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Retraction

Retracted: Analysis and Construction of Software Engineering OBE Talent Training System Structure Based on Big Data

Security and Communication Networks

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This article has been retracted by Hindawi, as publisher, following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of systematic manipulation of the publication and peer-review process. We cannot, therefore, vouch for the reliability or integrity of this article.

Please note that this notice is intended solely to alert readers that the peer-review process of this article has been compromised.

Wiley and Hindawi regret that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

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[1] Z. Jie, "Analysis and Construction of Software Engineering OBE Talent Training System Structure Based on Big Data," *Security and Communication Networks*, vol. 2022, Article ID 3208318, 10 pages, 2022.

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Research Article

Analysis and Construction of Software Engineering OBE Talent Training System Structure Based on Big Data

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Software engineering is one of the most active fields of entrepreneurship and innovation in the world, and it is also the core field of the information technology industry. Software talents as the foundation and support are an important weight to determine the future direction of my country's software engineering. How to make colleges and universities cultivate compound software talents with innovative ability and engineering ability and how to guide students to closely combine innovative thinking with social practice are a major challenge faced by the current software process education in colleges and universities in my country. At present, the overall quality of software engineers is poor, which cannot meet the needs of enterprises and training objectives. This paper puts forward the application of the OBE (outcome-based education) model in the training of software talents, which can effectively solve the current problems of talent quality and social demand. The analysis shows that there is a high correlation between collaborative education and satisfaction, and the collaborative education model can effectively improve satisfaction. The investment of scientific research funds can effectively improve the overall quality of scientific research team members. The OBE talent training mode can effectively improve the overall test effect, whether in the experimental set or the test set, the test result of the OBE talent training structure is still the highest, the accuracy rate can reach 94.23%, the recall rate can reach 94.51%, and the F1 value can reach 95.13%. It is fully explained that the identification accuracy is the highest when the OBE talent-training structure is adopted.

1. Introduction

The OBE concept is a result-oriented advanced educational concept, which has gradually become the mainstream educational concept to which developed countries pay more attention. Facing the rapid development of information science and technology and the society's demand for compound skilled talents, technical colleges have put forward a new direction for the training of computer professionals. By introducing the concept of OBE education, the overall quality of talents can be improved. Promote the long-term development of talents, improve the teaching effect, and greatly improve the social competitiveness of talents. This paper studies the construction of circuit and electronic technology courses based on the OBE talent training model and puts forward feasible suggestions [1]. It discusses the training of computer hardware talents and proposes a progressive training model for computer hardware talents based on OB [2]. Based on the concept of OBE, this paper realizes the goal of training high-quality applied talents for English majors in private colleges and universities [3]. Through the in-depth analysis of the professional development of human resource management in our school, this paper summarizes the development status of human resource management based on the concept of OBE [4]. How to introduce OBE theory into the talent training process of higher education in China has become an important issue [5]. It starts from the basic principles of construction and environmental professional personnel training and gives specific construction measures for the professional personnel training model from the whole process of training [6]. It shows that "result-oriented, student-centered continuous improvement" is the core of engineering education certification in my country [7]. Based on achievement education and the CDIO (conceive design implement operate) education model, combined with emerging engineering education, this paper proposes a training model for engineering education in China [8]. Based on the concept of OBE in the vocational education talent training project, this paper adjusts the curriculum system and reforms the teaching mode and the teaching method, in order to continuously improve the teaching quality [9]. Based on the concept of OBE engineering education, this paper proposes new concepts, new methods, and new achievements with characteristics in view of the new problems faced by the innovation of the talent training model [10]. In the context of China's "One Belt, One Road" strategy, this article discusses a new model for talent training [11]. According to the concept of OBE, it puts forward new challenges to the revision and improvement of the training objectives of engineering and technical personnel [12]. It expounds on several different aspects that the introduction of the OBE concept into the reform of the vehicle engineering talent training mode has played a positive role in cultivating students' knowledge, ability, and quality [13]. From the perspective of OBE, it clarifies the requirements of the training program and designs a training program evaluation system based on the OBE concept [14]. It explores the advanced education concept of OBE based on the current ability training guide for talent training [15]. The above literature has carried out a large number of descriptions on the application of the OBE mode in personnel training, starting from the needs of different professional construction and the corresponding training programs, but it has not evaluated the effect of OBE personnel training, and the overall advantages have not been effectively reflected. The second part explains the training of OBE talents, the third part explains the theory of the OBE talent training structure model, and the fourth part compares the training effect of the OBE mode and other modes in software engineering.

The OBE Model is applied to personnel training, curriculum construction, professional construction, and so on. It can effectively evaluate the quality of personnel training and achieve the training effect. In this paper, the OBE Model is applied to verify the goal of software engineering personnel training, through improving the software training process, to achieve the talent training mode of enterprise demand as the goal.

2. OBE Talent Training System Structure Construction

2.1. OBE Mode. In the OBE model education, the four important operational components of curriculum structure, knowledge imparting process, students' performance evaluation and ability certification, and students' positioning and development are related to each other, which are different from those in the traditional teaching model. What OBE proposes is a set of methods for designing, implementing, documenting, and reflecting on teaching objectives that are different from traditional educational models. Facts also proved that many schools organize teaching activities around the teaching goals determined according to their own characteristics and finally make students and schools achieve common progress. The internal organizational relationship of the OBE model is shown in Figure 1.

2.2. Analysis of Talent Training. Under the OBE concept, the curriculum system and teaching plan should be formulated according to the graduation requirements, and the requirements that computer majors need to meet for graduation should be defined so as to carry out targeted teaching activities. Therefore, they should be carried out from the following aspects: first, with the professional ability assessment standards for computer majors as a guide, through information means to the relevant enterprises, departments, industries, and professional teachers, evaluation of the current graduation requirements, solicitation of opinions, and provision of feedback on the technical colleges. The graduation requirements of computer professional-skilled talents in the school are analyzed and requested, so as to form a unified opinion. The dimensions of professional talent training analysis are shown in Table 1.

3. Establishment of the OBE Talent Training Structure Model

3.1. Analysis of the Talent Training Model. The index reflects the control of the talent source by the talent system of the college in the actual implementation process. The specific calculation method is shown in the following equation [20]:

$$I_1 = \frac{N_{yyk}}{N_{jh}} \times 100\%. \tag{1}$$

Here, N_{yyk} represents the total number of people who enter vocational schools to study each year and N_{jh} represents the total number of planned enrollment of vocational schools in that year.

The formula for calculating the quality level of potential talents is as follows:

$$I_2 = \frac{1}{n} \sum \text{Score}_{yi}. \tag{2}$$

The theoretical training effect is shown in the following equation:

$$I_3 = \frac{1}{N_s} \sum \frac{1}{N_{bk}} \sum \text{Score}_{jlj}, \quad i = 1, 2, \ldots, N_s. \tag{3}$$

The effect of vocational theory training is shown in the following equation:

$$I_4 = \frac{1}{N_s} \sum \frac{1}{N_{lk}} \sum \text{Score}_{lli}, \quad i = 1, 2, \ldots, N_s. \tag{4}$$

The professional skill training effect is shown in the following equation:

$$I_5 = \frac{1}{N_s} \sum \frac{1}{N_{sk}} \sum \text{Score}_{lsi}, \quad i = 1, 2, \ldots, N_s. \tag{5}$$

The practical ability training effect is shown in the following equation:

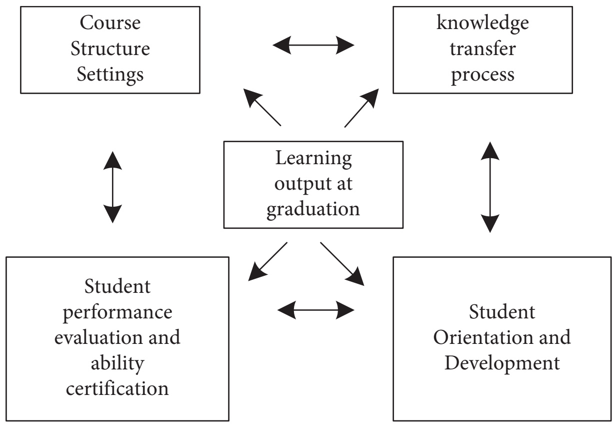

Figure 1: Internal organizational relationship of the OBE model.

$$I_6 = \frac{1}{N_{ls}} \sum \frac{1}{N_t} \sum \text{Score}_{lzi}, \quad i = 1, 2, \ldots, N_{ls}. \tag{6}$$

Investment in infrastructure in the process of talent training is as follows:

$$I_7 = \frac{\sum F_m}{\sum A_n} \times 100\%. \tag{7}$$

The degree of emphasis placed on vocational skill training in higher vocational colleges is shown in the following equation [21]:

$$I_8 = \frac{\sum P_k}{\sum S_h} \times 100\%. \tag{8}$$

The talent system attaches importance to information and professional talent performance appraisal as shown in the following equation:

$$I_9 = \frac{\sum V_1}{\sum S_h} \times 100\%. \tag{9}$$

Emphasis on relearning ability is shown in the following equation:

$$I_{10} = \frac{N_{ce}}{N_{pz}} \times 100\%. \tag{10}$$

The degree of emphasis on talents in the process of vocational skill talent allocation is shown in the following equation [22]:

$$I_{11} = \frac{\sum HR_j}{\sum F_j} \times 100\%. \tag{11}$$

The theoretical level of professional talent system training talents is as follows:

$$O_1 = \frac{\sum N_{li}}{N_{pz}} \times 100\%. \tag{12}$$

The level of the professional talent system to cultivate skilled talents is as follows:

$$O_2 = \frac{N_{pz}}{N_{ls}} \times 100\%. \tag{13}$$

Supply capacity of professional talents is shown in the following equation [23]:

$$O_3 = \frac{\sum P_{hx}}{\sum P_t} \times 100\%. \tag{14}$$

The ability of professional talents to use professional skills is as follows:

$$O_4 = \frac{\sum P_{zy}}{\sum P_t} \times 100\%. \tag{15}$$

Professional talents' practical skill inheritance ability is shown in the following equation:

$$O_5 = \frac{\sum S_{dn}}{\sum S_t} \times 100\%. \tag{16}$$

Re-learning ability of professional talents is shown in the following equation:

$$O_6 = \frac{\sum K_{dn}}{\sum K_n} \times 100\%. \tag{17}$$

The consistency check is shown in the following equation [24]:

$$CI = \frac{\lambda_{\max} - n}{n - 1}. \tag{18}$$

The normalization formula is shown in the following equation [25]:

$$b_{ij} = \frac{a_{ij}}{\sum_{i=1}^{n} a_{ij}} i, j = 1, 2, 3, 4, 5. \tag{19}$$

4. Simulation Experiments

4.1. Comparative Experiment. In order to verify the effect of the software engineering OBE talent training model based on big data, we conducted a three-year practice of the talent training program model for software engineering majors in a university and compared it with the students who did not go through the talent training program. Judging from the employment situation of fresh graduates in the past three years, compared with before practice, the employment ratio of software engineering graduates in well-known IT companies has increased by one grade, and the average monthly salary of graduates has also increased. The comparison results of graduation quality in the past three years are shown in Table 2.

According to the statistical results in Table 2 and Figure 2, it can be concluded that after the implementation of the new model, the employment ratio of well-known enterprises has increased from 60% to more than 80%, and the average monthly salary of graduates has increased from 5,000 yuan to 7,000 yuan. The purpose of the experiment is to test the situation of enterprises and employment

Table 1: Analysis dimensions of professional talent training.

Analysis dimension	Illustrate
Talent training goals	The determination of talent training goals is the initial point of implementation of higher education, which reflects the fundamental pursuit of specific majors [16]
Type of course structure	The construction of a specific structure and type of the course group is the most basic and most valuable service that a specific major of a university can provide [17]
Teaching method	The innovation of teaching methods is the use of high-quality educational resources of various majors by universities in the process of talent training, which reflects the educational concept and education ability of specific majors [18]
Evaluation of training results	Result evaluation is a measure of the effectiveness of specific professional personnel training. The evaluation methods, evaluation content, evaluation process, and other evaluation systems themselves reflect the professional value orientation and business pursuit [19]

Table 2: Graduation quality comparison results in the past three years.

Year	High-quality employment (%)	Average monthly salary of graduates/yuan
Graduated in 2018 (after the implementation of the new model)	88.9	7520
Graduated in 2017 (after the implementation of the new model)	81.8	7180
Graduated in 2016 (before the implementation of the new model)	62.3	5250

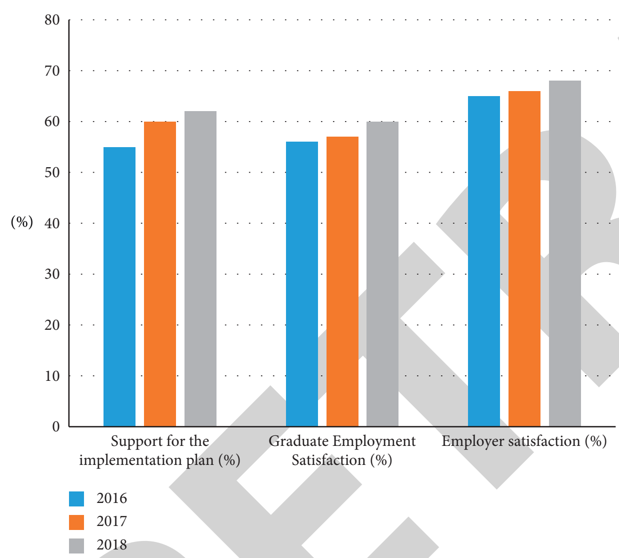

Figure 2: The statistical chart of the survey before the implementation of the scheme.

satisfaction before and after the implementation of the new model by adjusting the feedback of the recent three graduates. The specific survey data are as follows.

According to the survey results in Table 3 and Figure 3, we can conclude that before the implementation of the talent training plan, the overall satisfaction level was at a low level. The highest level of support for the implementation of the plan is only 60%, the highest level of employer satisfaction is 68%, and the average monthly salary of graduates is also at a low level.

According to the experimental data in Table 4 and the statistical results before the practice of the talent training program, the related satisfaction of the graduates has improved by leaps and bounds. The graduates' support for the collaborative education model after the implementation is above 90%. Employment satisfaction increased from 56% in 2016 to over 96% in 2018 compared to 2016 graduate employment satisfaction before the program was implemented. At the same time, employers' satisfaction with the quality of graduates has also increased from 65% before the implementation in 2016 to more than 98% after the implementation. Based on the survey results, the implementation of the new model has also improved the comprehensive literacy of students in software engineering. In the process of software analysis and design, students continue to summarize, report, discuss, make videos and report PPT, and condense innovation points, so students' literacy in summary, analysis, expression, reporting, and communication has significantly improved.

The implementation of the new model has also recognized the innovation of the software achievements of the fresh students in the practice session. Comparing before and after the implementation of the new model, it is found that in 2017 and 2018, fresh students applied for more than 30 University of Electronic Science and Technology College Students' innovation and entrepreneurship funds. The number of participants accounts for more than 60% of the total number of participants. The software works participated in Microsoft Global Embedded It has won more than 10 awards in various IT and software competitions, such as the "China Cup" software design competition for college students, and the number of participants accounted for more than 25% of the total number of participants, whether in terms of the number of projects, the number of awards, or the proportion of participants, compared with 2016 before the implementation, and the specific situation is shown in Table 5.

4.2. Analysis of Influencing Factors. In order to further quantitatively analyze the influencing factors of industry-university-research cooperation on the cultivation of

Table 3: The satisfaction survey before the implementation of the new model.

Year	Support for the implementation plan (%)	High-quality employment (%)	Employer satisfaction (%)
2016	55	56	65
2017	60	57	66
2018	62	60	68

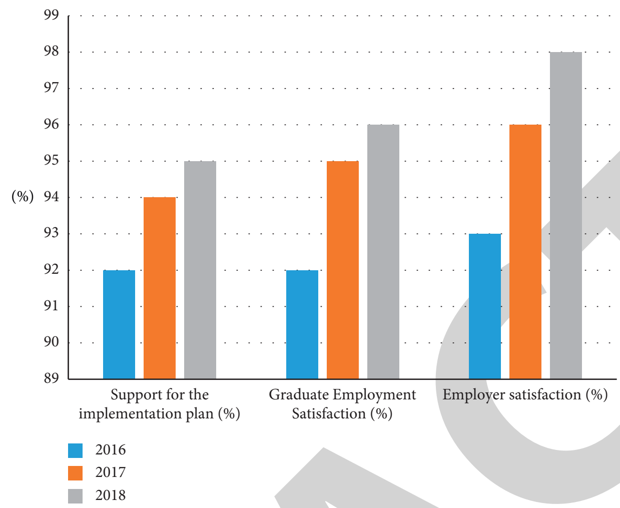

Figure 3: The statistical chart of the survey after the implementation of the scheme.

Table 4: The satisfaction survey after the implementation of the new model.

Year	Support for the implementation plan (%)	High-quality employment (%)	Employer satisfaction (%)
2016	92	92	93
2017	94	95	96
2018	95	96	98

Table 5: Comparison of project approval and award-winning data in the past three years.

Years	Innovation and entrepreneurship fund/project	Participation ratio (%)	Discipline competition award/item	Participation ratio (%)
Graduated in 2018 (after the implementation of the new model)	18	80	5	30
Graduated in 2017 (after the implementation of the new model)	12	60	5	25
Graduated in 2016 (before the implementation of the new model)	5	10	2	8

innovative talents, the empirical research method was adopted in the experiment. The collected questionnaires are analyzed by weight, and the results are as follows.

According to the above results, after the grey correlation analysis, it can be obtained that among the influencing factors of industry-university-research cooperation on the cultivation of innovative talents, the level of scientific research has the greatest impact on the cultivation of innovative talents, and the subject patents have the least impact on the cultivation of innovative talents. The investment of scientific research funds and the number of personnel engaged in scientific research activities have basically the same influence on the cultivation of innovative talents, and the influence ability is relatively weak. The environment of industry-university-research cooperation has a greater impact on the cultivation of innovative talents, and the perfect network and environment construction are ranked second and third, respectively, as shown in Figures 4–6 and Tables 6–8.

4.3. Model Checking. The talent training structure model has a great role in promoting the efficiency of talent training. The experiment combines the talent training structure model proposed in the article with the traditional talent training structure, the industry-university-research cooperation talent training structure, and the control teaching talent

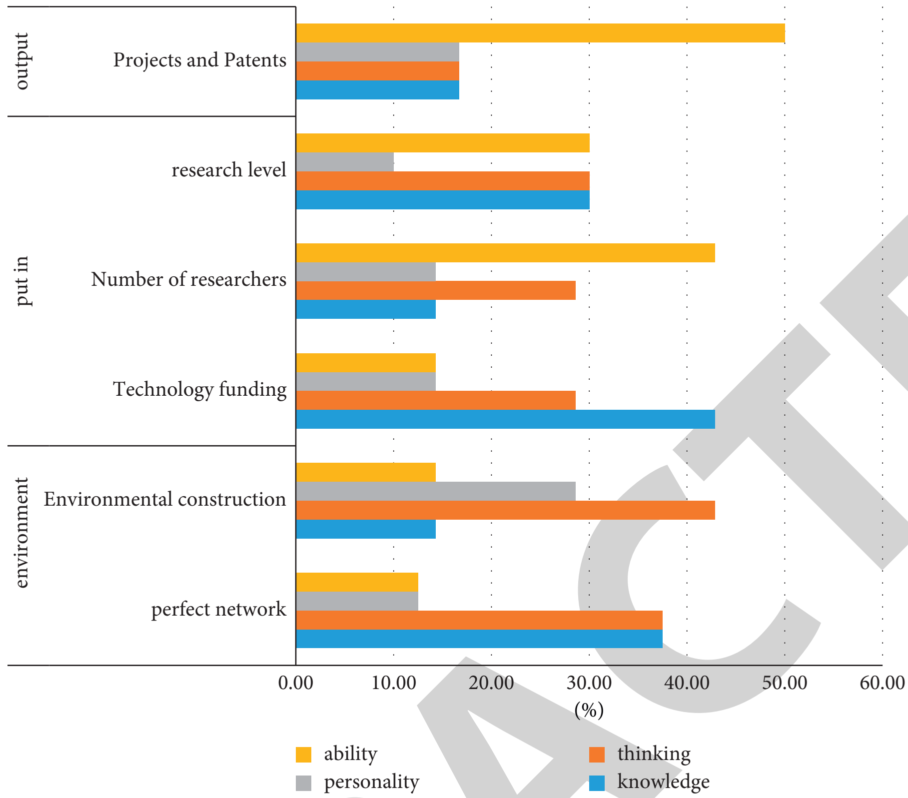

FIGURE 4: The statistical chart of horizontal proportion.

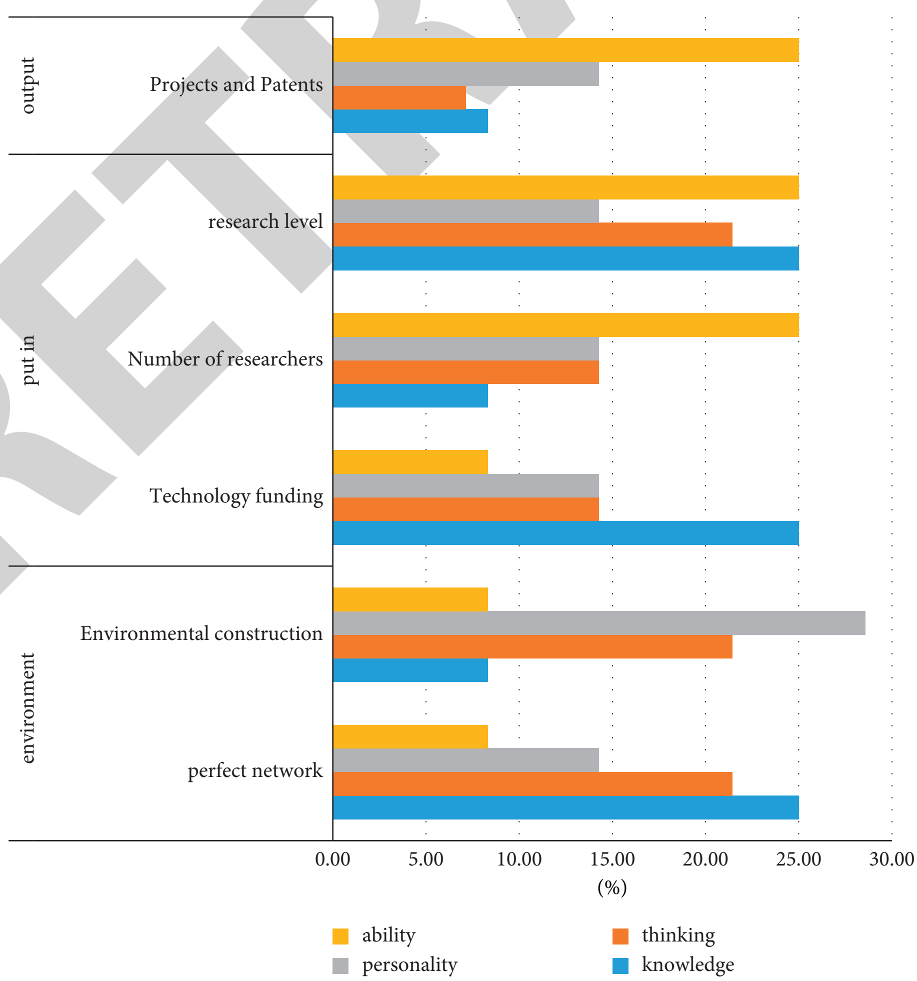

FIGURE 5: Vertical proportion statistical chart.

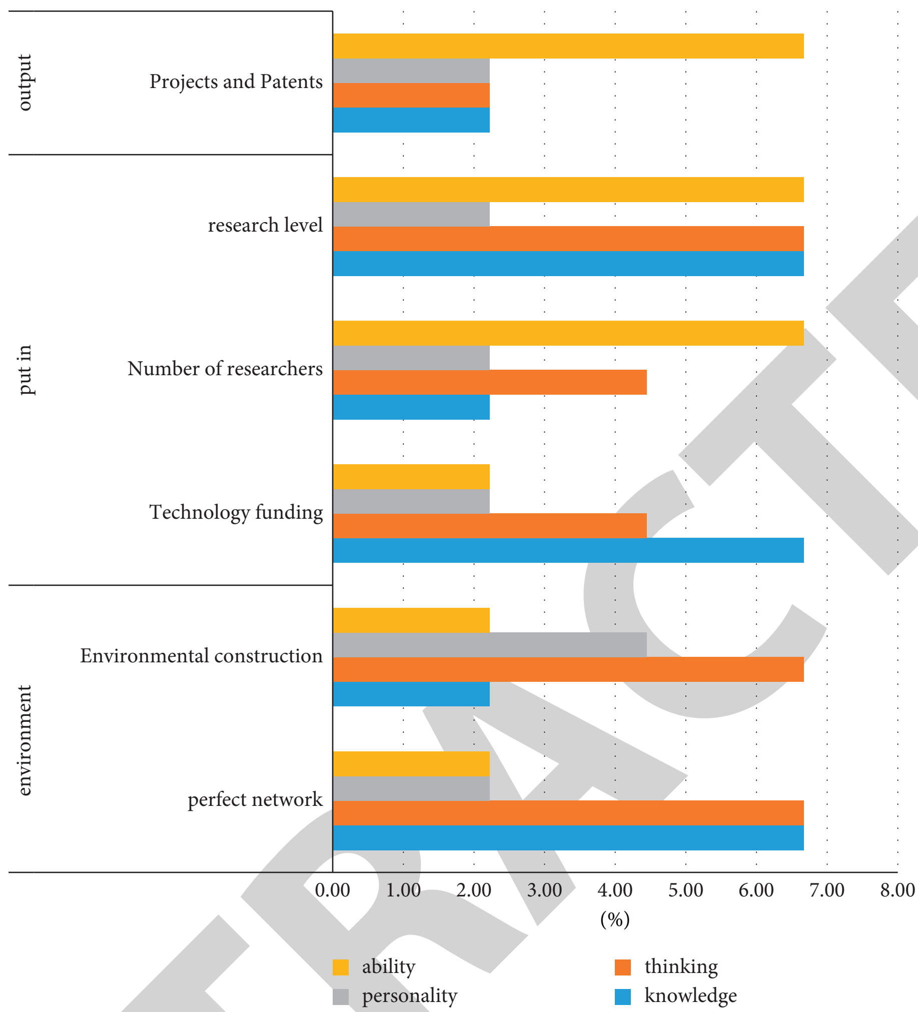

Figure 6: Vertical proportion statistical chart.

Table 6: Horizontal proportion of the impact of industry-university-research cooperation on the cultivation of innovative talents.

Operation	Technical index	Knowledge (%)	Thinking (%)	Personality (%)	Ability (%)
Environment	Perfect network	37.50	37.50	12.50	12.50
	Environmental construction	14.29	42.86	28.57	14.29
Input	Technology funding	42.86	28.57	14.29	14.29
	Number of researchers	14.29	28.57	14.29	42.86
	Research level	30.00	30.00	10.00	30.00
Output	Projects and patents	16.67	16.67	16.67	50.00

training structure in different dimensions so as to test the performance of different models. The specific experimental data are shown in Tables 9 and 10.

According to the experimental data in Table 9 and Figure 7, the test result of the OBE talent training structure proposed in the article is the highest, indicating that the performance of the OBE talent training structure is the best, and the accuracy rate of talent training can reach 96.23%. The training effect is not ideal, the talent training plan is not perfect, and the detection value of the industry-university-research cooperation talent training structure and the control teaching talent training structure is between the highest value and the lowest value. According to the graph, it can be seen that the data of the OBE talent training structure are relatively stable, and the experimental data also show that the OBE talent training structure has a great role in promoting talent training.

According to the data in Table 10 and Figure 8, it is concluded that the OBE talent training structure has the highest accuracy rate for talent cultivation, and the detection accuracy rate remains above 94%, indicating that the test results are excellent and can meet the requirements of most talent cultivation. The graph of the OBE talent training structure also shows a stable situation, which is better than

Table 7: Vertical proportion of the impact of industry-university-research cooperation on the cultivation of innovative talents.

Operation	Technical index	Knowledge (%)	Thinking (%)	Personality (%)	Ability (%)
Environment	Perfect network	25.00	21.43	14.29	8.33
	Environmental construction	8.33	21.43	28.57	8.33
Input	Technology funding	25.00	14.29	14.29	8.33
	Number of researchers	8.33	14.29	14.29	25.00
	Research level	25.00	21.43	14.29	25.00
Output	Projects and patents	8.33	7.14	14.29	25.00

Table 8: The overall proportion of the impact of industry-university-research cooperation on the cultivation of innovative talents.

Operation	Technical index	Knowledge (%)	Thinking (%)	Personality (%)	Ability (%)
Environment	Perfect network	6.67	6.67	2.22	2.22
	Environmental construction	2.22	6.67	4.44	2.22
Input	Technology funding	6.67	4.44	2.22	2.22
	Number of researchers	2.22	4.44	2.22	6.67
	Research level	6.67	6.67	2.22	6.67
Output	Projects and patents	2.22	2.22	2.22	6.67

Table 9: The performance of each model in the experimental set.

Model	Precision (%)	Recall (%)	F1 score (%)
OBE talent training structure	96.23	97.12	97.56
Traditional talent training structure	62.13	63.14	63.45
Industry-university-research cooperation talent training structure	82.12	83.14	85.16
Control the training structure of teaching talents	85.26	86.24	86.78

Table 10: The performance of each model in the test set.

Model	Precision (%)	Recall (%)	F1 score (%)
OBE talent training structure	94.23	94.51	95.13
Traditional talent training structure	65.36	66.12	66.23
Industry-university-research cooperation talent training structure	80.13	80.24	80.49
Control the training structure of teaching talents	83.36	83.49	84.13

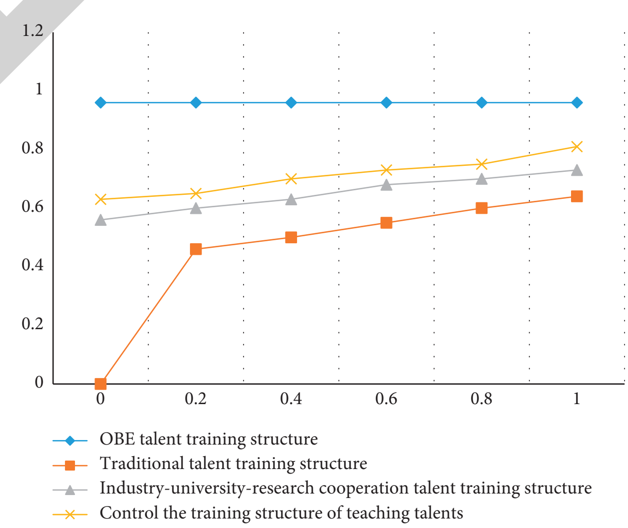

Figure 7: ROC curve in the test set.

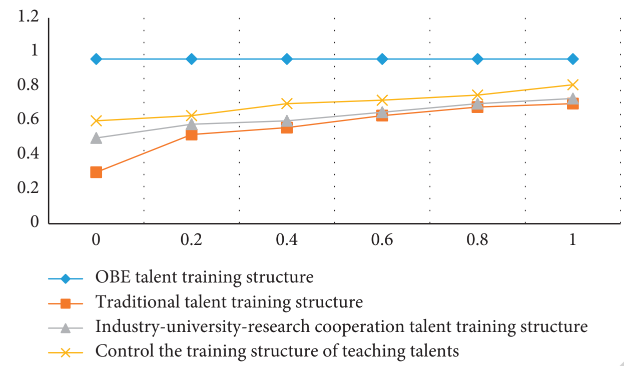

Figure 8: ROC curve in the test set.

the performance of other models, which shows that the talent training model proposed in this paper can be applied in the talent training scheme.

5. Conclusion

The task of higher education is to cultivate a group of high-quality innovative talents for the country. Facing the requirements of "new engineering," this paper focuses on "what kind of talents should be cultivated to meet the requirements of software engineering" and in order to achieve such a training goal, a professional talent training system of school enterprise integration and collaborative education is studied and constructed. Establish the talent training goal with "high-level and application-oriented" as the core, and implement it based on social needs. It is a professional training mode of gradual school-enterprise in-depth cooperation for four years in the university.

Data Availability

The experimental data used to support the findings of this study are available from the author upon request.

Conflicts of Interest

The author declares no conflicts of interest regarding this work.

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