universities is mainly based on the performance of scientific research projects and teaching results, which leads most college teachers to pay too much attention to scientific research projects and daily teaching, while ignoring the cultivation of practical ability of professional degree graduate students. After investigation, it is found that most colleges and universities do not pay much attention to practical teaching in the training and education of professional degree postgraduates, nor do they fully cultivate students' abilities in autonomous learning, practical operation, divergent thinking and innovation, and college teachers cannot formulate corresponding training courses according to the characteristics and training objectives of professional degrees.

### ***3.3. Lack of Guarantee of Training Quality Supervision System***

Through the comparative analysis of the training process of agricultural professional degree postgraduates in developed countries such as Europe, America and Japan, it is found that these countries attach great importance to the

practical teaching link in the training process, set up corresponding courses guided by the actual needs of agricultural development, and cultivate the agricultural practical application ability of professional degree postgraduates. Through the survey, it is found that most graduate students with agricultural degrees in China mainly enter agricultural production enterprises after graduation to engage in work related to agricultural industrialization, and less engage in academic and theoretical research. However, at present, many colleges and universities fail to implement the training process for graduate students majoring in agriculture according to the requirements of the training outline, but focus on the improvement of students' theoretical ability, lack the training of students' professional and technical ability to solve practical problems, and lack the connection between theoretical teaching and the practical application needs of agricultural enterprises [17]. Due to the lack of a sound training supervision and evaluation mechanism, colleges and universities have more or less problems in setting up training programs. In this case, the education development level of agricultural graduate students is poorly coordinated with local agricultural development, and the talent demand and quality requirements of agricultural development cannot be solved for a long time.

## **4. Construction of Comprehensive Ability Evaluation System for Professional Degree Postgraduates**

At present, there are many methods to evaluate the comprehensive ability of full-time professional degree graduates, including comprehensive evaluation method, analytic hierarchy process and artificial neural network. Comprehensive ability evaluation is a comprehensive measure of its development. Appropriate and appropriate evaluation indicators must be selected to ensure that the evaluation system is relatively perfect and feasible. By using analytic hierarchy process to evaluate the target object, this method has the characteristics of strong operability and simplicity, and is suitable for solving semi qualitative and semi quantitative problems. This paper tries to analyze from the perspective of practical and comprehensive evaluation. By using the analytic hierarchy process, the evaluation system model of the comprehensive ability of agricultural graduate students is established, so as to evaluate and analyze their comprehensive ability.

The data of the paper was obtained through the sampling survey of eight training bases in Shandong, Jiangsu and Anhui provinces, and the obtained data were collated, evaluated and analyzed. Among them, eight experimental training bases, 80 graduate students majoring in agriculture, 6 powerful agricultural related enterprises and agricultural research institutions were selected, and local third-party evaluation institutions were contacted to conduct a questionnaire survey on the graduates of agricultural degrees of pilot universities, Confirmatory factor analysis was carried

out. In terms of the selection of evaluation factors, the paper consulted more than 130 relevant core journal articles at home and abroad in the past decade, and took the 100 enterprises with the largest number of graduate students as the research object. Through the research on the enterprise recruitment brochures, it preliminarily sorted out 132 factors related to the comprehensive ability of graduate students with agricultural degrees, and counted the occurrence frequency of

each factor, This paper analyzes the basic elements that affect the comprehensive ability of graduate students majoring in agriculture, determines the corresponding evaluation factors, and designs an analytic hierarchy process model structure for improving the comprehensive ability. The model structure is composed of target layer, three first-class indicators and 12 second-class indicators. The model structure is shown in Table 1.

**Table 1.** Analytic hierarchy process model structure for improving comprehensive ability.

Target layer	Primary factor level	Secondary factor level
Comprehensive ability evaluation A	Ideological and political education quality B <sub>1</sub>	System plan C <sub>11</sub>
		Course construction C <sub>12</sub>
		Sense of responsibility C <sub>13</sub>
		Satisfaction C <sub>14</sub>
	Course teaching quality B <sub>2</sub>	Basic course C <sub>21</sub>
		Professional characteristic course C <sub>22</sub>
		Autonomous Learning C <sub>23</sub>
		Divergent thinking C <sub>24</sub>
	Practical training quality B <sub>3</sub>	Practical experience C <sub>31</sub>
		Decision making ability C <sub>32</sub>
		Communication ability C <sub>33</sub>
		Physical fitness C <sub>34</sub>

First, we need to determine the weight of the first level factor layer and the criterion layer, so as to determine the set of evaluation factors. There are three factors in the criterion layer, and  $u_1$ ,  $u_2$  and  $u_3$  are used to represent the three secondary indicators of the second layer respectively. Then the evaluation set  $u = \{u_1, u_2 \text{ and } u_3\}$ , and then five grades are set according to the determined evaluation criteria. The degree of each grade is expressed by very important, generally important, unimportant, ordinary and ineffective, respectively expressed by V1, V2, V3, V4 and V5, and the corresponding scores are 100, 80, 50, 30 and 0 respectively. Finally, the evaluation results are calculated. By means of questionnaire survey, scoring and evaluation, the instructors of colleges and enterprises are invited to evaluate the comprehensive ability of graduate students majoring in agriculture, count the frequency  $M_{ij}$  of each factor evaluation standard, so as to calculate the score of each factor, and normalize the data, so as to obtain the weight value of each factor index. The calculation results are shown in Table 2.

**Table 2.** Criterion layer weight.

Evaluation objectives	Factor indicators	Coefficient
Comprehensive ability of professional degree graduate students	Quality of Ideological and Political Education	0.3137
	Course teaching quality	0.2637
	Practical training quality	0.4226

To determine the weight of each factor of the index layer, first construct a judgment matrix, and compare the importance of the elements of the index layer and the standard layer by questionnaire. Through the comparison of their importance, the judgment matrix of the index layer to the standard layer and the standard layer to the index layer is obtained by using the scaling method, and the weight value of each level is obtained by sorting a single level and checking its consistency. Finally, the maximum eigenvalue of

each matrix is calculated to obtain the normalized vector  $W$ . When  $CR < 0.1$ , the consistency requirements are met.

$$CR = \frac{CI}{RI}$$

Where,  $CI = \frac{\lambda_{max} - n}{n - 1}$ ,  $n$  is the order of the matrix. Thus, the judgment matrix of the index layer for  $B_1$ ,  $B_2$  and  $B_3$  and the judgment matrix of the standard layer for  $C_{11}$ - $C_{34}$  are calculated respectively. Through the calculation, it is concluded that:  $CR < 0.1$ , the consistency ratio meets the requirements of consistency.

Finally, the overall ranking of each level is carried out, and the consistency test is carried out, so that  $W = [w_1, w_2, w_3]$ ,  $w_i = [w_{i1}, w_{i2}, \dots, w_{ij}]$ , where  $i$  is 1, 2, 3 respectively,  $j$  represents the number of indicators contained in the standard layer  $B_i$ , and the calculation formula of the comprehensive weight of indicators is  $A_{ij} = W_i \times W_{ij}$ .

Through the assignment of importance and weight of the established hierarchical evaluation model, and the relevant calculation according to the analytic hierarchy process, it is concluded that the first two comprehensive weights of the second level indicators are  $B_3$  practice training quality and  $B_2$  course teaching quality, and the first five indicators of the comprehensive weight are ranked, which are practical experience, divergent thinking, decision-making ability, sense of responsibility and physical quality.

## 5. Research on the Construction of Training Mode and Countermeasures for Improving Comprehensive Ability

Through the ranking of the comprehensive weight indicators obtained from the above analysis, we can put

forward the problem of improving the comprehensive ability of professional degree graduate students. We need to focus on improving students' practical experience, divergent thinking, decision-making ability, sense of responsibility and physical quality. This requires colleges and universities to cooperate with local governments and enterprises to build a multi-level training curriculum system and build a practical platform for improving students' comprehensive ability, and establish the corresponding effect evaluation system as the quality assurance. The specific suggestions put forward in the paper are as follows:

### **5.1. Build a Multi-level Training Curriculum System**

The cultivation of professional degree graduate students' comprehensive ability needs a perfect curriculum system as a guarantee, and the improvement of the curriculum system needs to match the local economic and social development, and the curriculum system needs to be gradually decomposed into different levels of training objectives. Therefore, in the training process, we need to pay attention to the practical and applied characteristics of professional degrees, and set up the corresponding curriculum training system, teaching methods and teaching practice content. In terms of teaching methods for professional degree graduate students, we need to break through the traditional pure theoretical teaching methods for academic graduate students, and transform to practical teaching methods; In the design and arrangement of courses, we need to further improve the proportion of practical application courses, and pay attention to the training requirements of comprehensiveness and professionalism, commonness and individuality, theoretical teaching and practical application. In the arrangement of course content, we need to combine the distribution of theoretical courses and practical application courses, and improve the proportion of practical application courses in the whole course arrangement. The course content should mainly cultivate students' ability to analyze, solve problems and innovate.

### **5.2. Strengthen the Construction of Practice Platform**

In view of the problem of how to cultivate high-level applied talents to meet the needs of local economic and social development, due to the lack of student practice bases and practical teachers in Colleges and universities, students lack practical experience, which requires colleges and universities to establish a joint practical training platform with local governments and enterprises, so that students can get the training of theoretical courses and practical application courses in Colleges and universities and enterprises, and finally realize resource complementarity. In the process of building a school enterprise practice platform, enterprises can realize the reserve of human resources. After graduation of professional degree postgraduates, enterprises can recruit excellent postgraduates who have practiced to work in enterprises. At the same time, if enterprises encounter technical problems in the process of R & D and production, they can carry out scientific and technological cooperation

with colleges and universities through the joint practice platform of colleges and enterprises, so as to solve the problems encountered in R & D and production. Graduate students with professional degrees who participate in enterprise practice can help enterprises apply for national patents and publish papers in relevant journals, which not only accelerates the application of scientific research results, but also improves the popularity of enterprises and their brands. Through the industry university research practice platform built between universities and enterprises, the complementary advantages and multi-directional cooperation between the two sides are guaranteed.

### **5.3. Constructing the Evaluation System of Comprehensive Ability Training Effect**

Due to the application-oriented characteristics of professional degrees, the training effect of professional degree postgraduates needs not only to be assessed from the aspects of ideological quality, theoretical courses, paper quality, innovation ability, but also to pay attention to the assessment of practical ability. Therefore, the evaluation system of comprehensive ability training effect is a multi-directional and diversified evaluation system, which includes the government's evaluation of colleges and universities, colleges and universities, students' evaluation of teachers, Students to universities and enterprises to students. In the training practice of professional degree graduate students, the evaluation index of its practical effect needs to be formulated according to the practice content of its major, the multi-dimensional evaluation mechanism such as student or group mutual evaluation, practice training base evaluation, achievement reporting needs to be established, and the standard for awarding professional degrees needs to be formulated according to the training objectives and characteristics of professional degrees. For the evaluation of students' comprehensive ability, it is necessary to fully consider the application-oriented characteristics of professional degrees. The form of assessment can adopt investigation reports, project analysis, curriculum design, scoring evaluation and other methods to realize the comprehensive evaluation of the ideological quality, theoretical knowledge, practical application ability and other aspects of professional degree graduate students. By improving the quality assurance mechanism of professional degree practice, and introducing the assessment mechanisms of college practice evaluation, enterprise evaluation and practice achievement evaluation, we can provide institutional guarantee for the improvement of professional degree graduate students' practical application ability.

## **6. Summary**

In this paper, a three-level analysis model for the improvement of the comprehensive ability was constructed, the order of the comprehensive weight indicators was analyzed. It was found that the proportion of practical

experience, divergent thinking, decision-making ability, sense of responsibility and physical quality were high. This paper also proposed that colleges and universities need to work with local governments and enterprises to setup a new training curriculum system with multi levels, build a practical platform to improve students' comprehensive ability, and establish a corresponding effect evaluation system for better improvement of professional degree graduate students' comprehensive abilities.

## Conflicts of Interest

The authors declare that they have no competing interests.

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