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Research on Deepening the Integration Mechanism of Industry and Education in Higher Vocational Colleges to Promote Rural Revitalization under the Background of Double High School—Taking Yangling Vocational and Technical College as an Example

Shuantao Dong*

College of Mechanical and Electrical Engineering, Yangling Vocational & Technical College, Yangling, Shaanxi, 712100, China
1134538686@qq.com
**Corresponding author*

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Abstract: In the context of the construction of "double high" (high-level vocational schools and high-level professional groups), vocational colleges, as important bases for cultivating technical and skilled talents, are increasingly playing a prominent role in promoting rural revitalization. As a leading agricultural vocational college, Yangling Vocational and Technical College actively explores the mechanism of industry education integration (IEI) to promote rural revitalization. However, current vocational colleges still face the problems of insufficient depth of industry education integration and a disconnect between talent training models and industrial demands in deepening the integration of industry and education and serving rural revitalization. This article first introduces the background and challenges of deepening the integration mechanism of industry and education in vocational colleges to promote rural revitalization under the background of dual high schools. Then, this article elaborates in detail on the practical exploration of Yangling Vocational and Technical College in the integration of industry and education, including the integration mode of industry and education, talent training system, social services, and technological innovation. Furthermore, this article analyzes the promoting effect of the integration mechanism of industry and education in Yangling Vocational and Technical College on rural revitalization through experimental investigation results. The experimental survey results show that in terms of student internship satisfaction, the experimental group has a satisfaction rate of 85%, which is much higher than the reference group's 70%. The teacher participation rate of the experimental group also reaches 90%. In terms of graduate employment rate, the experimental group has a higher employment rate of 92% than the reference group's 80%, with a difference of 12%. This further proves the outstanding performance of the experimental group in improving students' employability and expanding employment channels, providing strong support for rural revitalization.

1. Introduction

With the deepening implementation of the national strategy for rural revitalization, vocational colleges, as an important force in cultivating technical and skilled talents and promoting technological innovation, play an increasingly important role in promoting rural revitalization. In the context of the "dual high" construction, vocational colleges need to further improve the quality of talent cultivation, deepen the mechanism of IEI, in order to better serve rural revitalization. Currently, research on the integration mechanism of industry and education in vocational colleges mainly focuses on the integration mode of industry and education, talent training system, social services, and technological innovation. However, there is relatively little research on how vocational colleges can deepen the mechanism of IEI to promote rural revitalization, and there is a lack of specific practical cases.

This article first introduces the research background and challenges, then analyzes the shortcomings of relevant literature, and then elaborates in detail on the practical exploration of Yangling Vocational and Technical College in the integration of industry and education. Through experimental investigation results, analysis and discussion are conducted, and finally the research conclusions and future improvement directions are summarized. Specific practical cases of Yangling Vocational and Technical College deepening the mechanism of IEI to promote rural revitalization are provided, which can provide reference experience and inspiration for other vocational colleges.

2. Related Work

Scholars' research on the integration mechanism of industry and education in vocational colleges mainly focuses on the integration mode of industry and education, talent training system, social services, and technological innovation. Scholars have conducted in-depth research on multiple themes, including vocational education, urban-rural development, regional innovation, and green development, in response to the aforementioned sectors. Xue et al. [1] explored the type based vocational education system in China, aiming to understand its characteristics and advantages; Fang [2] focused on the strategy of urban-rural integration development. Wang Y et al. [3] studied the role of digital economy in promoting urban-rural integration through Chinese case studies, while SUN et al. [4] analyzed the mechanism and optimization path of comprehensive land consolidation to promote urban-rural integration. Tang [5] emphasized the strategic position of world-class universities in regional innovation systems, particularly in the application of the Greater Bay Area in China and the academic community in Hong Kong. Deng et al. [6] used developmental geography methods to explore solutions for promoting regional development. Mei et al. [7] revealed the challenges of school wide entrepreneurship education in Chinese higher education institutions. Guo et al. [8] studied sustainable poverty alleviation and green development in underdeveloped areas of China. Wang G et al. [9] explored the influence of Confucian tradition on the status of vocational education in China; Wang Z et al. [10] compared the labor market outcomes of Chinese academic and vocational education graduates, questioning whether vocational education is a suboptimal choice. These documents collectively point out the problems in current research, such as unclear positioning of vocational education, uneven urban-rural development, and imperfect regional innovation mechanisms, and provide targeted insights and suggestions, providing new perspectives and paths for research and practice in related fields [11].

3. Method

3.1 Integration Mechanism of Industry and Education

The cooperation between Yangling Vocational and Technical College and enterprises to establish a training base is an important manifestation of the integration of industry and education. This collaborative model not only provides students with a real professional environment, but also promotes the deep integration of theory and practice. Training bases are usually built according to the actual needs of enterprises, equipped with advanced equipment and technology, so that students can receive skill training that matches the actual production of enterprises here. In the training base, students can participate in actual production projects of enterprises to understand their operational processes, management systems, and cultural atmosphere. This firsthand experience helps to enhance students' professional competence and comprehensive abilities, laying a solid foundation for their future career development. In addition to the training base, Yangling Vocational and Technical College also collaborates with enterprises to jointly establish research and development centers. The R&D center is an important platform for colleges and enterprises to carry out technological innovation and product research and development. Here, the research team of the college works closely with technical personnel from enterprises to overcome technical difficulties and promote the transformation and application of scientific and technological achievements. By jointly building research and development centers, the college can not only timely understand the technological and market needs of enterprises, but also transform scientific research achievements into actual productivity, providing strong technical support for the development of enterprises. At the same time, this cooperation model also helps to enhance the research level and innovation capability of the college, promote the discipline construction and professional development of the college. In the process of integrating industry and education, resource sharing and complementary advantages between colleges and enterprises are the key to achieving a win-win situation. The college has abundant teaching resources and research capabilities, while enterprises have market resources and production experience. By jointly building training bases and research and development centers, both parties can fully utilize their respective advantageous resources, achieve optimized allocation and efficient utilization of resources [12].

3.2 Promoting Role of Rural Revitalization

Rural revitalization is an important strategy for current national development, and vocational colleges, as important bases for talent cultivation and technological innovation, play an irreplaceable role in promoting rural revitalization. As an agricultural vocational college, Yangling Vocational and Technical College has provided strong support and promotion for rural revitalization by deepening the integration mechanism of industry and education. Yangling Vocational and Technical College has provided a large number of compound talents with agricultural technology knowledge, management ability, and innovative spirit for rural revitalization through the mechanism of IEI. The college focuses on the establishment of professional courses and the strengthening of practical teaching. Through cooperation with actual employers such as enterprises and agricultural cooperatives, it carries out educational models such as engineering integration and on-the-job internships, so that students can be exposed to the actual work environment, understand industry needs, and enhance vocational skills and employment competitiveness during their learning period. The school has provided comprehensive support for rural revitalization by building a diversified talent training system, strengthening cooperation with agricultural research institutions, enterprises, and government departments, and jointly developing courses and majors that meet the needs of rural revitalization [13-14].

3.3 Reform of Talent Training System

In today's rapidly changing market environment, seamless integration between talent cultivation and market demand has become a common goal pursued by educational institutions and enterprises. To achieve this goal, the college has collaborated with enterprises to explore efficient new models for talent cultivation. Order based training refers to the joint development of talent training plans by colleges and enterprises based on market demand. Enterprises place orders with colleges in advance, specifying the quantity, specifications, and quality requirements of the required talents. Colleges then provide targeted teaching and training according to the needs of enterprises. This training model achieves seamless integration between talent cultivation and market demand, improving the pertinence and effectiveness of talent cultivation. Engineering alternation refers to students regularly interning and training in enterprises while studying theoretical knowledge in the college, achieving a transition between learning and work. This training model helps students combine theoretical knowledge with practice, enhance their professional competence and comprehensive abilities. Figure 1 shows the composition of the talent cultivation model for the integration of industry and education.

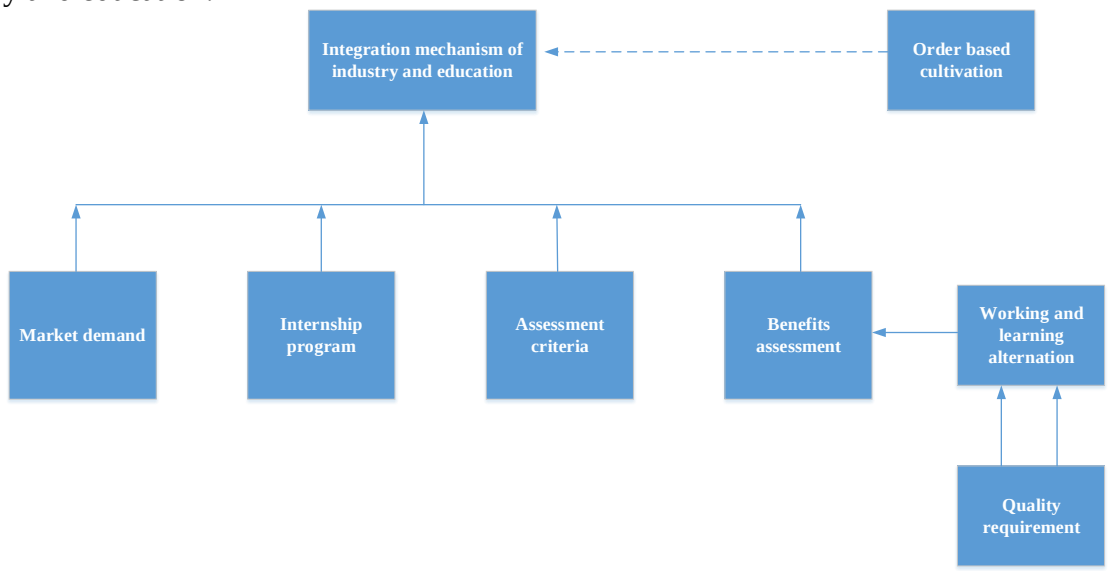

Figure 1: Industry-education integration model

In the implementation process of engineering alternation, the college will jointly develop internship plans and assessment standards with enterprises. Students will enter enterprises for internships under the guidance of the college, and will be guided and assessed by the technical or management personnel of the enterprise. After the internship, students are required to submit an internship report and reflections, which will be jointly reviewed and evaluated by the college and the company.

$$Q = \sum_{i=1} n\, W_i + S_i \tag{1}$$

Among them, Q represents the quality of talent cultivation; W_i represents the weight of each evaluation indicator; S_i represents the scores of various evaluation indicators. Through this model, this article can conduct quantitative evaluation on all aspects of talent training, so as to more accurately understand the quality of talent training.

$$B = (P_1 + P_2) - C \tag{2}$$

Among them, B represents the benefits of school enterprise cooperation; P_1 represents the talent benefits obtained by the enterprise through cooperation (such as employee quality improvement, technological innovation, etc.); P_2 represents the teaching benefits obtained by the college through cooperation (such as abundant teaching resources, improved teaching quality, etc.); C represents the cost of school enterprise cooperation (such as capital investment, manpower investment, etc.). Through this model, this article can conduct quantitative analysis on the benefits of school enterprise cooperation, so as to evaluate the effectiveness of cooperation more scientifically [15-16]. By introducing the talent cultivation quality evaluation model and the school enterprise cooperation benefit evaluation model, this article can more accurately understand the quality of talent cultivation and the effectiveness of school enterprise cooperation. This cooperation model not only helps to enhance students' professional ethics and comprehensive abilities, but also promotes the discipline construction and professional development of the college, providing strong technical support and talent guarantee for the development of enterprises. At the same time, this cooperation model also provides strong talent and intellectual support for rural revitalization [17-18].

4. Results and Discussion

4.1 Effectiveness of Talent Cultivation in Universities

In the context of the dual high school policy, Yangling Vocational and Technical College actively responds to the national call and is committed to improving the quality of talent cultivation through deepening the integration mechanism of industry and education, in order to promote rural revitalization. This article selects some students from Yangling Vocational and Technical College to form an experimental group and a reference group, and their performance effects are shown in Table 1.

Table 1: Talent training effect

Target layer	Experimental group	Reference group	Improve the range
Ideological and political quality	85	80	6.25%
Professional ethics	90	82	9.76%
Basic quality	78	75	4.00%
Personnel training	88	84	4.76%

The talent cultivation indicators of the college show that the experimental group students have performed well in terms of ideological and political quality, professional ethics quality, and basic quality. Among them, the experimental group data is generally higher than the reference group data, especially the improvement in professional ethics quality is the largest, reaching 9.76%. This indicates that the college has achieved significant results in strengthening ideological and political education, emphasizing the cultivation of professional ethics, and improving students' basic qualities. The college closely integrates theoretical knowledge with practical operations through cooperation with enterprises to establish training bases and carry out joint training, providing students with more practical opportunities and employment channels, thereby enhancing their comprehensive quality and employment competitiveness. Overall, the data for "talent cultivation" is 88 points, which still shows a significant improvement compared to the reference group (an increase of 4.76%). This further proves the overall progress made by the college in talent cultivation and provides strong talent support for rural revitalization.

4.2 Curriculum Design and Update Evaluation

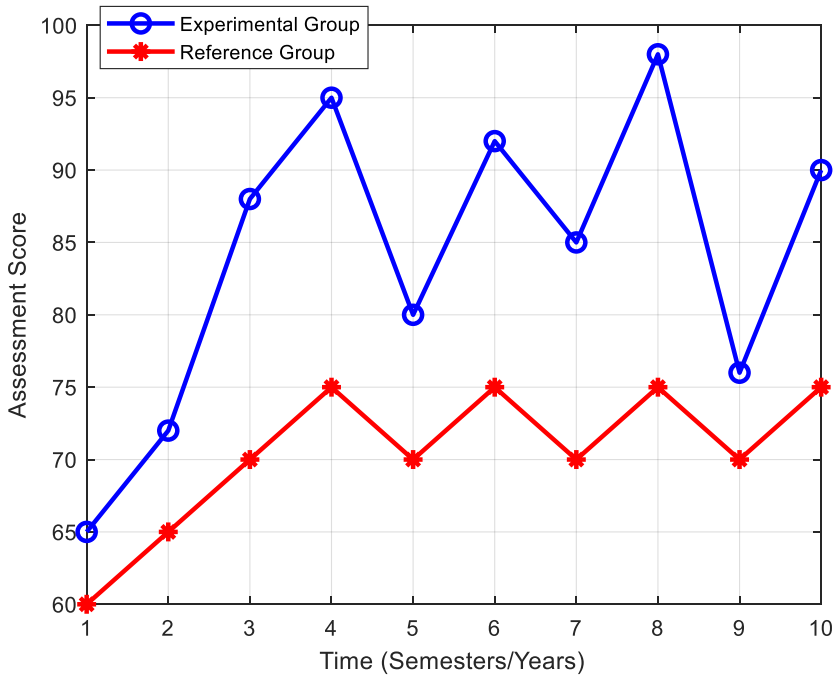

Figure 2: Comparison of the evaluation results in the curriculum setting

This article compares the evaluation results of course settings before and after optimization, and observes Figure 2 to see the differences in data between the experimental group and the reference group. The data of the reference group is represented by a red asterisk line. From Figure 2, it can be seen that the data of the reference group is relatively stable, with specific scores of 60, 65, 70, 75, 70, 75, 70, 75, 70, 75. This indicates that without optimization, the evaluation scores of the course setting are basically maintained at a low and stable level. In contrast, the data of the experimental group is represented by blue circular lines, showing significant fluctuations and upward trends. The evaluation scores of the experimental group are specifically 65, 72, 88, 95, 80, 92, 85, 98, 76, and 90. It can be seen that after implementing optimization measures, the evaluation scores of the curriculum have significantly improved, especially in the middle and later stages, where the scores have reached a high level. By comparing two sets of data, this article can clearly see the effect of optimization. The evaluation scores of the experimental group are generally higher than those of the reference group, and the fluctuation range is larger. This reflects the positive impact of optimization measures on curriculum design and updates. It can analyze whether the curriculum design of educational institutions conforms to the current industry development trend and talent demand, and evaluate the speed and effectiveness of educational institutions updating curriculum content according to changes in industry development.

4.3 Assessment of Student Ability Development

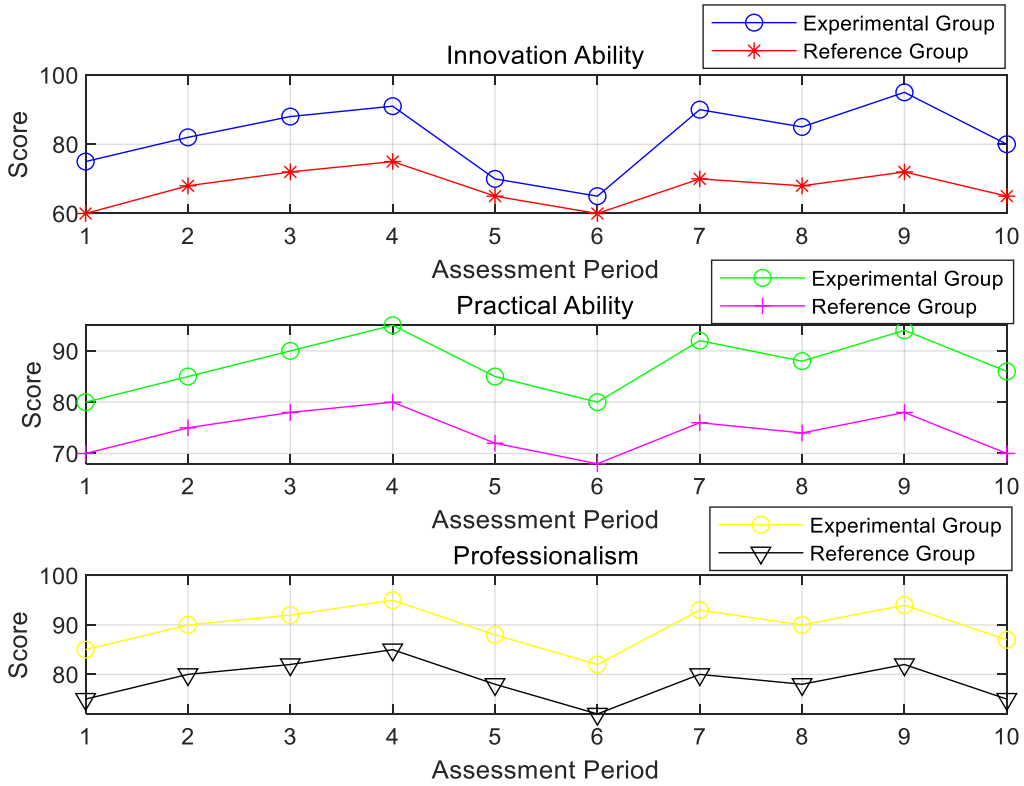

Figure 3: Comparison of student ability cultivation

The testing of students' abilities is manifested in three aspects: innovation, practice, and professional competence. According to the results data in Figure 3, in terms of innovation ability, the score of the reference group starts from 60 points with small fluctuations, with the highest score being only 72 points, the lowest score being 60 points, and the average score being 67.5 points. In terms of practical ability, the score starts from 70 points and does not fluctuate significantly, with a maximum score of 78 points, a minimum score of 68 points, and an average score of 73.5 points. In terms of professional ethics, the score starts at 75 points with slight fluctuations, but overall it remains at a relatively low level, with a maximum score of 85 points, a minimum score of 72 points, and an average score of 78.5 points. The experimental group's data in terms of innovation ability started from 75 points and reached a maximum score of 95 points. In terms of practical ability, the score starts from 80 points, with a maximum score of 95 points, a minimum score of 80 points, and an average score of 88.5 points. In terms of professional ethics, the score starts from 85 points, although there is some fluctuation, it remains at a relatively high level overall, with a highest score of 95 points, a lowest score of 82 points, and an average score of 89.5 points, reflecting students' good professional ethics, teamwork, and communication skills. The comparison effect before and after is obvious, and the experimental group performs better than the reference group in all three aspects, with a larger fluctuation range, which reflects the positive impact of optimization measures on student ability cultivation.

4.4 Assessment of Production Education Support

Table 2: Comparison of production and education support

Index	Experimental group	Reference group	D-value
Number of industry education cooperative enterprises	50	35	15
Student internship satisfaction	85%	70%	15%
Teacher engagement	90%	65%	25%
Graduate employment rate	92%	80%	12%

By observing the data in Table 2, this article can clearly see the positive impact brought by industry education cooperation. The experimental group reaches 50 industry education cooperation enterprises, an increase of 15 enterprises compared to the reference group's 35, which reflects the significant effectiveness of the experimental group in attracting enterprises to participate in cooperation. In terms of student internship satisfaction, the experimental group's satisfaction rate of 85% is much higher than the reference group's 70%, with a difference of 15%. This indicates that the experimental group may be more outstanding in internship arrangements, corporate cooperation quality, and other aspects. At the same time, the participation rate of teachers in the experimental group reaches 90%, an increase of 25% compared to the reference group's 65%. This reflects the experimental group's emphasis on the role of teachers and their active participation in industry education cooperation. Finally, in terms of the key indicator of graduate employment rate, the experimental group achieves a 92% employment rate higher than the reference group's 80%, with a difference of 12%. This further proves the excellent performance of the experimental group in improving students' employment ability and expanding employment channels.

5. Conclusion

In the context of the "dual high" construction, deepening the integration mechanism of industry and education in vocational colleges to promote rural revitalization has important practical significance and strategic value. This article first introduces the research background and literature challenges, and then elaborates in detail on the practical exploration of Yangling Vocational and Technical College in the integration of industry and education, and analyzes and discusses the experimental survey results. The experimental investigation process of this article includes field research, data collection, and analysis, ensuring the accuracy and reliability of the research results. The experimental survey results show that Yangling Vocational and Technical College has effectively improved the quality of talent cultivation and social service capabilities by deepening the mechanism of IEI, providing strong support for rural revitalization. Although Yangling Vocational and Technical College has achieved significant results in the integration of industry and education, there are still some problems and challenges, such as insufficient depth of IEI and a mismatch between talent training models and industry demand. In the future, Yangling Vocational and Technical College can further strengthen cooperation with enterprises and the government, and deepen the mechanism of IEI; at the same time, the college can also strengthen the reform and innovation of the talent training system, improve the pertinence and effectiveness of talent training, enhance resource integration and collaborative innovation, and provide more comprehensive and powerful support for rural revitalization.

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