Research on Digital Teaching of Pre job Training for Vocational Education under the Background of Five Education Integration

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Abstract. With the deepening of education reform, vocational education, as an important battlefield for cultivating applied talents, has made innovation in its teaching mode and content particularly important. There are many limitations to traditional vocational education oriented pre job training, which to some extent limit the cultivation of students' comprehensive abilities. In the context of the integration of the five educations, how to effectively improve the efficiency and quality of pre job training for vocational education has become one of the hot topics in current educational research. This article focuses on the research of digital teaching in pre job training for vocational education, introduces the development and design principles of the "Five Education Integration" digital teaching system, and verifies the effectiveness of teaching reform through teaching practice, promoting the comprehensive development of students.

Keywords: Integration of Five Education, Pre employment Training, Digital Teaching

1 Introduction

As an important platform for cultivating high-quality technical and skilled talents, higher vocational education's targeted pre job training directly affects the quality of students' future career development. Currently, traditional teaching methods are often used for pre job training in vocational colleges, which have problems such as scattered teaching resources, single teaching methods, and difficulty in quantifying teaching effectiveness[1]. At the same time, training content often focuses on imparting vocational skills, neglecting the cultivation of students' comprehensive qualities[2]. These issues to some extent limit the cultivation of students' comprehensive abilities[3]. Faced with the new requirements for talent quality in the new era, pre job training for targeted training in higher vocational education faces the following challenges: firstly, how to effectively integrate teaching resources and improve training efficiency; Secondly, how to innovate teaching methods and stimulate students' interest in learning; The third is how to

H. Kannan et al. (eds.), *Proceedings of the 5th International Conference on Internet, Education and Information Technology (IEIT 2025)*, Atlantis Highlights in Social Sciences, Education and Humanities 40,
https://doi.org/10.2991/978-94-6463-803-5_16

scientifically evaluate the effectiveness of training and promote the comprehensive development of students.

In the context of the new era, the integration of moral education, intellectual education, physical education, aesthetic education, and labor education highlights the value proposition of cultivating well-rounded talents. It emphasizes the organic connection and mutual promotion between morality, intelligence, physical fitness, aesthetics, and labor, and achieves comprehensive development of students' morality, intelligence, physical fitness, aesthetics, and labor through interdisciplinary and cross disciplinary integrated teaching. The significance of integrating the five aspects of education lies in cultivating comprehensive talents who can adapt to the needs of modern social development through a comprehensive educational approach[4]. The theoretical basis of the integration of the five educations originates from the concept of comprehensive development education, emphasizing the organic integration of moral education, intellectual education, physical education, aesthetic education, and labor education. A review of relevant research indicates that scholars at home and abroad have extensively explored the integration of the five educations, including educational concepts, teaching methods, curriculum design, and other aspects. For example, Han Lei and Yang Xiaoyu [5] pointed out the value, methods, and paths of integrating the five educations from the perspective of core literacy, emphasizing the importance of integrating the five educations in cultivating students' comprehensive qualities. The "Dual Vocational Training" system in Germany is the core of the vocational education system, and its cross competency training model aims to cultivate workers with both professional skills and comprehensive literacy through deep cooperation between enterprises and vocational schools. The Teaching Factory in Singapore is an innovative education model proposed by Nanyang Technological Institute (NYP). Its holistic education philosophy emphasizes cultivating graduates with technical skills, innovative thinking, and social responsibility through a "boundaryless campus" environment.

With the continuous deepening of educational informatization, digital teaching has become an important means to promote educational modernization and improve teaching quality due to its rich resources, diverse forms, and strong interactivity. As a key link connecting school education and the workplace, the research on digital teaching in vocational education oriented pre job training is of great significance[6].Therefore, in the context of the integration of the five educations, our school has established a "pre job training" system and implemented digital teaching for targeted pre job training in higher vocational education.

2 Construction of "Pre job Training" System

2.1 Design of Technical Architecture

The platform adopts a "browser/server" architecture and is a web application. Supporting mobile internet technology, students can access the platform for learning anytime and anywhere through mobile devices such as smartphones and tablets. The front-end technology adopts HTML/CSS/JavaScript front-end development technology to build web page structure, define styles, and implement interactive effects. At the same time,

the use of React and Vue front-end frameworks has improved development efficiency and maintainability[7]. Choose Python programming language, Spring Boot, and Django backend framework as the backend technology to build server-side logic. In terms of databases, MySQL and MongoDB databases are used to store user information, course content, learning records, and other data. Choose a reliable domestic cloud service provider to deploy the platform for cloud services and server configuration, ensuring high scalability and stability. Meanwhile, by configuring and managing Linux servers[8], the security and reliability of the servers are ensured. In terms of video and live streaming technology, in order to build video courses and live streaming functions, integrated streaming media servers, real-time communication technology based on WebRTC, and video encoding and decoding technology are used to support the implementation of video functions. Data analysis and intelligent recommendation functions utilize data mining and machine learning techniques to analyze student data, understand student interests and behaviors, and provide personalized learning recommendations and content for students. The system architecture is shown in Figure 1.

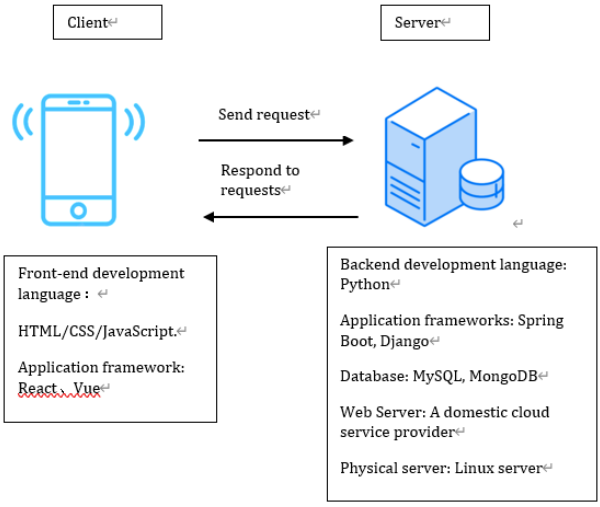

Fig. 1. Pre job training system architecture.

2.2 Functional Module

After registration, individuals and institutions can participate in the development and utilization of the Five Education Integration Curriculum. The system supports the integration and sharing of different types of educational resources, ensuring the richness and diversity of resources. The platform adopts a modular design, dividing the "Five Education" content into multiple independent yet interrelated modules.

Each module contains clear learning objectives, content, activities, and evaluation methods, making it easy for learners to choose and combine according to their own needs. The platform is centered around a task system, and individuals or institutions can publish integrated course videos[9], teaching cases, practical training projects, simulated exams, etc. in the form of "tasks" for students to choose from and learn from.

Design virtual training environments or integrate with real work scenarios, providing practical opportunities such as simulated operations, case analysis, and project implementation. Through practical training, enhance students' practical abilities and professional qualities.

Students who pass the certification can participate in the implementation of the Five Education Program, and will receive a report on their quality education after completing the program. Support personalized learning path planning, provide customized learning advice and recommendations based on students' learning interests, foundations, and abilities, and help students explore their interests, personalities, abilities, values, etc. in an entertaining and immersive teaching experience.

Establish a diversified evaluation system, including process evaluation, summative evaluation, and peer evaluation. By using data analysis techniques, track and record students' learning processes, and generate various forms of student learning records and reports. These reports can start from the dimensions of time and space, recording students' task completion time clues and task completion status within the resources of the five educational venues. Finally, through big data analysis, a report on the analysis of students' personal five education career data was generated, awakening the internal driving force for students' comprehensive literacy development.

Establish a student community and encourage communication and collaboration among students. Through community interaction, share learning experiences, solve problems, stimulate learning interest and motivation. User feedback can also be collected and processed through user feedback channels to continuously optimize platform functionality and user experience[10].

Based on the analysis and design of the system functions mentioned above, the user side functions of the "pre job training" system are divided into four main modules: basic function module, creation module, usage module, and evaluation and feedback module. As shown in Figure 2.

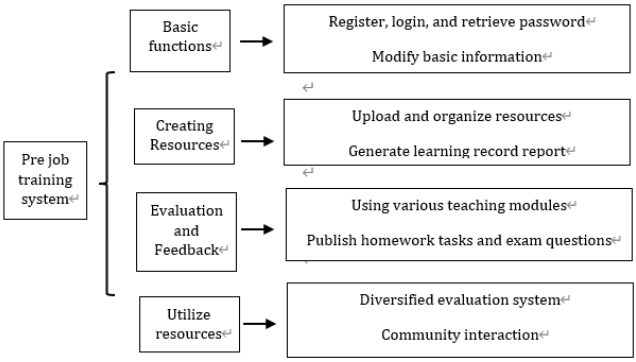

Fig. 2. Functional modules of the 'pre job training' system.

Algorithm implementation:

(1) Feature engineering: Construct a user profile vector U=[u1, u2,..., un], which includes features such as knowledge mastery (based on the IRT model), learning style (Felder Silverman scale), and historical interaction duration.

(2) Recommendation model: Adopting a hybrid model of collaborative filtering (CF) and content filtering (CB), where:

CF module calculates student similarity: sim (U_i, U_j)=cosine (W · U_i, W · U_j), where W is the feature weight matrix

CB module uses TF-IDF to extract resource labels and match user interest vectors

(3) Path optimization: Based on Q-learning reinforcement learning algorithm, define state s_t=(current knowledge point, ability value), action a_t=recommended resources, reward function r=test score improvement rate+learning duration decay factor

Evaluation algorithm framework:

Process evaluation: Use LSTM network to model the learning behavior sequence, extract indicators such as focus (number of operations per unit time), persistence (task interruption rate), etc

Peer peer evaluation: Bert model is used to conduct sentiment analysis on comment texts, and the sentiment polarity score S=∑ (w_i · s_i) is calculated, where w_i is the weight of the evaluation item

-Visualization of Capability Graph: Layout of Five Dimensional Radar Graph Based on Force directed Algorithm, Node repulsion F=1/(1+Correlation Coefficient)

3 Example of the Application Effect of the "Pre Job Training" System

The teaching resources in the "pre job training" system can integrate moral education content such as professional ethics and social responsibility, and enhance students' moral cognition and practical ability through interactive methods such as case analysis and role-playing. Through digital resources such as online courses and simulated training, students can more intuitively understand and master professional knowledge, enhance their intellectual level and problem-solving ability. It can also provide functions such as sports data analysis to encourage students to participate in physical exercise and improve their physical fitness. The abundant artistic works, music videos, and other educational resources provide students with opportunities to experience and appreciate beauty, cultivating their aesthetic ability and creativity. Through technologies such as virtual reality, students can simulate real work scenarios, conduct labor skills training, and enhance their labor awareness and practical abilities. Digital teaching methods, with their novel, vivid, and interactive characteristics, greatly stimulate students' interest and enthusiasm for learning.

Apply the "pre job training" system to the pre job training process of railway vehicle fitters in a certain bureau, develop certain teaching resources using the system, and allow students to learn and use the resources through the system platform to test the effectiveness of the "pre job training" system in promoting the comprehensive improvement of students' moral, intellectual, physical, aesthetic, and labor qualities.

In this railway vehicle fitter training, two parallel classes, Class 1 and Class 2, were selected as the experimental subjects and control classes. The teaching staff of the two classes are the same, and the teaching content is synchronized. At the same time, both classes have 25 students, and their gender, age composition, and knowledge level are

relatively similar. Therefore, it can be considered that the two classes are homogeneous. Randomly select Class 1 as the experimental group and Class 2 as the control group. The students in Class 1 use the "pre job training" system for learning in the course, while the students in Class 2 still use traditional classroom teaching methods. Comparing the average scores of the two classes in the five aspects of education after the training (as shown in Figure 3), it can be clearly seen that Class 1 has higher scores in all five aspects than Class 2, proving that the "pre job training" system can fully improve the comprehensive quality. The interactive function of the platform makes communication and feedback between teachers and students more timely and effective. Students can also ask questions to teachers and discuss with classmates through the platform, quickly resolving any doubts they may have during learning, greatly improving teaching effectiveness and learning efficiency[11].

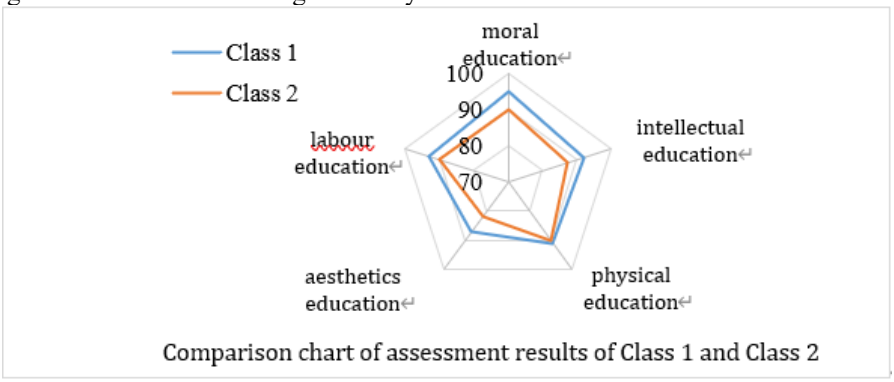

Fig. 3. Comparison of Average Grades between Class 1 and Class 2.

Independent sample t-test was conducted on the five education scores of the experimental and control groups, and the results showed that:

Moral education: t (48)=3.21, p=0.002, Cohen's d=0.89 (large effect)

Intellectual Education: t(48)=2.97, p=0.005, d=0.78

Sports: t(48)=2.15, p=0.037, d=0.61

Art education: t(48)=2.43, p=0.019, d=0.68

Labor education: t(48)=3.08, p=0.003, d=0.85

Further investigate the contribution of different teaching modules through one-way analysis of variance (ANOVA):

||SS|df|MS|F|p|

|Inter group | 58.32 | 4 | 14.58 | 6.73 | 0.001|

|Within the group | 102.41 | 45 | 2.28|||

|Total | 160.73 | 49||||

The post hoc test (Tukey HSD) showed that the improvement effect of the labor education module was significantly higher than that of other modules ($p<0.05$).

The above results prove that the "pre job training" system can fully enhance the comprehensive quality.

4 Conclusions

The research results of this article indicate that through digital teaching methods, the pertinence and effectiveness of pre job training for vocational education can be effectively improved, promoting the comprehensive development of students in moral education, intellectual education, physical education, aesthetic education, labor education, and other aspects. Specifically, digital teaching can provide students with richer and more diverse learning resources, stimulate their interest and motivation in learning; At the same time, through the interactive functions of digital teaching platforms, real-time communication and feedback between teachers and students can be achieved, improving teaching effectiveness and learning efficiency.

Acknowledgments

Grant sponsor: Education Research Project of Hubei Vocational and Technical Education Society in 2024- Analysis of Pre employment Training and Teaching Reform in Vocational Education Targeted Training from the Perspective of "Five Education Integration"and Grant no: 2024ZJGB005.

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