Short communication

Research on the Construction and Application of Innovative Practice Platform for Collaborative Education of Industry and University:Take the Big Data Driven Digital Economy Platform as an Example

Abstract: The collaborative education of industry university cooperation plays an important role in the cultivation of students' professional quality and innovation ability. Taking the big data driven digital economy innovation practice platform jointly built by Yancheng Teachers University and Beijing Zhilian Technology Co., Ltd. (referred to as the big data economic practice platform) as an example, this paper introduces the era background, construction methods and use scenarios of the construction of the practice platform. The big data economic practice platform plays an important role in supporting the collaborative hybrid teaching of "university teachers -AI- enterprise teachers", supporting interdisciplinary research teaching, supporting discipline competitions, etc., and has achieved a series of results in promoting the improvement of the school enterprise integrated talent training program, connecting the school enterprise professional core courses, promoting the co construction and sharing of school enterprise teaching resources, promoting the virtual and real integration of the practice environment, and promoting the reform of evaluation methods. This paper discusses the problems existing in the collaborative education of industry university cooperation in coordinating interest demands, jointly building and sharing teaching resources, cross regional cooperation and other aspects, and puts forward some paths for the sustainable development of the collaborative education of industry university cooperation, such as establishing the dominant position, clarifying the division of education, establishing coordination institutions, and expanding the cooperation mode.

Key words: Industry-university cooperation; Big data digital economy; Innovation practice platform; Construction application

1. Introduction

"Science and technology is the first productivity, talent is the first resource, and innovation is the first driving force"[Xi Jinping,2022].New scientific and technological revolutions and industrial changes such as big data and artificial intelligence have promoted the innovative development of new quality productivity, and the cultivation of innovative and excellent engineering talents has become the goal of "new engineering" in colleges and universities.

However, from the current situation of college students' employment and enterprise recruitment, the dilemma of "employment difficulty" and "no one to use" is formed. On the one hand, it's difficult for college students to get employed. In 2023, the number of college graduates in China was 11.58 million, and the offer acquisition rate of undergraduate graduates was 47.5%. In 2024, there were 11.79 million college graduates across the country, and the offer acquisition rate of undergraduate graduates was 45.4%, which was significantly lower than the offer rate of college graduates. On

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the other hand, there is a talent gap of 1 million in new productivity industries such as unmanned enterprises, intelligent connected car testers, UAV operators and 3D visualization technology. [CCTV,2024]Therefore, colleges and universities must connect with new economy, new technology and new occupation, build new majors, update and upgrade a number of existing majors, moderately plan a number of new majors ahead of time, eliminate a number of backward majors, set up undergraduate majors scientifically, and increase cooperation with enterprises to cultivate talents, so as to cultivate new innovative talents needed by the society.

In order to implement the spirit of the opinions of the general office of the State Council on deepening the reform of innovation and entrepreneurship education in Colleges and universities (Guo Ban Fa [2,015] No. 36) and the opinions of the general office of the State Council on deepening the integration of industry and Education (Guo Ban Fa [2,017] No. 95), and deepen the integration of industry and education and the cooperation between schools and enterprises, the Department of higher education of the Ministry of Education organized relevant enterprises to support colleges and universities to jointly carry out the cooperative education project of industry and education. Since 2,018, the Ministry of education has been docking school enterprise cooperation projects through the "industry university cooperative education online docking display platform". According to the data of the Ministry of education, there were 21,300 cooperative projects in the 2,018 annual school cooperation cooperative education project, with a support fund of 7.52 billion. In 2023, there were 12,215 projects that passed the acceptance of the Ministry of education expert group[Ministry of Education,2023], and the school enterprise cooperative education achieved remarkable results.

2. Construction of Digital Economy Practice Platform Driven by Big Data

2.1 Background of Practice Platform Construction

In August 2015, the State Council issued the action plan for promoting the development of big data [The State Council,2015], noting that data has become a national basic strategic resource. On December 12, 2,017, China reform daily published the article "implementing the national big data strategy and accelerating the construction of Digital China", which proposed the comprehensive implementation of big data development action and promoting the healthy development of digital economy. Yancheng Teachers University went with the tide. In 2015, it began to set up the direction of big data in the software engineering specialty. In August 2016, it cooperated with dawn Chengdu Westone Information Industry Inc to build a big data application innovation center. In 2018, it applied for the data science and big data technology specialty and enrolled in 2019. As a new major, the school experience is relatively lacking. While cooperating with Beijing zhongketrui science and Technology Co., Ltd., it actively expands the channels of interdisciplinary and practical innovative talents training. Through the online docking display platform of the Ministry of education production and learning cooperation education, it cooperates with Beijing Zhilian science and Technology Co., Ltd. to build a big data driven digital economy practice platform, with a view to improving the training quality of practical, innovative and interdisciplinary new engineering talents.

Beijing Knowledge Chain Technology Co., Ltd. (https://www.educhainx.com/) is a leading overall solution provider of block chain, financial technology and intelligent accounting industry talent training in China. It takes "new technology enabling education" as the core concept, closely follows the top level strategic design of "science and technology power", closely follows the industrial talent demand and professional discipline construction and development,

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realizes the interconnection of industrial chain, innovation chain, education chain and talent chain by connecting industry and education, creates a new ecological chain of industry and education integration, and provides continuous intellectual support for the development of national strategic industries.

2.2 Construction of Practice Platform

Yancheng Teachers University attaches great importance to the cultivation of practical skills of students majoring in data science and big data technology. It has built a campus laboratory for curriculum experiments and curriculum design, a base training room for comprehensive project training, a Ruiyi workshop for Discipline competitions, and an enterprise internship room for enterprise professional skills. It implements a practice teaching system of "four environments and four levels."[Cao Yingying, 2024].

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In line with the principle of win-win cooperation and adhering to the concept of "discipline docking industry, professional docking enterprise", Yancheng Teachers University and Beijing Zhilian Technology Co., Ltd. signed an agreement in July 2022 to build a "big data driven digital economy practice platform" (referred to as "big data economic practice platform") for schools and enterprises. Yancheng Teachers University provides the platform construction site, computer and other hardware equipment, and Beijing Zhilian Technology Co., Ltd. provides enterprise courses and virtual training platform related to big data. The practical teaching platform was completed and put into use in December 2022, which further optimized the practice environment for basic teaching, innovative practice, discipline competition and graduation design of data science and big data technology, and provided guarantee for the cultivation of interdisciplinary high-level applied talents.

3. Use of Big Data Economic Practice Platform

3.1 Support "Three Teachers" Collaborative and Mixed Teaching

The school enterprise practical teaching platform realizes the "three teachers" collaborative teaching pattern of university teachers, AI and enterprise teachers. University teachers have a strong theoretical foundation and a strong knowledge system. They have a certain education and teaching methods, which is conducive to the imparting and solving of knowledge; Enterprise teachers have accumulated rich practice cases, with a certain practical application ability and innovation ability; At the same time, with the development of AI technology and educational application, in the practice teaching platform co built by schools and enterprises, AI intelligent assistant can take the trouble to answer students' questions in time and inspire students' innovative thinking; It can also help teachers accurately analyze students' learning, and provide data support for teachers' teaching decisions. The "three teachers" of school teachers, AI and enterprise teachers have their own strengths, theory and practice complement each other, and jointly promote the improvement of education quality and talent training. The school enterprise cooperation big data economic practice platform realizes the online and offline mix of teaching, effectively promotes students' autonomous learning, and improves the teaching effect and quality.

3.2 Support Interdisciplinary Research Teaching

Big data has become a national basic strategic resource, which can be used in various industries and fields such as the Internet of things, smart cities, augmented reality, blockchain, speech recognition, etc., with the characteristics of interdisciplinary. Therefore, in the teaching of data science and big data technology courses, we can't talk about technology in terms of technology, we must carry out in-depth technology applications. The big data economic practice platform jointly

built by schools and enterprises provides students with theoretical and practical teaching of block chain basic principles, big data finance and other courses. Through the project form and group collaborative exploration, the interdisciplinary application research of big data is realized, the Internet thinking of students is cultivated, and the cooperative learning ability and the problem solving ability of students are promoted.

3.3 Supporting Discipline Competitions

The subject competition requires the participants to apply theoretical knowledge to practical problems, and solve practical problems through continuous attempts, modifications and improvements. It is challenging and interesting, which can stimulate the curiosity and curiosity of students, and help to cultivate students' practical ability and problem-solving ability. It is an important starting point to improve students' professional practice ability. According to the national college student competition, the national level competitions that students majoring in data science and big data can participate in include the national college student financial innovation competition, the MathorCup big data competition, the national big data and computing intelligence challenge competition, and the data mining competition. Many of the competitions are cross financial and medical fields. With the help of the big data economic practice platform, the student team can participate in various competitions, which can cultivate the professional ability of students, build the technical team and application service team of the big data industry in the future, and become the future employment star.

4. Application Effect of Big Data Economic Practice Platform

The ultimate goal of collaborative education through industry university cooperation is to enable students to achieve high-quality employment in the corresponding or related industries of their major. On the one hand, students can give full play to their interests and professional expertise, adapt to the needs of the industry as soon as possible, promote career development, improve employment stability, enhance social identity, and promote the development and innovation of the industry; On the other hand, enterprises will reduce the training time for new recruits, improve enterprise efficiency, and reduce the uncertainty and risk of new recruits due to frequent job hopping.

4.1 Promote the Improvement of the Talent Training Program of School Enterprise Integration

With the increasing demand of enterprises for data processing and analysis talents, the training of big data professionals has been paid attention to by various schools. In the construction of the big data economic practice platform, the school benchmarked the engineering education certification standard of "student center, output orientation and continuous improvement". Through the cooperation with Beijing Zhilian Technology Co., Ltd., the school systematically planned the talent training objectives around the knowledge, skills, professional quality, innovation ability and other talent qualities required by the big data major from the perspective of moral cultivation and training of new generation; From the perspective of high-quality development, sustainable development, diversified development and innovative development, the enterprise focuses on the basic quality, professional ability, comprehensive ability, industry experience and other needs of employees, and connects with the school, so that the talent output standard of the school and the talent demand of the industry and enterprises are consistent, and the integration of talent training program preparation is realized.As shown in Figure 1.

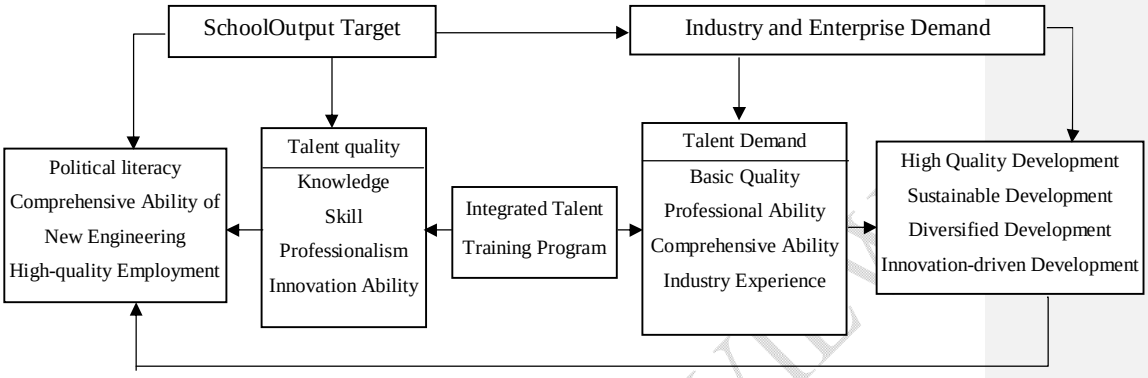

Figure 1School enterprise integration and talent training program

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4.2 Connect the Core Courses of School and Enterprise

The professional core courses in colleges and universities include basic theory courses, professional direction courses and practical application courses, covering the core concepts, basic theories and key skills in the professional field. The content is rich and the system is complete, which is crucial for students' professional quality and comprehensive ability. But the setting of these courses often has a certain lag, too much emphasis on the system and integrity of the theory, for practical applications, especially innovative applications are often less. As far as big data is concerned, core courses such as data economics and data visualization technology, school practice places and big data sources are often limited. Cooperate with enterprises, understand the knowledge structure and skills requirements of talents needed by enterprises, adjust the curriculum settings of big data major in colleges and universities, add cutting-edge courses such as data mining and machine learning, so that the courses of schools and enterprises are deeply integrated, and optimize the curriculum structure of colleges and universities. At the same time, use the real project cases and data provided in enterprise courses to carry out intelligent analysis, and the results are real, which can improve the public service ability and accuracy of decision-making of local governments, and better promote the local high-quality development.

4.3 Promote the Co Construction and Sharing of School and Enterprise Teaching Resources

School enterprise cooperative education is an inevitable trend of education modernization, and school enterprise co construction and sharing of teaching resources is an important way to achieve this goal. On July 25, 2,023, at the establishment meeting of the first national major industry education integration community, vice minister Wu Yan proposed that the golden college, the golden class, the golden teacher, the golden land and the golden textbooks are the five new infrastructure tasks to be done by the industry education integration community. Systematic, diversified and high-quality teaching videos and textbooks, as well as real teaching cases of enterprises, are the basis of teachers' mixed teaching and the guarantee of students' personalized learning. According to the integrated education goal and the division of labor and cooperation according to their respective

advantages, the school and enterprise develop various teaching resources, realize the sharing and management of teaching resources, and promote the deep cooperation between the school and enterprise.

4.4 Promote the Integration of Virtual and Real Practice Environment

The big data economic practice platform provides a large number of virtual simulation experiments for students, improving the reality of students' data acquisition and data analysis. At the same time, enterprise teachers and university teachers cooperated, according to the needs and characteristics of new engineering interdisciplinary talent training, combined with the concerns, complexity, high intensity, innovation and other requirements of innovative practice projects, built four real innovation and entrepreneurship workshops of "real scene, real task, real process, and real pressure", and students achieved concept and technology innovation while simulating real problems in the industry.As shown in Figure 2

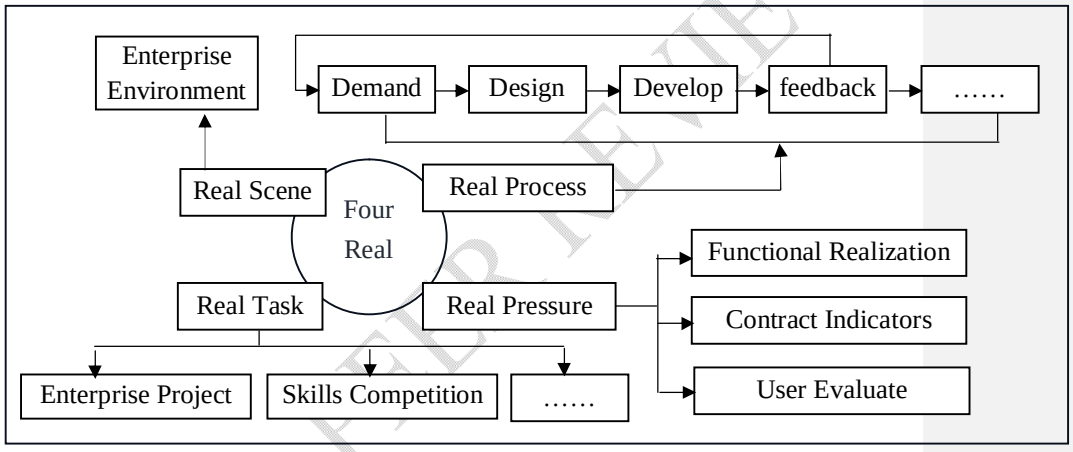

Figure 2 Four true workshops

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4.5 Promote the Change of Evaluation Methods

The use of big data economic practice platform has promoted the change of evaluation methods, emphasizing the student-centered evaluation concept. From the perspective of evaluation content, from the school focusing on the mastery of theoretical knowledge to the comprehensive evaluation of the performance, practical ability and professional quality of students in the actual work scene of enterprises; In terms of evaluation methods, from school examinations and tests to enterprise project evaluation, practice reports, output performance and other multiple evaluation; In terms of evaluation criteria, from the unified standard of the school to the humanized and scientific standard of the enterprise serving the growth and development of students; In terms of evaluation tools, from the school's paper tests to the accurate portrayal of learning process big data based on the platform's learning process records. The evaluation of school enterprise cooperative education realizes the combination of practice and theory, the combination of diversity and flexibility, the combination of unified standards and personality performance, the combination of process and results, the combination of qualitative evaluation and quantitative precision evaluation. The changes of these evaluation methods can comprehensively evaluate the practical ability and professional quality of students, improve the employment competitiveness

of students, and provide strong talent support for the innovation and development of enterprises and the continuous progress of society.

5. Thinking on the Problem of Collaborative Education Through Industry University Cooperation

5.1 Achievements in Collaborative Education Through Industry University Cooperation

The construction and use of the big data economic practice platform has achieved good results in the teaching of the core courses of data science and big data technology and the cultivation of students' practical ability. The results of the questionnaire on students' learning effect show that the students have significantly improved their self-learning ability, learning methods, knowledge application ability, problem-solving and problem-solving ability, practical innovation ability, and real task control ability.As shown in Figure 3.

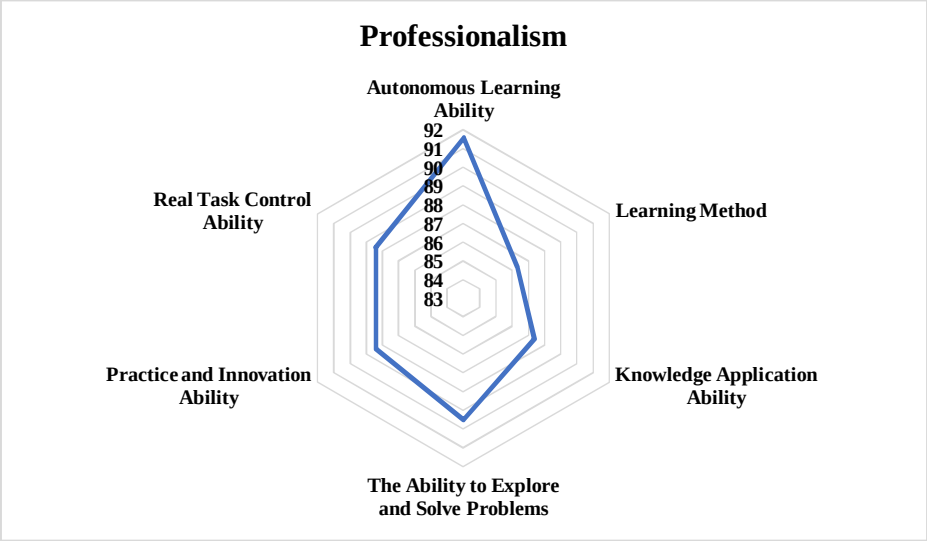

Figure 3 Survey and statistics of professional quality

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In the past 2 years, the penetration rate of data science and big data technology students to participate in discipline competitions was more than 90%, participated in 13 undergraduate innovation and entrepreneurship plan projects, approved 20 software copyrights and patents, and won 84 professional skills competitions, including 43 provincial and above discipline competitions, and 41 skill competitions; The employment rate was 98%, and the postgraduate entrance examination rate was 23%.

5.2 Problems Existing in Industry University Cooperation and Collaborative Education

Collaborative education through industry university cooperation has many advantages in improving students' practical ability and integrating education and industrial knowledge. However, there are also some difficulties and challenges in the actual implementation process.

5.2.1 The collaborative education of industry university cooperation involves multiple participants such as universities, enterprises, students and the government. Each participant has different interest demands, operation methods and regulatory requirements, which leads to the difficulty of collaborative education. There may be

differences between colleges and enterprises in training objectives, curriculum design and other aspects, which to some extent restricts the smooth progress of education. The government's policy guidance and financial support in school enterprise cooperative education is also a difficulty. Sometimes it is difficult to achieve the desired effect. Students' recognition of their major and their efforts in professional practice affect the final effect of collaborative education.

5.2.2 The collaborative education of industry university cooperation involves the sharing and cooperation of resources. Although school enterprise cooperation has brought about the integration and sharing of resources, problems such as uneven resource distribution and irregular resource management often occur. Universities and enterprises need to establish a long-term and stable cooperative relationship, so as to better carry out resource construction and sharing. In addition, the cooperation in different disciplines also needs to overcome the constraints of discipline boundaries and carry out effective integration and coordination.

5.2.3 The collaborative education of industry university cooperation needs to overcome the problems of regional differences and unbalanced industry development. Some regions have favorable enterprise resources and industrial development, while some regions lack these conditions. Therefore, students in different regions have different opportunities and resources in the collaborative education of industry university cooperation. In addition, the development degree and demand of different industries are also different, which puts forward different requirements and challenges for the collaborative education of industry university cooperation.

5.3 Sustainable Development Path of Collaborative Education Through Industry University Cooperation

In the development of industry university cooperation and collaborative education, it is very important to explore a sustainable development path suitable for the region, the University and the enterprise.

5.3.1 It is necessary to establish the dominant position of industry university cooperation and collaborative education, clarify the division of labor and responsibilities between schools and enterprises in the process of education, and form a reasonable division of labor and cooperation relationship.

5.3.2 It is necessary to strengthen the construction of organizations of both parties, establish a sound organization system of industry university cooperation and collaborative education, clarify the responsibilities and authorities of organizations at all levels, and form an efficient management and operation mechanism.

5.3.3 We should actively explore the mode of multi-party cooperation, establish a long-term mechanism of school enterprise community cooperation in education, give full play to the advantages of community resources, and realize the sharing and optimization of education resources between school enterprise communities.

6. Conclusion

The construction of an innovative practice platform for collaborative education through industry university cooperation has realized the in-depth cooperation between universities and enterprises in the fields of teaching, scientific research and practice. While improving students' practical ability and employment competitiveness, it has promoted the industrial development and technological innovation of enterprises, and achieved the organic combination of educational resources and social needs. However, we should also see the changes in talent demand brought about by the green transformation and innovative development of enterprises in the era of artificial intelligence. The 2023 future employment report released by the World Economic Forum (WEF) predicts that 23% of jobs will change and 12.3% of jobs will disappear

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in the next five years; In the next 20 years, more than 50% of occupations will realize machine automation; 85% of the probability of personal career success is related to core qualities such as learning ability, thinking ability, creativity and problem-solving ability, while only 15% is related to professional skills. [World Economic Forum,2023] Although school enterprise cooperation and collaborative education has improved students' practical ability to a certain extent, it has solved the problem of high-quality employment of students. But in the long run, students may be too professional and limit their development in other fields. Therefore, as a school, while considering students' professional ability and professional quality, it should consider the cultivation of students' innovation ability and social adaptability, so that students can learn to learn and survive in the era of intelligence.

7. Statements and Declarations

Funding:2022 Ministry of Education Industry University Cooperation Collaborative Education Project "Construction of Big Data Driven Digital Economy Practice Platform" (Project Number: 220605844080053). 2023 Jiangsu Province Education Reform Project "Research on the Cultivation of Innovative Applied Talents in New Engineering Based on Maker Education" (Project No.: 2023JSJG362). 2023 Jiangsu Province Education Science "14th Five Year Plan Key Project" Research on Strategies and Paths for Enhancing the Intelligent Teaching Ability of Young and Middle aged Teachers in Universities "(Project No.: B/2023/01/179)

Conflicts of Interest: The authors declare no conflict of interest.

Reference

[1] Xi Jinping Holding high the great banner of socialism with Chinese characteristics and striving for the comprehensive construction of a modern socialist country: report on the twentieth National Congress of the Communist Party of China [M] Beijing: People's publishing house, 2,022

[2] CCTV news The talent gap is 1 million! In this new position, you can't fly [EB/OL] https://baijiahao.baidu.com/s?id=1813557162980943527&wfr=spider&for=pc.2024-10-22

[3] Ministry of education Notice of the Higher Education Department of the Ministry of education on the announcement of the final acceptance results of the 2,023 industry university cooperative education project [EB/OL] https://hudong.moe.gov.cn/s78/A08/tongzhi/202407/t20240723_1142394.html. July 17, 2024

[4] The State Council Action plan for promoting the development of big data [EB/OL] (2015-08-31)[2024-6-15]. http://www.gov.cn/zhengce/content/2015-09/05/content_10137.htm.

[5] Cao Yingying Professional introduction of Yancheng Teachers University: School of Information Engineering - Data Science and big data technology [EB/OL] https://www.douyin.com/video/7384628690149264667

[6] World Economic Forum.2,023 future employment report [EB/OL] https://www3.weforum.org/docs/WEF_Future_of_Jobs_2023.pdf

7. Ergun Demirel DD. Establishment of cooperation and collaboration platforms between universities and industry to improve education quality. The Online Journal of Quality in Higher Education. 2015;2(3):59.

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8. Sun Y. [Retracted] Design and Application of Collaborative Experiment Management Platform for Innovation and Entrepreneurship Education Based on an Intelligent Sensor Network. Journal of Sensors. 2022;2022(1):9542280.

9. He Z, Sun X. [Retracted] Index Construction and Application of School‐Enterprise Collaborative Education Platform Based on AHP Fuzzy Method in Double Creation Education Practice. Journal of Sensors. 2022;2022(1):7707384.

10. Wu P. Analysis on the Innovative Application of Industry-University-Research Collaborative Education Mode. InThe 6th International Conference on Arts, Design and Contemporary Education (ICADCE 2020) 2021 Jan 6 (pp. 285-289). Atlantis Press.

11. Xiaa Z, Xiaolingb J, Chengjiec L, Luyued H, Zhaojune R, Naf L. Reconstruction and Practice of Digital Construction Collaborative Innovation Teaching System under the Background of Construction Industry Transformation and Upgrading. Frontiers in Edu‐ cational Research. 2022 Mar 5;5(3):1-4.

12. Qin Q, Tang T, Wang P, Gong G. The Construction of Collaborative Education Practical Teaching System Based on Emerging Engineering Oriented Towards the Integration of Production-Education. InInternational Conference on Computer Science and Educational Informatization 2023 Aug 11 (pp. 401-412). Singapore: Springer Nature Singapore.