Research on Practical Teaching Reform of Blockchain Technology Application Specialty

Rui Huang
School of Artificial Intelligence,
Shenzhen Polytechnic University,
Shenzhen, China

Abstract—The Blockchain Technology application major is based on the interdisciplinary disciplines of computer science and cryptography, aiming to cultivate highly skilled interdisciplinary talents with the ability of blockchain system design, development, operation and maintenance and security management. Practical teaching is helpful to improve students' practical operation ability, problem solving ability and innovation ability. At present, there are some problems in the practical teaching of blockchain technology application, such as disconnection between theory and practice, lack of teaching cases that match the actual industry needs, and insufficient integration of project development. The major of blockchain technology application should build a teaching reform system that is oriented to the needs of the industry, strengthen the deep integration of theory and practice, and improve the teaching content to ensure and keep up with the development of cutting-edge technologies, so as to enhance students' technological innovation ability.

Keywords—Blockchain; Teaching Reform; Practical Teaching

I. INTRODUCTION

Blockchain technology application major is an emerging interdisciplinary field, integrating the knowledge of computer science, information technology, cryptography, economics and other disciplines, focusing on cultivating high-quality professionals who master the ability of blockchain technology design, development, application and security management. With the wide application of blockchain technology in the fields of finance [1], supply chain management [2], Internet of Things [3], digital copyright [4], etc., the importance of professionalism has become increasingly prominent. At present, the practical teaching of the application of blockchain technology faces many challenges, such as the disconnect between theory and practice, and the lack of teaching resources that match the needs of the industry. Therefore, it has become an urgent problem to reform the practical teaching of the application of blockchain technology to meet the needs of the development of the industry. In this context, according to the characteristics of the blockchain technology application major, it is of great significance to explore the strategy and path of the reform of the practical teaching of the blockchain technology application major.

II. THE IMPORTANCE OF PRACTICAL TEACHING

Blockchain technology shows its unique application potential in several fields, especially in finance, supply chain management, digital rights, and smart contracts. The practical teaching of blockchain technology application major is an organic integration of theory and practice, and students can combine theoretical knowledge with practical application to deepen their over all understanding of blockchain technology. In the project-based development course, students' ability to solve problems independently is cultivated, so that they can better adapt to the needs of future career development in practical teaching, so as to achieve effective docking with the supply side of industrial talent training.

A. Cultivate Students' Practical Ability and Professional Quality

In professional practice teaching, the teaching of blockchain technology is not only to teach programming or software operation skills, but more importantly, to train students to have a deep understanding of the core concepts of blockchain such as distributed ledger, encryption algorithm, consensus mechanism and other complex theories. These theories and technologies are the cornerstone of the successful application of blockchain technology in all walks of life. For example, distributed ledger technology provides a decentralized way to manage data, which changes the limitations of traditional centralized storage and enhances the transparency and security of data. Through practical project development, students can intuitively understand its working principle and potential application scenarios, and cultivate students' practical ability [5].

Practical teaching can also help students master how to deal with real-world technical problems and challenges. In the practical operation of the blockchain project, students need to learn how to design a secure and reliable blockchain network, how to deal with security threats such as network attacks and data leaks, and how to optimize system performance in dealing with a large number of transactions and data scenarios. The solution of these practical problems depends not only on technical knowledge, but also on critical thinking and innovation ability. By facing real development practices, students are able to test and verify in a real environment, cultivating students' professionalism and innovation ability.

B. Strengthen Interdisciplinary Competence and Professional Adaptability

The application of blockchain technology spans many fields, including finance, healthcare, supply chain management, public services, etc., which requires talents engaged in blockchain technology not only to have professional technical knowledge, but also to understand business processes and laws and regulations in various fields. By simulating a real work environment, professional practice teaching gives students the opportunity to participate in interdisciplinary projects, thereby learning how to apply blockchain technology in different fields. For example, in the financial industry, blockchain

technology can be used to improve payment systems, prevent fraud, etc. In supply chain management, blockchain can help record and track the whole process of goods from production to consumption, ensuring the transparency and authenticity of information.

This interdisciplinary approach can greatly enhance students' career adaptability. In their future careers, students will be able to switch roles in different industries with greater flexibility and tackle a variety of complex work challenges. In addition, the rapid development of blockchain technology also requires practitioners to constantly learn the latest technologies and applications, and professional practice teaching can cultivate students' lifelong learning ability, enabling them to adapt to the rapidly changing workplace of technology. By developing projects with disciplines from different backgrounds, students are able to learn not only expertise, but also how to work in diverse teams, an indispensable ability in a modern work environment.

III. PROBLEMS EXISTING IN PRACTICE TEACHING

The quality of practical teaching directly affects the training effect of talents. In the practical teaching process of the application of blockchain technology, the problems faced cover multiple dimensions such as the optimization of teaching content, the fit degree of industry needs, the construction of teaching staff, the effective allocation of resources and the improvement of the evaluation system. These challenges not only profoundly affect the quality and effectiveness of practical teaching, but also restrict the growth and development of students' practical ability.

A. The Limitation of Practical Teaching Content in Depth and Breadth

The depth and breadth of the practical teaching content of the application of blockchain technology is a key factor affecting the quality of teaching, and an important dimension to measure the quality of teaching. At present, the practical teaching content of the major shows limitations, mainly focusing on the basic category and initial application of blockchain technology, while the discussion of the core theoretical framework, key technical elements and frontier development trend of the field is particularly insufficient. Specifically, the key links that constitute the core of technology, such as the consensus mechanism of blockchain, encryption algorithms, and smart contracts, are often only at the level of theoretical elaboration in practical teaching, lacking the necessary hands-on practice and exercises. As a series of emerging application scenarios and technologies of blockchain technology continue to emerge, the content system of practical teaching fails to keep pace with it, resulting in a disconnect between teaching content and real needs.

This lack of practical teaching in depth and breadth not only seriously restricts students' comprehensive and profound cognition of blockchain technology, but also further weakens the core competitiveness of students to cope with challenges and seize opportunities in their future careers. In response to this problem, it is necessary to systematically optimize and upgrade the practical teaching content to ensure that it can fully meet the needs of cultivating high-level blockchain technical talents.

B. The Degree of Matching Between Practical Teaching and Industry Needs

The fundamental purpose of professional practice teaching of blockchain technology application is to cultivate a team of talents who can accurately meet the needs of the industry and have high-quality skills. At present, the practical teaching activities of the major are insufficient in reflecting the actual needs of the industry and the real application scenarios. The practical teaching content has not fully integrated into the current industry frontier dynamics of blockchain technology, making it difficult for students to fully grasp the challenges faced by blockchain technology in the actual application of enterprises, and it is difficult to obtain corresponding solution strategies. In addition, in the construction process of practical teaching projects, there is a lack of deep cooperation mechanism with enterprises, which makes it difficult for students to personally experience the complexity and diversity of the front-line work environment, and it is difficult to obtain valuable real project development experience.

This status quo not only seriously weakens the competitiveness of students in the job market, but also greatly limits the future development potential of students in the field of blockchain technology. Therefore, in order to effectively improve the quality and effect of practical teaching, it is necessary to strengthen the close connection between practical teaching and the needs of the industry, to ensure that students can fully grasp the knowledge and skills required by the industry during school, and lay a solid foundation for their future career.

C. Lack of Practical Teaching Faculty

The faculty strength of the practical teaching of the application of blockchain technology is one of the key factors affecting the quality of teaching. At present, the major is facing the severe challenge of the lack of professional teacher team in the practical teaching. On the one hand, blockchain technology is an emerging field, and many teachers do not have the deep theoretical background and rich practical experience related to it, which restricts the effective play and guidance ability of teachers in practical teaching activities to a certain extent. On the other hand, due to the rapid development and changes of blockchain technology, teachers need to constantly update their professional knowledge and skills, and continuously improve their knowledge reserve and practical operation ability to better meet the needs of practical teaching. However, due to limited training and learning opportunities, many teachers find it difficult to achieve sustained professional growth and development, which makes it difficult to improve their professional quality and practical ability.

The problem of weak teachers in practical teaching not only seriously weakens the overall quality of practical teaching, but also greatly limits students' in-depth exploration of the field of blockchain and the exploitation of practical potential in the classroom. In order to effectively improve the quality and effect of the practical teaching of the application of blockchain technology, it is necessary to pay attention to and strive to solve the problem of weak teachers, and provide solid talent support and intellectual guarantee for practical teaching.

D. Insufficient Allocation of Practical Teaching Resources

The practical teaching activities of the application of blockchain technology need to be supported by sufficient facilities and resources. At present, there are significant shortcomings in the allocation of practical teaching resources. The experimental equipment and software resources urgently needed in the process of practical teaching are seriously insufficient, which is difficult to support the needs of in-depth learning and practical exploration of blockchain technology. For example, the development and testing of blockchain technology lacks the necessary hardware infrastructure and software platform support, making it difficult for students to carry out in-depth practical operations and exploration. On the other hand, the case materials and data resources necessary for practical teaching are also relatively scarce, which greatly hinders students from carrying out in-depth case analysis and data experiment activities. In addition, in view of the particularity of blockchain technology itself, practical teaching needs to be equipped with corresponding network security nodes and privacy protection facilities to ensure the safe and orderly conduct of practical activities.

The insufficient allocation of practical teaching resources not only seriously restricts the effective development of practical teaching activities, but also affects the cultivation and improvement of students' practical skills and innovation ability in the field of blockchain. It is necessary to increase the investment in practical teaching resources and optimize the allocation structure of resources to ensure the smooth development of practical teaching activities and provide a strong guarantee for the all-round development of students' practical skills and innovative ability.

E. The Evaluation System of Practical Teaching Lacks Objectivity

The evaluation system of the practical teaching of the application of blockchain technology is a key yardstick to measure the quality and effectiveness of teaching, and its scientificity and objectivity are of great importance. At present, there is a lack of scientificity and objectivity in the evaluation of practical teaching. On the one hand, the evaluation system tends to focus too much on the results of practice, while ignoring the evaluation of the practice process. This tendency prompts students to focus only on the completion of the task, while ignoring the learning and growth contained in the practice process. On the other hand, the practical teaching evaluation fails to fully integrate into the industry needs and enterprise standards, which makes it difficult for students to accurately grasp their actual positioning and competitiveness level in the industry. In addition, the evaluation system is also insufficient in the comprehensive evaluation of students' practical ability and innovative ability, which hinders the development of students' self-cognition to a certain extent, making it difficult for them to clearly recognize their own advantages and disadvantages.

The lack of objectivity of practical teaching evaluation system not only seriously hinders the continuous optimization and promotion of practical teaching, but also restricts the future career development and competitiveness of students. In order to build a more scientific and objective practical teaching evaluation system, it is necessary to pay attention to the

balance between process and result, strengthen the docking with industry and enterprise standards, and comprehensively evaluate students' practice and innovation ability, so as to provide strong support for the improvement of practical teaching quality and the all-round development of students.

IV. PRACTICE TEACHING REFORM PATH

Scholars' research on practical teaching mainly focuses on the construction of practical teaching system, the improvement of teaching evaluation, the establishment of quality assurance mechanism and the in-depth exploration of practical teaching mode. In the field of practical teaching of the application of blockchain technology, the research is more specific around the close docking of talent training and industry development, aiming to build an innovative practical teaching model through in-depth exploration and practice, covering several key links such as "post docking - course integration - discipline competition - certificate integration - project practical training".

A. Strengthen Job Docking and Improve Professional Quality

In the practical teaching reform of the blockchain technology application major, post docking is regarded as the core strategy to improve students' practical ability and promote employment quality. The specific initiatives of this strategy cover multiple levels, aiming to ensure that the educational content is highly aligned with the needs of the industry, so as to cultivate blockchain technical talents that meet the needs of the market. Specific initiatives include: strengthening deep cooperation with blockchain enterprises, and jointly developing practical teaching syllabi and course content. Ensure that the practical teaching content not only covers the core theory of blockchain technology, but also incorporates cutting-edge industry trends and practical application cases. So that students can get in touch with the real work scene and business process during the school, laying a solid foundation for the future job docking; Cooperate with enterprises to establish off-campus practice base, providing a wealth of internship opportunities. In these internship bases, students can participate in real blockchain projects under the guidance of corporate mentors, thereby transforming theoretical knowledge into practical skills and enhancing students' employment competitiveness.

B. Optimize Course Resources and Enhance Practical Ability

Curriculum integration is a key part of improving teaching quality and efficiency. In order to train high-quality technical skills talents to adapt to the development of the new generation of information technology, the specific measures of curriculum integration need to be taken as follows. The original curriculum system is comprehensively sorted out and optimized, and a modular and hierarchical curriculum system is built. It not only covers basic courses such as blockchain technology, Linux operating system, Introduction to the meta-universe, Go language basics, but also introduces core courses such as smart contract development, blockchain testing, and blockchain development practice. Through modular design, we can flexibly combine course modules to support diverse talent training needs. At the same time, the hierarchical course design enables students to master the basic knowledge while gradually deepening, improving professional skills and innovative thinking.

In addition, we cooperate with enterprises to develop practical courses such as blockchain application development practice and smart contract development, and organize students to participate in the comprehensive practice of blockchain projects, so that students can master the skills of blockchain application development, testing, operation and maintenance in practice. Through these specific measures of curriculum integration, not only can improve the teaching quality and efficiency, but also cultivate students' practical ability and innovative thinking. After graduation, students can engage in blockchain application development, testing, operation and maintenance, and become high-quality technical talents in the field of blockchain.

C. Deepen discipline competition and promote innovative thinking

Discipline competition has become an important starting point to promote teaching reform and enhance students' practical ability and innovative thinking. In order to train high-quality talents to meet the needs of the rapid development of blockchain technology, a series of practical teaching reform measures oriented by discipline competition have been adopted. Actively introduce high-level blockchain technology-related competitions at home and abroad, such as the World Vocational College Skills Competition and provincial Vocational College Skills Competition, and incorporate these competition projects into the practical teaching system. By organizing students to participate in the competition, it not only provides students with a platform to show themselves and challenge themselves, but also allows students to deeply understand the latest application and development trend of blockchain technology in the competition, so as to stimulate students' innovation enthusiasm and learning motivation. At the same time, establish a complete competition training system, including pre-competition training, simulated competition and other links, to ensure that students can be fully prepared to improve the performance of the competition.

Pay attention to the combination of competition results and curriculum teaching, and realize the virtuous circle of "promoting learning by competition and promoting competition by learning". On the one hand, the excellent works and cases emerging in the competition will be included in the teaching content of the course, enriching teaching resources and improving the quality of the course; On the other hand, students are encouraged to apply the knowledge and skills learned in the competition to their course studies and project practice, thereby deepening their understanding and mastery of blockchain technology. Through this combination, it not only improves students' practical ability and innovative thinking, but also cultivates students' teamwork spirit and problem-solving ability.

D. Strengthen the Integration of Certificates and Improve Practical Skills

In the reform of practical teaching in the application of blockchain technology, certificate integration has become an important innovative measure, aiming to strengthen students' practical skills and industry adaptability by combining professional certification and curriculum system. In order to comply with the rapid development of blockchain technology and its requirements for professional talents, we actively explore the integration of blockchain technology certification recognized at home and abroad into the practical teaching system, so as to cultivate compound talents who have both theoretical knowledge and proficient in practical operation. Select authoritative certificates closely related to blockchain technology, such as "blockchain application operator", "blockchain engineering technician", etc., and integrate the standards and requirements of these certifications into daily teaching. By adjusting the curriculum and adding projects and cases that match the content of the certification exam, students can ensure that they can directly connect with the requirements of the certification exam while completing their studies. In addition, experts with rich industry experience and certified qualifications are invited to serve as guest lecturers to provide students with targeted training and practical guidance to further enhance students' practical skills and competitiveness.

Through the practical teaching reform initiative of certificate integration, remarkable results will be achieved in the training of talents in the application of blockchain technology, which not only improves the practical skill level of students, but also promotes the effective docking of teaching and industry needs, and provides high-quality professionals in the field of blockchain.

E. Deepen the practical training of the project and improve the application ability

In the practical teaching reform of the blockchain technology application major, the project practical training has become a crucial reform measure, aiming to strengthen students' technology application ability and problem solving ability by simulating real application scenarios. In order to cultivate high-quality professionals who adapt to the rapid development of blockchain technology and the needs of the industry, we actively build a practical teaching system with practical training as the core of the project, closely combining theoretical knowledge with practical operation, in order to achieve the educational goal of applying knowledge to practice. In-depth cooperation with blockchain technology enterprises and research institutions to jointly develop practical training projects closely related to the application of blockchain technology, such as blockchain platform construction and maintenance, smart contract writing and testing, blockchain enterprise payment system, etc. These projects not only cover the core knowledge points of blockchain technology, but also integrate cutting-edge industry application cases, so that students can learn and master the application methods of blockchain technology in simulated real application scenarios. At the same time, it is equipped with corresponding practical training equipment and software environment, including blockchain development platform, testing tools, etc., to provide students with good practice conditions.

In the process of practical training, focus on cultivating students' teamwork spirit and innovation ability. Through group practical training, project report, defense and other links, students need to work in a team to complete the practical training project together, and show their practical results and innovative ideas in the report and defense. This training mode not only exercises students' practical operation ability, but also improves students' communication ability and innovative thinking, laying a solid foundation for future career

development. In addition, students are encouraged to transform their practical training results into software works, patents or entrepreneurial projects to further stimulate their enthusiasm for innovation and practical motivation.

Through the practical teaching reform initiative of the project practical training, it not only improves the students' technology application ability and problem solving ability, but also promotes the deep integration of teaching and industry needs, and provides high-quality talents with practical experience and innovative ability for the blockchain industry.

V. CONCLUSION

In the emerging and rapidly developing professional field of blockchain technology application, practical teaching reform has become the core approach and key measure to improve the quality of talent training and effectively respond to the needs of rapid changes in the industry. It is of great theoretical value and practical significance to deeply and systematically promote the practical teaching reform of the blockchain technology application major, and actively explore and build a comprehensive practical teaching mode integrating "post docking - course integration - discipline competition - certificate integration - project practical training".

Through a series of multi-dimensional and deep-level reform measures such as strengthening the practical training link of the project, deepening the cooperation mechanism between schools and enterprises, and introducing industry authority certification, practical teaching reform has achieved remarkable results in significantly improving students' technical application ability, stimulating their innovative thinking and cultivating their team spirit. It is not only reflected in the growth and progress of individual students, but also reflected in the improvement of the overall quality of professional education and the innovation of industrial talent training mode.

In the future, with the continuous innovation and wide application of blockchain technology, as well as the rapid development of the industry, practical teaching reform still needs to be deepened and expanded to adapt to the new trends, new needs and new challenges of the development of the industry. Only in this way can we send more outstanding talents with rich practical experience, excellent innovation ability and good team spirit to the blockchain field, and contribute more wisdom and strength to promote the further development and wide application of blockchain technology.

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