Journal of Computing and Electronic Information Management
ISSN: 2413-1660 | Vol. 10, No. 1, 2023

Exploration on Big Data Application Platform of "Industry-education Integration"

-- Taking the E-commerce Major in Zhejiang Industry & Trade Vocational College as an Example

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Abstract: In recent years, deepening the industry-education integration has basically become a consensus of education reform in colleges and universities. However, for implementation, the research on the strategy and method of the industry-education integration is still under exploration. The Big Data Application Platform of "Industry-education Integration" researched in this paper applies big data, cloud computing and other IT means to integrate governments, industry, colleges and universities, scientific research institutions enterprise and other elements, thus creating a big data service platform of "interconnection, interaction, integration and reciprocity" and promoting the development of "Internet + Vocational Education".

Keywords: Industry-education Integration; E-commerce Training; Zhejiang Industry & Trade Vocational College.

1. Research Significance

Zhejiang Industry & Trade Vocational College has such high-energy platforms as the E-commerce Collaborative Innovation Center of the Ministry of Education, the National Training Base for High-skilled Talents, and the Provincial Demonstrative Training Base. Its E-commerce major is supported by state revenue and is a characteristic specialty of Zhejiang Province.

As of September 2021, the second batch of national teaching innovation team of vocational teachers has been established for three years, and school-enterprise cooperation, as a schedule of construction task for school-enterprise cooperation, is one of the important tasks of construction, mainly including reform in education, development of talent training program, school-enterprise alliance, training base construction, etc. as shown in Table 1.

In recent years, on the basis of deepening university-industry cooperation, based on the small and scattered private enterprises in Wenzhou, the cooperation model of "school, industry and enterprise" has been explored, and Wenzhou merchants have been served with the support of industry association, thus building a domestic and foreign e-commerce training platform, and serving the training of professional talents. As shown in Figure 1.

Students' professional comprehensive ability is extraordinary, and the employment and entrepreneurial quality rank top: the average employment rate of the students majoring in E-commerce in the past three years is 99.68%, with the average entrepreneurship rate of 20.27%, indicating that the achievements in entrepreneurship are remarkable. A total of 52 entrepreneur teams have been hatched and 32 company entities have been registered.

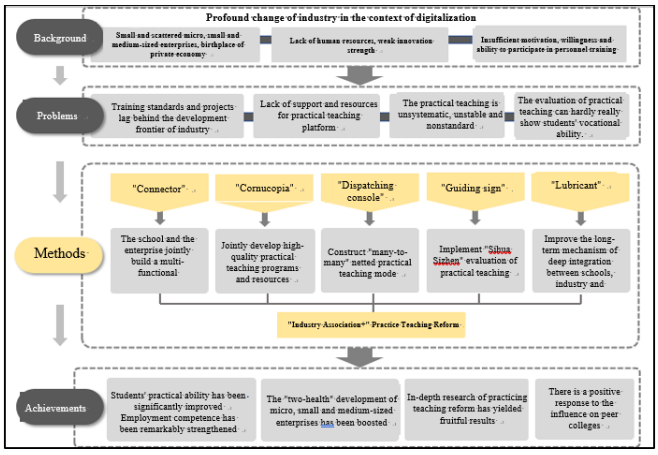


Figure 1.1Diagram of "Industry-Enterprise-School" Cooperation

However, in the "Industry-University-Research" practice of e-commerce major, there are also some problems, such as the lack of depth and breadth of school-enterprise cooperation, the disconnection between enterprise training and school education, the mismatch between students' abilities and positions, and the long period of induction training, etc.

1.1. Single and decentralized cooperative mode due to the restriction of territory and time domain

Although the industry-education integration is various in forms, the mode of cooperation is excessively centralized and there is no close cooperation between them. Currently, several Industry-University-Research means have been adopted in e-commerce major, such as work-study program. For the substituted post exercitation in enterprises and job-oriented trainee classes signed with enterprises, in most cases, students engaged in simple work in enterprises in a certain semester. Moreover, during the COVID-19, due to epidemic prevention and control, the school suspended internship cooperation with some enterprises. And the school, based on the principle of

proximity, cooperates with enterprise. Now, the business volume of local enterprises in Wenzhou reduce due to the restrictions of economic development and COVID-19, resulting in a decrease in the accommodation of internship positions.

1.2. Division of collaborative education management

The school has developed a 3G system platform for the communication between teachers and students to manage the progress of students' internships and graduation theses. However, this system lacks the participation of enterprises. Therefore, the enterprises know nothing about the students' practical level and theoretical learning level on school days. However, students' performance during internships in enterprises are only fed back with texts. Therefore, teachers know students' internships outside school unilaterally. All of these have led to the separation of training and management between the two sides, which has laid a hidden trouble for the practice management and school training.

Table 1.2Schedule of Construction of School-enterprise Cooperation Community, One of the National Team Building Tasks

Construction mission	Schedule diagram		
	2021	2022	2023
Building a school-enterprise cooperation community	1. Developed the construction plan of the team of outstanding teachers in school-enterprise cooperation; 2. Established a school-enterprise and inter-school cooperative working mechanism; 3. The school and enterprise jointly developed 2-3 sets of practical teaching standards or working standards; 4. Increased 5 practice bases of enterprises; 5. Developed 1-2 excellent teaching cases and established 1-2 school-enterprise cooperation courses; 6. 50% full-time teachers were employed as consultants by enterprises, providing technical services for more than 10 enterprises; 7. Strengthened partner assistance for colleges and universities in central and western regions, and help 1-2 schools.	1. Improved a school-enterprise and inter-school cooperative working mechanism; 2. Initiated the establishment of a community alliance of shared school-enterprise destiny for the e-commerce major; 3. Jointly built a high-level e-commerce development center for teachers at or above the municipal level; 4. Perfected the management, assessment and evaluation system of the team of top teachers; 5. Initiated the establishment of the cooperative community of e-commerce major in higher vocational colleges in Zhejiang Province; 6. Increased 8 practice bases of enterprises; 7. 70% full-time teachers were employed as consultants by enterprises, providing technical services for 20 enterprises; 8. Develop 3 cases of prominent teachers, and build 1-2 school-enterprise cooperation courses and 1-2 golden courses with wide influence.	1. Strengthen the communication and cooperation of the community of shared destiny of the e-commerce major between schools and enterprises in Zhejiang Province; 2. Improve the operating mechanism and software and hardware construction of the Development Center for Teachers; 3. Strive for a National Team of Danian Huang-style Teachers in Colleges and Universities; 4. Build 10 practice bases of enterprises; 5. 80% full-time teachers are employed as consultants by enterprises, providing technical services for 30 enterprises; 6. Develop 3-5 excellent teaching cases of university-industry cooperation, and build 2-3 school-enterprise cooperation courses and 1-2 golden courses with wide influence in the industry; 8. Apply for the National Demonstrative Vocational Education Group

1.3. Lack of efficient strength, depth and breadth of collaboration

The specialized e-commerce courses are basically completed in campus, so students have a poor communication with various enterprises. Similarly, enterprises also subjectively think that higher vocational colleges cannot accomplish technology research and development and achievement transformation and lack enthusiasm and trust, which results in the temporary signing of agreements for meeting their respective needs between the two sides. In addition to learning basic courses of e-commerce, students majoring in e-commerce will also learn other skills, such as art design and operation. However, due to enterprises' inability to intuitively and clearly know students during interviews, they often assign students to positions that do not match their abilities. For example, in large-scale e-commerce activities such as "Tmall double 11" and "JD.COM 618", cooperation with enterprises in customer relationship management is more frequent. Students are exposed to and learn relevant knowledge of customer relation management, but there are few cooperation projects such as online shop art, operation and online shop design. In the process of cooperation between industry and education, only "industry and learning" have been realized, while "research" is less involved. The system of "promoting learning by industry, research by learning and industry by research" does not work normally.

1.4. Incomplete reform of collaborative education

In the e-commerce team, some teachers have outdated teaching concepts, with a traditional teaching mode and weak consciousness and ability of teaching innovation. Their

teaching ability and practical teaching effect, and capacity and quality for scientific research need to be improved. There are deficiencies in adapting to modern educational information technology, weak abilities in the application, development and evaluation of curriculum teaching resources, and few classroom teaching skills. And the teaching methods need to be changed. Enterprise mentors are less involved in teaching reform, and usually only teach a certain course as part-time teachers. They make less contribution to the professional talent training program and curriculum reform.

E-commerce major belongs to the field of rapid development and change, but the teaching materials of major courses disconnect with enterprises and industry, the content is timeworn, the three-dimensional teaching resources are inadequate, and the teaching materials lack practicality, which affect the teaching efficiency of related major courses.

Ultimately, these problems existing in industry-education integration lie in enterprises' pursuit of profit and the pressure they bear in the market, which makes enterprises have no patience to cultivate college teachers and students. The difference in value orientation between enterprises, higher learning institutions and scientific research institutions has led to a serious disconnection between technology supply and demand, resulting in a relatively single "Industry-University-Research" cooperation, and the combination of depth, breadth and validity is difficult to achieve the desired results.

2. Building Scheme of Big Data Application Platform of "Industry-education Integration"

2.1. Meet the sector demands and reconstruct the practical teaching

Firstly, conduct an in-depth research on the skilled personnel required by the e-commerce positions in enterprises, extract the skills required for various positions, and optimize the professional e-commerce courses on this basis. Focus on the construction of theory-practice integration courses, such as online shop operation and management, e-commerce visual marketing, data analysis and other courses, and form a set of courses that can support skills training and upgrading, especially the training of highlighting job skills in practice courses. List the outline and framework based on the skills required for posts in enterprises; Determine course catalogues, cases and chapter requirements based on the specifications, requirements and curriculum standards of e-commerce talent development program. Finally, professional teachers and enterprise mentors implement specific performance that can represent different courses for job skills together, especially the content and methods of skills training. The types of personnel required for e-commerce positions are shown in Figure 2.

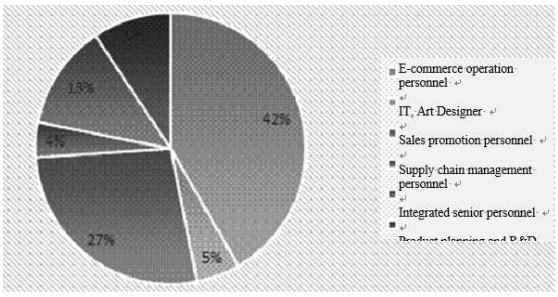


Figure 2.3Types of Personnel Required for E-commerce Positions

2.2. Strengthen the practice teaching of "school-enterprise-industry" and perfect the evaluation mechanism of "four in one" productive practical teaching

Further strengthen the comprehensiveness and diversity of teaching evaluation, and the course teachers conduct a comprehensive evaluation of the students' basic skills, comprehensive skills, professional abilities and professional qualities in their study and practice career with the instructors and industry masters.

At the same time, explore the curriculum assessment mechanism based on working process and the evaluation mechanism of mixed teaching and flipped classroom teaching based on online open courses. With the cultivation of students' professional ability, professional quality and information quality as the core, online course leaders and professional teachers work together to develop a characteristic assessment and evaluation mechanism that combines qualitative and quantitative analysis.

Optimize the assessment and evaluation methods in practice and training, improve the "four-in-one" evaluation mechanism for productive practice and training, involve corporate mentors in the evaluation of students in practice and training throughout the process, add a module for students' mutual evaluation, and pay attention to project performance orientation. Conduct the phased assessment for students in the modern apprenticeship class. After the internship of each post is completed, enterprise mentors and teachers at school jointly evaluate and reward the excellent students. Create a leading and unique evaluation system in China for practical training and apprenticeship personnel training.

2.3. Carry out "Combined Competition and Teaching, Promoting Competition by Fighting" to improve students' overall quality

Attach importance to various vocational skills competitions of major groups, reasonably integrate the competition contents into the contents of courses, strengthen the optimization and module design of the courses related to the competitions, set up combined training courses when necessary, organize a steering team and an experienced evaluation team, strengthen lateral communication and cooperation, share the experience of competition preparation, strengthen process guidance, improve the scores of vocational skills competitions of major groups, deeply perform "course-competition integration", and strive to win 3 to 5 awards of national student skills competition awards in the next two years.

And practical training can more effectively promote the improvement of skills for competitions and normalize the e-commerce skills competition, which is conducive to selecting students to participate in off-campus higher-level professional skills competitions, and encouraging them to make more efforts in training and accumulate practical experience through the rewards of competitions.

2.4. Form a "Radar Chart" of students' grid development by focusing on "the development of students"

Apply qualitative and quantitative evaluation for assessment of practical courses. Facing students' different

career development directions, the radar chart analysis method is used to assess students' core e-commerce skills such as e-commerce operation, product shooting and picture processing, online shop art, new media operation, marketing promotion, data analysis, and customer service ability. A "Radar Chart of Core Competence" is generated for each student. The achievement that students can obtain in the core competence for graduation of each course in the talent training program is the obtained scores, weights and learning scores of each course that should be taken in the final evaluation of students, and it is displayed in the radar chart after being converted by the weight formula. The radar chart can intuitively show the students' core competence for graduation. It shows that the area of the core competence radar chart is small after the students complete the course in the first academic year. With the increase of academic years and courses, the area of radar chart gradually increases. The intuitive radar chart can not only help students know their core skills, but also provide feedback on the core competencies that need to be improved. The Radar Chart of analysis of the core skills of e-commerce majors is shown in Figure 3.

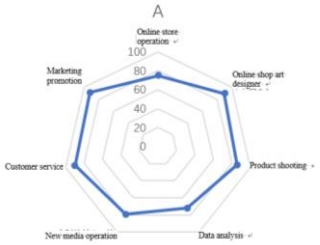
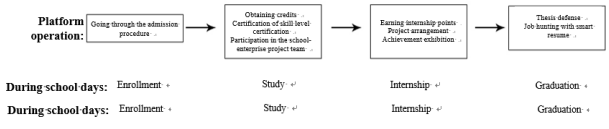


Figure 3.4Radar Chart of Analysis of Students' Core E-commerce Skills

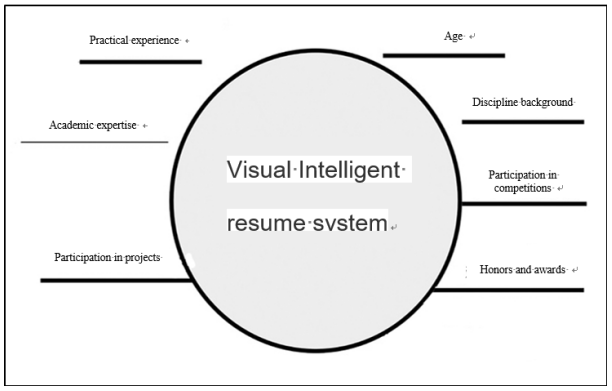
3. Design of Big Data Application Platform of "Industry-education Integration"

3.1. "Student-oriented" platform design concept

This project, based on the "student-oriented" design concept, provides students with intelligent services during the academic year. Most platforms for school-enterprise cooperation built by other colleges and universities in China are for the management of students during the practice, which disconnect with students' learning at school, and students can only use them for a short time. However, in this project, the platform is designed as an intelligent growth platform, which can record students' academic performance and practice results on school days, and form smart visual resumes for students based on their development experience, so that students can use the platform from the admission to practical training and even graduation. Secondly, due to the management of the platform before, students contradict it. However, the platform in this project stimulates students' interest in learning and practice through skills ranking and learning points, as shown in Figures 4 and 5.



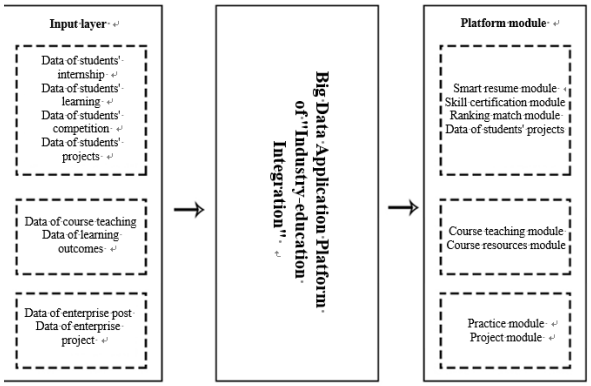
5Students' Platform Operation during School Days



6Students' Intelligent Visual Resume

3.2. Big Data Application Platform of "Industry-education Integration" with close cooperation between the school and enterprises

In this project, a Big Data Application Platform of "Industry-education Integration" is designed, which combines theory with practice, with convenient equipment management and visual real-time data. The platform includes the modules for teachers, enterprises, students and school administrators. Through the shared teaching data, practice data, school-enterprise projects, display of students' ability and other information, the school and enterprises are closely linked, thus training students jointly and making the learning and training no longer isolated and closed. The platform not only breaks down the barriers between the school and enterprises, but also promotes the project cooperation between the two sides and the educational reform at school. The modules of data collection and functions of the platform are shown in Figure6.



7Data Collection and Module Display of Platform

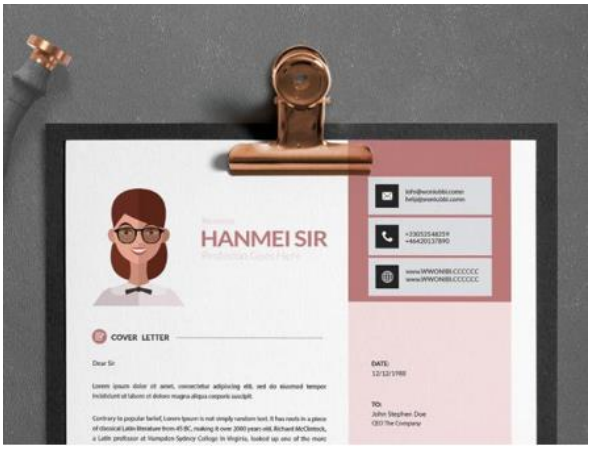
3.3. Design of specific modules for the platform

3.3.1. Smart visual resume and qualifying tournament promote students' self-improvement

The e-commerce courses are mostly courses without examinations, and only theoretical courses such as Introduction to E-commerce are exam courses. With the cultural transmission of popular "Buddha-like" and "couch potato" by the people after 90s, many students lack internal motivation in their studies, which leads to their lack of competitive awareness in their internships in enterprises.

The "Industry-Education Integration" platform displays students' information on practical skills (such as PS, short video shooting and editing, and online marketing) and students' basic information (such as individual digital resume

and achievement) in real time through big data and visualization technology, selects the star of skills and core marketing personnel in stages, and publicly commends and rewards them, thus stimulating students' awareness of self-improvement. Before graduation, students can also compare their own rankings to predict their employment in the market, which can help them quickly and accurately match with jobs, as shown in Figure 7.



8Students' General Information and Ranking

3.3.2. The Big Data Application Platform of "Industry-education Integration" helps students seamlessly connect their learning and internship

Previously, due to the divided management of students' internship and learning, enterprise tutors rarely communicate with teachers, with low efficiency; However, the management of interns by teachers in school is still carried out in a time and labor consuming way, such as on-site guidance and inspection. Some teachers even guide interns in Hangzhou and Ningbo for one semester, which costs a lot of time and money; On the other hand, when enterprises select interns in the preliminary stage, due to the lack of effective ways to know the students, they often assign students to positions that do not match their abilities.

In view of these phenomena, on the platform, students' skills are exercised in many ways, and students are arranged to the right position according to the job requirements of enterprises, which helps enterprises select interns efficiently. In addition, the introduction of new media such as short video and live streaming in the training management platform can help school teachers intuitively know students' internship and reduce the management cost of teachers to interns to a large extent.

3.3.3. Implementation of "co-construction, sharing, co-supervision" school-enterprise collaborative practice teaching

Previously, school-enterprise cooperative teaching was often carried out in the form that an enterprise mentor taught one or more courses at school. This form, on the one hand, was often unable to be normally carried out due to the uncertainty of the time of the enterprise mentor. On the other hand, the enterprise mentor did not understand the entire talent training system and curriculum system of the major, which was not conducive to promoting the development of teaching reform. Set up a curriculum reform module on the "Industry-Education Integration" platform. Higher vocational education is an organizational form of higher education with the goal of cultivating "high-quality, application-oriented talents who meet the needs of the production front line of the enterprise". The talent training program must be close to the market demand, thus grasping the development trend of the industry in real time. Therefore, the school-enterprise-industry develops a training plan based on the development needs of the benchmarking industries and enterprises, and decomposes the training of professionals into various training modules; Share curriculum resources and enterprise project resources. The e-commerce industry has developed at a faster speed and the refresh cycle of knowledge and technology is shorter. Therefore, to achieve real-time, dynamic grasp of the development of information technology, the traditional market research of demand for talents cannot be taken, the information technology should be effectively used, and the network advantages should be applied to achieve multi-industry, trans-regional collection of market demand data. Enterprises and industrial alliances can release the demand for talents timely through information sharing on the platform. Higher vocational colleges can obtain the industry trends through the platform. Then, teachers can timely adjust the teaching as the circumstances may require, keep up with the pace of enterprise development and exercise students' practical skills. Co-supervision of teaching quality: The school, enterprise and industry jointly establish a monitoring mechanism for the teaching quality, and specify the quality requirements of each major teaching link. The closed-loop quality monitoring model consisting of school supervision, enterprise supervision and industry supervision for all-round, whole-process and continuous improvement of practical teaching is established, as shown in Figure 8.

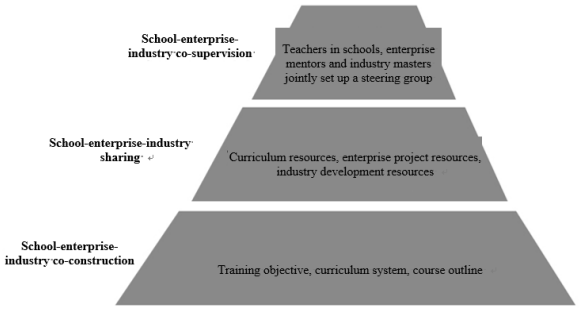


Figure 8.9"Co-construction, Sharing and Co-supervision" Reform Mechanism of School-enterprise Collaborative Teaching

3.3.4. "Order-based" project docking boosts students' innovation and entrepreneurship

For the innovation and entrepreneurship education, it is necessary to develop students' personality, explore their "secondary interest", and motivate their subjective initiative and awaken their self-consciousness through psychological empowerment. "Secondary interest" refers to students' subjective self-awareness after receiving basic education and forming independent personality and freedom of action and thought, thus awakening their self-awareness. Students, through the determination of interest, come out from the confused period of entering the university from high school. They make a transition from compulsory learning to autonomous learning, consciously build career plans and independently think.

The "order-based" school-enterprise docking system promoted by the school-enterprise project of the "industry-education integration" platform is the "talent scout" of students' "secondary interest", which classifies the skills required by e-commerce majors, such as marketing and art design, and establishes a studio respectively. Enterprises

publish projects through the "industry-education integration" school-enterprise cooperation platform, and teachers and students in universities and colleges organize a project team to undertake enterprise projects. Students can increase their hands-on background and accumulate project experience, thus enhancing their ability of practice. Teachers can participate in the development of actual projects in enterprises, accumulate project experience and improve the ability to engage in actual projects, which are beneficial to improving their qualifications of dual professional degrees. After many competitions and projects, the students can enhance their skills, improve their self-consciousness and accumulate social resources in the practice of multiple projects, thus becoming the "springboard" for entrepreneurship, as shown in Figure 9.

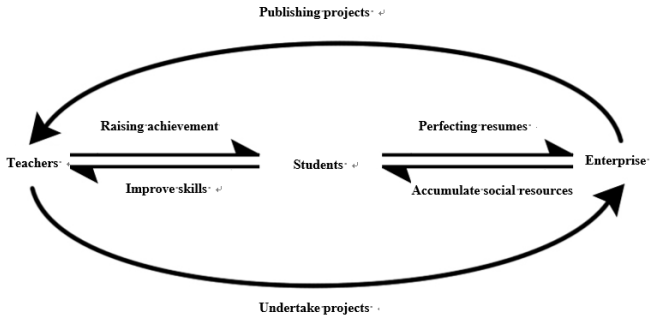


Figure 9.10"Order-based" Docking System of School-enterprise Projects

For the industry-education integration, in addition to education and production, the coordination and integration of scientific research functions and resources can also be strengthened, which is an effective method to promote the coupling of "science and technology" and "economy". However, the scientific research projects of teachers in universities and colleges are not closely related to the actual needs of the market, and the conversion rate of achievements is low. The "Order-based" Docking System of School-enterprise Projects promotes the deep integration of science and technology services and economic development.

3.3.5. Perfect the tracking and evaluation system of practical teaching with modern information technology

Because the selection of interns and employment personnel by enterprises can be traced on the platform, the school can track the career development of students in the later period. And the employer can give timely feedback on the professional level and work ability of students through the school-enterprise cooperation platform of "industry-education integration", and the school can modify the practical teaching according to the evaluation of employers.

4. Conclusions

This paper is committed to the research of breaking through multiple barriers, taking colleges and universities, governments, enterprises, scientific research institutes and other teaching resources as the main body of talent cultivation, giving full play to each subject's respective advantages in personnel training, broadening the teaching space, integrating teaching resources and optimizing the allocation of resources, thus forming an innovative model of personnel training that organically combines theoretical education based on learning knowledge with practical education based on direct acquisition of practical skills, improving the teaching effect, students' learning interest, the quality of e-commerce teaching in vocational colleges, contributing to the innovation and reform of education, and delivering more practical talents with professional skills for Wenzhou. The ultimate goal is to cultivate high-skilled and highly-competent talents and create vocational education in which everyone can become a useful person.

Acknowledgment

Fund program: General Scientific Research Project of Education Department of Zhejiang Province in 2021 "Exploration on Big Data Application Platform of "Industry-education Integration" -- Taking the E-commerce Major in Zhejiang Industry & Trade Vocational College as an Example" (Project No.: Y202147710).

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