

Thinking about the Construction of the OBE-Based Industry-Education Integration Information Technology Talent Training Model

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Abstract: In recent years, with the rapid development of big data, cloud computing, artificial intelligence, machine learning and other information technology, enterprise information management has also entered the "post ERP" era. Enterprise informatization has become the mainstream of global economic and social development. The training of engineering talents in local colleges and universities in China has problems such as difficulties in "industry-education integration", difficulties in implementing school-enterprise collaboration and unclear professional standards. On the basis of this, an education system of industry-education integration is established by combining the teaching idea of OBE. After years of practice, it has initially formed a production-oriented training mode for engineering applied talents, and established a long-term cooperation mechanism with school-enterprise cooperation, which has solved the problems of incompatibility between engineering talents and social needs and difficulties in long-term cooperation between schools and enterprises, and provided a reference basis for the construction of "Six Excellence and One Excellence" Plan 2.0 for local universities. It provides a certain reference basis for the construction of "Six Excellent and One Top" program 2.0 in local universities.

Keywords: OBE, Industry-education integration, Information-based talent training

1. Introduction

At present, the application-oriented talents in China are difficult to form the "discipline objective" under the situation of "industry-education integration", and "lack of cooperation between small and medium enterprises". "This has restricted the development of universities to a certain extent. The "curriculum system" is difficult to meet the diversified and diverse needs of information technology personnel training. How to analyze and solve these problems in depth, which is an important issue in the cultivation of engineering talents in Chinese universities. The output-oriented OBE education model requires that all aspects of the talent cultivation system are centered on output goals, so that each student can achieve his or her own goals after completing his or her studies. The OBE teaching model does not prescribe a specific teaching or evaluation method, but points out that the curriculum system, practice opportunities and evaluation methods should help students achieve the desired output purpose [1]. The Washington Agreement is based on OBE, while the accreditation of engineering education is based on the ideas of "output-oriented", "student-oriented" and "continuous improvement" throughout the whole process of talent cultivation. This is the current quality management system of engineering education in China. Combined with production education, it promotes the needs of talent cultivation and industrial development and the comprehensive development of education, talents, industrial chain and innovation chain. In the fields of discipline construction, curriculum system construction, teaching material writing and internship training, we integrate the needs of enterprises into the process of cultivating talents, so that the construction of disciplines and majors can adapt to the development of new technological revolution, industrial revolution and new economy, so as to promote the cross-fertilization of disciplines and majors and accelerate the construction of "new projects" [2].

2. Guiding Ideas

While China is implementing an innovation-led development strategy, education reform and

development are facing a new situation, new challenges and new requirements. In October 2017, General Secretary Xi Jinping proposed in the report of the 19th National People's Congress that "synergistic development with scientific and technological innovation, financial innovation, and human resources", "taking talents as the first resource to support development", and "Innovation-driven is essentially talent-driven". Premier Li Keqiang also mentioned that in the supply-side structural reform, the cultivation of talents is an important link. Therefore, deepening the integration of industry and education at different levels as a way to optimize the structure and improve the quality, which is a major issue facing China's higher education at present. Higher education institutions should take the initiative to develop in a practical direction, and then combine discipline construction with industrial development.

In-depth enterprise research was conducted, and the characteristics of OBE were analyzed and analyzed. In order to make universities and enterprises collaborate and innovate in the rapidly changing business environment, we must establish an enterprise-oriented and industry-oriented talent cultivation model. To build a long-term mechanism of industry-education cooperation, industry-education integration and industry-academia cooperation, which is the key to improve the teaching quality of higher vocational education. The core of OBE is industry-oriented and student-oriented, through the connection with production and training, constantly adjusting and formulating talent training standards, and collaborating with enterprises, then optimizing the curriculum system and learning resources. Enterprises are deeply involved in the whole process of the school to achieve the goal of high-quality talent training, which has a strong application capability [3].

3. Output-oriented Construction of the Talent Training Model of Industry-education Integration

With OBE, innovation and entrepreneurship education as the guide, school-enterprise cooperation and production synergy as the basis, this strengthens students' practical ability, information management ability, ERP engineer's professional level, ERP consultant's comprehensive quality and core ability. The strategic positioning of "development leap, innovation and innovation" is "student training", "teacher training", "small and medium-sized enterprise collaboration", "continuous improvement". The strategic positioning of "development leap, innovation and innovation" is complemented by "student training", "teacher training", "SME collaboration" and "continuous improvement". From the three levels of enterprise informatization, ERP industry and SAP, we will conduct an in-depth discussion on the innovative talent needs of typical information enterprises and famous universities at home and abroad, and then explore the needs of various stakeholders of enterprises, and provide services for enterprises, society, universities and graduates. Deeply promote the training reform, closely follow up the industry dynamics, build the enterprise informatization training ability index, decompose the innovation ability at all levels, and display relevant courses, projects, themes and activities [4].

On this basis, the learning direction, learning objectives, graduation requirements, innovative thinking, innovative consciousness and innovative ability of the innovative talents of information technology are discussed in depth from the perspective of industry and profession. At the same time, the enterprise will be on the basis of good school-enterprise cooperation, we have to make full use of the rich resources of SAP Gold enterprise, and combined with the enterprise information construction, and enterprise urgently need ERP talents, and constantly improve the characteristics of ERP/SAP. Around the business solutions of ERP/SAP, we will develop teacher configuration, curriculum, experimental environment, internship training methods, employment paths, etc., and then make it a high quality talent with modern management concept as the core.

Guided by the idea of design and implementation, different talent training modes are applied to meet the needs of society. The basic knowledge, skills and abilities are divided into three types of competency indicators, and the indicators are combined with the course content to form a specialized, high quality and comprehensive training system. In the process of implementation, the systematic analysis method was applied to analyze the correlation between courses. On this basis, an innovative theory and practical training course system based on ERP/SAP was constructed according to the characteristics of ERP/SAP [5].

3.1. Output-oriented Determination of Training Objectives

Based on the output orientation, career development and school orientation, surveys of employers, students, parents and alumni, etc., the objectives of vocational education are set according to the

requirements of society for graduates' knowledge, ability and quality. From a general point of view, the orientation of the profession should be to cultivate high-quality applied talents with a strong sense of social responsibility, coordinated development of knowledge, ability and quality, as well as adapting to the development and construction needs of the information industry [6].

3.2. Designing an Integrated Innovative Talent Training System for Industrial Needs

Based on the clear information technology innovative talents training ability system, the school-enterprise cooperation curriculum system with "ERP/SAP" as the core of "learning output", carry out teaching mode reform, reverse design each course. The enterprise projects and cases are introduced into the curriculum system; the "five new" technologies - new theories, new technologies, new tools, new products and new applications - are integrated into the curriculum/programs in time to follow the industrial development.

Based on the OBE learning model and the innovative spirit of enterprises, we make dynamic adjustments to the training of ERP/SAP talents, and reconstruct the theoretical and practical systems. We have built up a comprehensive talent training system based on "on-campus and off-campus", "vocational education" and "quality education" through integrated planning of courses, projects, themes and activities.

3.3. Industry-university Docking to Develop Professional Standards and Training Programs

According to the national education certification standards, industry electronic information standards and the training tradition of "emphasizing foundation, practice, school-enterprise integration and open schooling", we make full use of the industry-university-research cooperation platform, and set up a joint school-enterprise expert group with relevant industries, industry associations and cooperative enterprises to discuss the competencies and quality requirements of high quality talents. Incorporate school standards into vocational training standards, and establish standards based on learning ability, analytical ability, competence and quality, innovative consciousness, organizational and communication skills and professional quality [7].

In the process of implementation, we have to establish a three-level teaching model of "vocational skills, professional skills and practical skills" by integrating the opinions and suggestions of experts from various industries. In order to implement the needs of students' professionalism and professional ability development, we build a platform and mechanism for school-enterprise cooperation by relying on the national training bases, so that students can "enter the enterprise early and participate in the project early". The teaching ideology of "practice, application and innovation" enables students to apply the knowledge and technology, which they have learned, to the actual production activities, technological innovation and development of all aspects, to achieve the ability to find and solve problems in the actual work. It also cultivates the creative thinking and hands-on ability of contemporary students, learns the advanced enterprise culture, and cultivates professional and ethical skills.

3.4. Designing ERP/SAP Special Innovative Talent Training System According to Social Needs

Divide BLOOM into four levels, six levels from memorization, understanding, application, analysis, evaluation, and creation. The students are provided with innovative practice, basic innovative ability, professional innovative ability and practical ability to improve comprehensively. Combined with the specific situation of enterprises, the training system of enterprise information innovation talents with ERP/SAP as the core is constructed. Professionals from industrial enterprises are involved in the design of the curriculum system, which not only enables the university's talent training and the needs of industrial talents to be more closely integrated, but also promotes the transformation from academics to output. On this basis, we establish a "competency-oriented and engineering-oriented" teaching system based on the knowledge system, competence structure and training of competencies of the information technology system.

The company and the school jointly develop the teaching content of the professional core curriculum, and make it the focus of the core curriculum in the school, and add new technologies and application examples to the curriculum. Under the premise of providing relevant theoretical knowledge and referring to qualification certificates, we have to work together with company teachers to increase the proportion of professional courses, such as professional ethics and industry regulations, so as to

make up for the lack of non-technical factors in traditional teaching. Combining independent learning with teaching, we need students to participate in subject competitions, open experiments, faculty research, scientific and technological projects or social practice activities (8 credits), thus enhancing independent learning, innovation, cooperation and communication skills [8].

3.5. Industry-education Integration, Deep Participation of Enterprises in the Whole Process of Talent Training

The core of "industry-education integration" lies in the deep involvement of enterprises, which is another challenge for its development. On the basis of school-enterprise cooperation, create high-quality teaching resources, establish "integrated" teaching team, establish professional teaching materials, and then create a good atmosphere for enterprises to really integrate into the whole process of training [9].

3.6. Designing the Training System for the Training of Information Technology Talents for Five Levels of Project Teaching

In the cultivation of IT talents, the "3+1" talent training model is implemented, which is a teaching and training system combining teaching, and practice based on theoretical teaching and enterprise practice. This is three years of theoretical education, and one year of enterprise practice, so that students have one year of practical work experience before graduation, which makes up for their lack of work experience before finding a job. Enterprise teachers with rich practical experience in ERP are introduced into the professional education system, and teaching resources such as project libraries and case libraries are established.

The training method is practical, effective and operational, and it can break through the traditional training model, which is also closer to the actual needs of enterprises, so that students can carry out enterprises in their fourth year of college and participate in on-the-job internships, thus realizing the transformation from students to enterprise engineers. Through a clear positioning of the industry, we will gradually deepen the "five-level" curriculum system of modules, courses and comprehensive professional training, so as to cultivate information technology talents who master information systems and use information technology skillfully.

4. Mutual Benefit and Win-win, Building a Long-term Mechanism of School-enterprise Cooperation of "Double Construction, Double Training and Double Advancement"

Mutual benefit and win-win" is the prerequisite of "industry-education integration" and "school-enterprise cooperation", and it is the important guarantee of "University-University-Research" and "University-Enterprise Cooperation". To build a complete set of school-enterprise cooperation and win-win cooperation mechanism, it is conducive to enterprises to go deep into all aspects of talent training, and solve the problem that school-enterprise cooperation is difficult to sustain and the school is hot and cold. By signing strategic cooperation agreements with enterprises, establishing industry-university-research cooperation forums, establishing postgraduate workstations, provincial key laboratories, provincial engineering education bases, etc., we provide institutional guarantee for school-enterprise cooperation and collaborative education [10].

According to the system structure and development trend of modern communication network, as well as the close contact with domestic and foreign communication manufacturers, and telecommunication companies, we will work together with Huawei and ZTE to establish a "modern communication learning network" system, that is fully synchronized with domestic communication network technology. Its main features are the whole process (key links in the communication process), the whole network (many different types of networks in modern communication networks), and the whole reality (a real enterprise engineering environment). Four levels, from primary, advanced, project design to engineering internship, constitute a three-dimensional internship platform. At the early stage of construction, school-enterprise experts combined with industrial needs and introduced corporate wisdom to jointly complete the top-level design of the experimental platform. The scalable planning idea ensures that the experimental platform can be established gradually according to the development of the industry, which also ensures the integrity of the platform at the same time. In the construction process, enterprises use their equipment according to the needs of technology development, and adopt technical means such as enterprise donated systems and schools provide supporting services to

gradually realize the connection and connectivity of each system. After the completion of the construction, we follow the idea of "follow up the construction of off-campus bases and share the results of the platform construction", and supplement the network operated by the enterprises on the network and the test network established on campus with each other [11].

4.1. Double Construction: Building Laboratories and Training Centers

In the construction of laboratories for school-enterprise cooperation, it is necessary to build both an experimental system and a training center that is compatible with it. In the school-enterprise cooperation in the construction of professional laboratories, but also in cooperation with the above-mentioned enterprises, and then set up a number of school internship schools for vocational qualifications.

4.2. Dual Training: Training Students and Employees

In addition to training teachers and students in schools, the center also provides training for employees and customers of companies. In addition to providing practical training in the relevant professions, it also provides support in technology, materials, and teaching. By establishing the Innovation Training Center, companies can train their customers as well as train entrepreneurial practices and engineering teachers in the corresponding "Excellent Engineers" program, which is a win-win situation for both parties. This research has laid a solid foundation for the creation of an engineering college of "new engineering".

4.3. Double Entry: Real Cases into the Classroom of Teaching Materials, Professional Literacy into the Training Process

After the training, the teachers introduced the advanced certification course content, experimental cases, and certification assessment mode into the daily teaching, so that the teaching content is closely integrated with the needs of enterprises, and the actual environment of enterprises is brought into the training of talents. Taking IP network technology series as an example, the professional knowledge system of "introduction, and improvement" has been established with Huawei, ZTE, Shaanxi Telecom and other enterprises, and more than 100 experiments have been conducted at the level of "introduction and improvement", 37 of which are comprehensive designs. At the same time, the actual engineering cases of enterprises are transformed into "integrated application and innovation" courses, including the planning, design and implementation of enterprise networks, telecom metropolitan networks and backbone networks, ensuring the advanced, applicable and telecom characteristics of the courses and combining the training of talents with the needs of enterprises [12].

Enterprise practice includes "job skills assessment", "enterprise engineering practice training", "communication engineering project management", "job practice ", "graduation design", etc. On the one hand, students are able to acquire knowledge and skills in requirements analysis, project development, project implementation, project management, etc. Therefore, they are able to deal with problems independently and with team spirit. At the same time, they are also able to participate in the actual work of the factory and experience the working environment of the company first-hand, and improve their professional quality.

5. Interactive Mechanism of Professional Construction with Deep Integration of School and Enterprise

Based on ERP/SAP, we combine the goals and requirements of China's practical talent training model, and design an innovative system for talent training based on ERP industry. With the application of professional skills, and the cultivation of basic quality as the main line, and the discipline characteristics as the core, we expand the cycle development system of need-based learning, learning to help production, and production to promote learning, and then form the professional construction with the integration of industry-university cooperation [13].

5.1. According to the Needs of the Study, to Meet the Customized Needs of Enterprises

Through school-enterprise cooperation, we can carry out teaching activities and establish practice bases to achieve win-win situation and promote development. Through enterprise and social research,

timely acquisition of enterprise information, two-way information exchange, understanding of the needs of both sides, understanding of the win-win cooperation model, so as to take prompt action. In flexible management, make full use of my expertise, establish a rapid talent response mechanism, and realize the coordinated development of "school-within-enterprise" and "enterprise-within-enterprise".

Off-campus internship sites can provide students with a realistic SAP work environment. During the internship process, each student is trained and assessed according to the company's standards. The company also provides pre-employment training, business counseling and vocational training to each trainee so that students can better understand the company's system and work environment. The company adopts a personalized approach to teaching in order to improve students' creativity and hands-on skills, cultivate applied and applied talents, and promote their overall development.

5.2. Cultivating Innovative and Applied Talents through Learning and Supporting Production

Using the actual situation for engineering and case studies, students can better grasp the latest market technology and improve the economic efficiency of the company. At the same time, by strengthening communication and collaboration with enterprises, the focus can be placed on the global online information services, ERP/SAP project management, and ERP service outsourcing. We will strengthen collaboration with small and medium-sized enterprises, promote the combination of industry-university-research, and strengthen the training of talents who apply information technology to promote the combination of industry-university-research.

5.3. Promote Learning through Production and Promote Interactive Cooperation between Industry and Academia

Using flexible and diversified working mechanisms such as enterprise tutors and seconded teachers, we promote the mutual influence between production and training in enterprises, so that enterprises can really become an important base for training high-quality talents, training "dual-teacher" teachers and transforming high-tech achievements. Actively cooperate with enterprises, bring teachers to enterprises, and improve their practical operation level. Establish a project management procedure for school-enterprise cooperation, so as to realize the prior planning, supervision, follow-up inspection and summary of school-enterprise cooperation.

Starting with the training of professionals oriented to IT applications, we will gain an in-depth understanding of the needs of companies for IT professionals, form industry alliances, select human resources, train, deliver, research, and execute. At the same time, it is also possible to train excellent students and motivate them to learn, thus achieving effective and large-scale creative human resources training.

Through school-enterprise cooperation, we will strengthen the relationship between schools and enterprises, enhance the practical skills of professionals and technicians, and cultivate a large number of IT talents. At the same time, the personnel concerned should also make full use of flexible and versatile teaching mechanisms to strengthen collaboration in production and research, and to effectively enhance students' practical skills [14, 15]

6. Conclusion

The implementation of the Ministry of Education's "Six Excellent and One Outstanding" project version 2.0 will promote the construction of "New Engineering" and enhance the role of higher education in the economic and social development of China. The quality education of students has become the focus of attention of Chinese universities and the whole society. The OBE-based talent training model provides an effective way to cultivate IT talents. By strengthening school-enterprise cooperation and establishing a supply-demand docking platform, students are comprehensively trained to apply, create and adapt professional skills to society, to market changes and to the needs of enterprises.

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