Research on the Development of Textbook System for Blockchain Engineering Major under the Background of Emerging Engineering

Depeng Kong[1], Shaoqing Dai[2]*, Xiao Chen[3], Jiusheng Li[3], Weisi Gu[3]

[1]College of Education, Zhejiang University of Technology, Hangzhou 310023, Zhejiang, China

[2]Jiaxing Vocational and Technical College, Jiaxing 314000, Zhejiang, China

[3]The Center of Robot Education Research, Zhejiang University of Technology, Hangzhou 310023, Zhejiang, China

*Corresponding Author.

Abstract:

There is a large demand for high-end talents in the blockchain, and the establishment of blockchain engineering major in learning institutions can effectively alleviate the dilemma of insufficient talent supply. Cultivating innovative talents with the characteristics of the times under the background of new engineering requires not only a talent build model that keeps pace with the times, but also a scientific textbook design structure, as well as a supporting textbook system that can be implemented. Take higher learner blockchain engineering major as an example, grasp the dynamics of market demand for talents, determine talent cognitive methods, accelerate the construction of faculty, promote the allocation of software and hardware facilities, carry out research on the study textbook system of new technologies and new formats, and promote the development and implementation of textbook system, forming research results that can be applied and popularized.

Keywords: *Emerging engineering field; Block chain engineering subject; resources construction; Major con-struction; textbook development*

I. INTRODUCTION

Blockchain is an important evolution technology of the new generation information technology, and it is also a distributed data management technology [1]. With the help of consensus protocol and cryptography technology, the security of network access and data transmission can be ensured, and the advantages of multi-person cross-authentication, hard tampering and collaborative consensus can be realized [2]. It provides a new idea for the management and value release of data elements in the whole network, and provides a safe and reliable network data foundation for cross-platform and trusted cooperation among different subjects. Well-known domestic and foreign enterprises such as manufacturing, transportation, finance, peak carbon dioxide emissions, information technology, credit certification, carbon neutrality, etc. have crossed and integrated with the blockchain field [3]. The continuous increase of the number of blockchain industrial enterprises in China, the continuous expansion of industrial scale and the continuous improvement of international competitiveness are inseparable from the active deployment of national

government departments and the guidance of macro policies. For example, the Ministry of Industry and Information Technology Regulation [2016] No.425 "Software and Information Technology Service Industry Development Plan (2016-2020)" pointed out that creating conditions to promote the innovation level of China's artificial intelligence, virtual reality, blockchain and other fields to reach the international advanced level as soon as possible. And [2016] No.73 "Thirteenth Five-Year National Informatization Plan" issued by the State Council pointed out that accelerating the basic research and development of frontier layout of technologies such as gene editing, quantum communication, artificial intelligence, blockchain, etc [4], and building the first-Mover advantage of new stadiums. With the rapid rise of the blockchain industry, the demand for talents has greatly increased. Research shows that the shortage of talents is the key factor that restricts the development of the blockchain industry, and the shortage of middle and high-level talents reaches 75%. Therefore, the issue of blockchain talent strategy has attracted the attention of national leaders. The "1024 Conference" clearly pointed out that accelerating the innovation of artificial intelligence, big data, Internet of Things and blockchain industry cannot be separated from the construction of leading talents and high-level innovation teams in this field.

From the way of supply, the sources of blockchain talents are the training of professional courses in schools, project education in scientific research institutes, special training for industries and enterprises [5]. Advanced technology research, such as cross-integration of blockchain industries, system architecture and data mining, and talents development should be trained at undergraduate and postgraduate levels. Teaching Science and Technology Letter [2016] No.17 "Action Plan for Technological Innovation of Blockchain in universities" suggests building a number of blockchain technology and talent training innovation bases in university [6], and cultivating and gathering a number of blockchain technology research teams, including setting up blockchain engineering major. At present, it is just the right time to train middle and high-level talents. In 2019, Chengdu University of Information Technology took the lead in obtaining the approval of "Blockchain Engineering (code No. 080917T)" major, which played a milestone role in the talent construction of universities. In 2021, the Ministry of Education announced the results of the filing and approval of undergraduate majors in ordinary universities in 2020, and 14 universities filed the "Blockchain Engineering" major. Universities have a mature school-running model, a solid teaching staff and an advanced basic platform for scientific research and experimental practice. Like the current new engineering majors such as robotics, Internet of Things and artificial intelligence, the new area-based blockchain major is an attempt to cultivate talents under the new engineering background, and it is necessary to have a suitable training mode, training scheme and implementation path, as well as a matching teaching material curriculum system. As early as 2019, the Ministry of Education clearly emphasized that all localities and schools attached great importance to teaching material construction and research [7], worked hard to build a supporting system for teaching material construction, and constantly improved the scientific and professional level of teaching material construction. Taking the blockchain engineering as an example, the development and construction of the teaching material system are carried out from the aspects of serving the talent demand, professional development and innovative talent training.

II. DEMAND AND SUPPLY OF BLOCKCHAIN TALENTS

Before setting up blockchain engineering major in universities, talent supply mainly comes from the following three ways: Firstly, some universities set up related courses to fill the knowledge gap of blockchain, for example, Stanford University, New York University, Swiss federal Institute of Technology in Lausanne, Massachusetts Institute of Technology, University of California at Berkeley and University of Copenhagen, etc. They offer interdisciplinary courses, which are distributed in the bases of law, business, computer or school-enterprise cooperation. And the teaching materials are master's and doctoral dissertations, handouts and chapters in some disciplines. Secondly, it can cultivate talents by means of scientific research and project training. When conducting technical research, researchers will form a series of research results, and the recruited graduate students will acquire knowledge and skills in the form of doing projects or completing project tasks. For example, while offering blockchain courses, Swiss federal Institute of Technology in Lausanne will teach blockchain knowledge in the form of seminars or carry out learning activities in the form of summits, and arrange experts at different levels to conduct academic, technical and skill discussions. The teaching materials for learning are mostly academic exchange paper texts, Electronic manuscript of academic PowerPoint, technical deduction schemes, etc. Thirdly, it is to improve skills in the form of enterprise apprenticeship. When the talents in the company are in short supply, some talents in computer and communication encryption are generally recruited. After some technical training and project documentary, and through the links of project design, integration, implementation and acceptance, they gradually become technical talents in this field. At this stage, product manuals, technical documents, program codes and architecture models are used as the teaching contents, and implemented step by step to achieve the expected learning effect.

In China, the Central University of Finance and Economics first opened a blockchain course in July 2016, and Zhejiang University opened a course in September 2019 to introduce blockchain technology. Subsequently, Zhejiang University of Technology, Hangzhou Dianzi University and Hangzhou Normal University also set up a school-enterprise cooperation talent training laboratory with enterprises. The early training of talents is similar to the international model, mostly in the form of subject education, tutor leading graduate students and doctoral students training. Most of the talents who have made achievements in blockchain have taken the position of senior management, major or academic leaders, and a small number of them have moved to enterprises to engage in front-line technology development. Blockchain is a new field with a small number of comprehensive talents. After short-term training, with basic knowledge and related fields of technology, it will become a "seed player" for big enterprises. For example, some startup companies only need candidates to master C# programming, and then it will take another 3-6 months to retrain them and gradually become high-level talents. In Tarena training, some blockchain-related courses such as C++, Ethereum Smart Contract, Solidity, Python, etc. are specially offered, that is, short-term and fast measures are adopted to improve the learners' skills and strengthen the training of projects, which are delivered to employers after reaching a certain level. Among the above three modes of talent supply, there is no necessary and perfect training mode and curriculum system in the training process, and there is no corresponding planned teaching material. Therefore, "The Notice of the General Office of the Ministry of Education on Announcing the First Batch of 'New Engineering' Research and Practice Projects"[8] issued by the general

office of higher education of the Ministry of Education [2018] No. 17 pointed out that while setting up new engineering majors, a number of replicable reform achievements should be built in the construction of curriculum system, teaching content and teaching materials [9-10]. With the establishment of blockchain engineering major and the start of enrollment in universities, a perfect curriculum framework and a scientific teaching material system are needed.

III. DEVELOPMENT BUSINESS MODE AND SYSTEM ORIENTATION OF TEACHING MATERIALS

3.1. Business Model of Blockchain Teaching Materials

Teaching material is the carrier of teaching and learning content, which is convenient for teachers and learners. And the purpose is to make learners better acquire literacy, knowledge, technology and skills [11]. With the development of information technology, teaching and learning have broken the limitations of space, time and place. Since 2009, Khan Academy in the United States, online course learning platforms such as School Online and Chinese universities have been born, online and offline teaching modes have gradually taken shape, and mixed teaching modes such as live-streaming courses and online education have emerged. In order to adapt to this new teaching mode and better carry out knowledge transfer, literacy shaping and skill training, a new format teaching material has been born. This kind of teaching material is rich in performance by means of information technology, means and scenes. Compared with the words and pictures in traditional static teaching materials, it increases the dynamic display forms such as digital words, pictures, audio and video, and appears in the form of Website, CD-ROM, Pad or Mobile Terminal Learning [11]; The deep integration of technology and education is inevitable to adapt to the development of learning needs in the Internet age. In the process of teaching material construction, diversified contents such as words, pictures, courseware, practical cases and exercises should be deeply integrated to construct three-dimensional teaching material contents [12]. For blockchain engineering major, it is necessary to take the concept of "new engineering" and the demand of talent cultivation as the guide, and create diversified and rich teaching material systems according to different levels of universities.

The first is the development of electronic teaching materials for blockchain major. E-textbooks originated from paper textbooks, which is to make paper textbooks electronic. Blockchain major should give full play to the ways, carriers and forms of traditional textbooks, and actively explore the advantages of electronic textbooks in basic curriculum reform. The academic lectures, key technologies and knowledge systems of typical application fields taught by blockchain in previous years will be presented electronically for browsing by computers, mobile phones or e-readers. And it can provide readers or learners with the functions of large capacity, portability, online learning and inquiry. The second is "Internet Plus" E-textbook. Clear links (such as website or two-dimensional code) information such as knowledge topology, structure and trend are inserted into the teaching materials. Learners can scan and identify through mobile terminals, mobile phones and other portable ways, and carry out knowledge acquisition, exchange and interaction. Using "paper + network platform + digital resource" mode is helpful to blockchain encryption, model and algorithm knowledge explanation. At the same time, digital resources can help learners

understand, master and apply the knowledge, technology and skills of the real world through VR (Virtual Reality), through the presentation process of virtual scenes, event processes and things superposition. For example, through public key, private encryption, etc., the integration of three-dimensional model and flat paper can make the three-dimensional effect of teaching materials more obvious. The third is rich media mobile interactive teaching materials. E-textbooks have become rich-media textbooks by integrating more teaching elements and forms such as sound, animation and video [11], which emphasizes in-depth interactive teaching experience and UI (user interface) display. In the teaching materials of blockchain typical cases, rich-media technology can be added to the reading function to realize the interactive effects of dragging, sliding, playing and power in the learning process, and increase learners' interactive and dynamic perception of blockchain scene application. Online comment area for key questions and knowledge points discussion, as well as online examinations, etc., bring students a new sense of interaction and learning experience, and improve learning effect [13]. The fourth is learner-centered integrated teaching materials. With the reform of teaching mode, learner-centered, teaching materials not only have all kinds of teaching resources for teaching, learning and practicing, but also will be integrated into the function of "examination and evaluation". With the improvement of resource functions, teaching outlines, teaching plans, curriculum standards and known knowledge points will be integrated into micro-courses and fragmented digital resources. And all kinds of teaching materials will be integrated with the help of the Internet cloud learning platform, so as to promote the online and offline learning effect of learners.

3.2. Development System Orientation of Teaching Materials

"The National Teaching Material Planning for Primary and Secondary Schools (2019-2022)" points out that aiming at the new national strategic needs such as robotics, Internet of Things, data science and technology, artificial intelligence and blockchain. With the goal of improving the overall quality of universities and the guidance of excellent course construction, we will create a batch of new teaching materials for engineering majors that reflect the world's advanced level and promote the development of teaching materials construction in universities. Blockchain engineering is a new engineering major, with short start-up time and little experience in running a school. The construction of teaching material system needs to be closely combined with the talent training mode and direction.

3.2.1. The correspondence between teaching material system construction and blockchain training mode and teaching means

The teaching material system construction serves the talent training system, which includes the needs of talents in the industry and teaching modes. The requirements should not only meet the requirements of objective talent training, but also have the feasibility of practical implementation. The combing contents are as follows: First, the discrimination of talent training modes. The talent training mode of blockchain engineering is based on the technical background of Internet of Things, big data and 5G communication. It is a general term of strict teaching evaluation under the constraints of modern management system, with relatively stable teaching content (training scheme) and modern education curriculum training system, according to the training objectives and specifications of middle and high-level talents in the undergraduate

stage of universities. Second, the achievement of teaching strategies and training effects. The teaching material system construction is closely related to the training system, that is, according to the needs of talents at different levels of blockchain, setting different training objectives and specifications, making clear the education and teaching process of achieving the set objectives and training effects, forming the management and effect evaluation mechanism, and adopting suitable teaching methods and means to achieve the objectives. Third, the development of differentiation and integration. The interactive mechanism between the talent training goal, major setting and the development of students at different levels in blockchain universities promotes dynamic, diversified and personalized training strategies and implementation paths. Guided by the quality of talent training, the demand for talent training can be implemented, and the linkage adjustment of training mode, knowledge system, curriculum content and curriculum system can be realized [14].

3.2.2. Unity of curriculum arrangement and training objectives and talent orientation

In the teaching material system of blockchain talents training, the courses included can be divided into preparatory courses, general courses, major basic courses, specialized courses, centralized practical teaching links, graduation design, characteristic innovation and other modules. Through systematic implementation of the courses, the training objectives of blockchain engineering can be achieved in three aspects: First, they have certain good qualities, such as patriotism, social responsibility, professional ethics and sense of scientific and technological mission. They can understand the significance and value of decentralization, peer-to-peer and distribution, can evaluate the application of encryption sharing mechanism in engineering algorithms, and solve the relationship between sustainable development of blockchain in social governance, legal construction, exploration of new industrial formats, information traceability and security protection. Second, they have a solid theoretical foundation. They can understand the characteristics of blockchain technology integration and use the integration development of blockchain technology, algorithms and other industries to solve the technical problems of social management, economic development, information sharing and system encryption in people's daily work, study and life. They can carry out innovative design and have the experience and opinions of perfecting and improving projects, and take on the complicated blockchain public chain operation mode, private chain construction mode and product promotion path. Third, they have a clear understanding of the role of team cooperation and implementation. They can recognize their role in the team, have a reserve plan for project design and implementation, accumulate some experience in project cooperation and implementation, quickly integrate into the project team, and organize the cooperative relationship among members [15].

3.2.3. Chapter setting matches with literacy, knowledge and ability of talents

The undergraduate education system of blockchain engineering major is set to four years. After four years of training, with the implementation of the sequence of courses, it is necessary to coordinate the layout and cohesion of each chapter, and reflect the comprehensiveness of knowledge points and assessment ability. After refinement, its knowledge and ability need to meet the following aspects.

First, engineering knowledge literacy. Mathematics, natural science, blockchain algorithm, system architecture and professional knowledge can be used to solve complex blockchain engineering problems, such as public chain construction and private chain construction. Second, the ability to analyze and solve problems. Through four years' study, using the basic principles of mathematics, engineering, science, technology and skills, we can identify scientifically and theoretically, analyze complex engineering problems, and get solutions and conclusions. Third, the ability to design and develop. According to specific engineering and system processes, they can be able to interpret and design complex problems. According to requirements, process design and creative integration need to take into account social, cultural, health, safety and environmental factors. Fourth, the ability of independent research. According to their own knowledge and theoretical methods, necessary verification tests, data interpretation, problem research and application analysis are carried out, and reasonable and effective verification results can be obtained through information synthesis and evaluation. Fifth, the ability to use scientific tools. They can make proper use of the technical cloud resources of computers, networks, data platforms and blockchain, and make use of the comprehensive capabilities of information integration and design to carry out blockchain knowledge consultation, information sorting, underlying code development, system design and application promotion. Sixth, the sense of social responsibility. They are capable of professional evaluation, project management, educational design and complex engineering analysis by using blockchain technology, common laws and regulations and knowledge of educational background. Be able to better cope with social emergencies, have the awareness of information security and patriotism, and be able to understand and assume social responsibilities. Seventh, the cultivation of sustainable development thinking. Management, team building, project follow-up, personnel ability improvement, and personal development all have the concept of sustainable development, which should be combined with social development to give the best services and decisions. Eighth, career development and personal planning. One has a clear awareness of career development planning and design, can outline the development expectation of blockchain industry in the next decade, and has the awareness of actively obtaining the skill level certificate of blockchain and professional qualification certification of the industry, so as to work efficiently and standardize practice. Ninth, cross-regional teamwork and interpersonal communication. They should adapt to the change and work orientation of different roles in the team under the multi-disciplinary background of blockchain, such as independent individuals, team members and principals, who have an international perspective and can work and cooperate with different regions. In addition, it should have the ability of writing, audio-visual practice, manuscript design, statement, instruction expression, team member communication and leadership reporting. Tenth, the accumulation of experience and ability of project management. Have the basic consciousness, working methods and ideas of project demand analysis, task analysis and system comprehensive management, and grasp the integration and development trend of comprehensive design and cross-discipline under the multi-disciplinary background. Eleventh, the consciousness of lifelong learning and development. In the information age, it is clear that information updating is changing rapidly, abandoning the habit of self-restraint, keeping a clear head all the time, developing the habit and consciousness of lifelong learning, and constantly improving and adapting to the new environment.

IV. DEVELOPMENT PRINCIPLES AND STRATEGIES OF TEACHING MATERIALS

4.1. Development Principles

The development purpose of blockchain teaching materials is to meet the requirements of blockchain engineering construction and personnel training. On this basis, the following four principles should be followed. The first is the principle of typicality. The orientation of blockchain engineering major in each university is different, the corresponding training plan and training system are quite different, and the curriculum system and teaching materials are not the same. According to the orientation of local industry development in each university, set up some curriculum systems that can show the characteristics of talent cultivation, select typical courses with school characteristics and talent cultivation characteristics, and develop relevant teaching materials and tutorials. The second is objective principle. The development of teaching materials should focus on the talent training plan and curriculum system, aiming at achieving the talent training and serving students' learning and teachers' teaching. Therefore, in the process of topic selection, author selection and textbook compilation, we always adhere to the objective principle, so as to meet the diversified exploration of innovative talents training and teaching. The third is the systematic principle. The systematic principle emphasizes that the planning of the series of teaching materials for blockchain engineering major should be based on the overall professional curriculum system, and comprehensively consider the curriculum setting, teaching content, teaching arrangement, teaching requirements and other factors. In addition, it is also necessary to take into account the diversified needs of students, the differences in professional development and industrial integration of different levels of universities. Therefore, it is necessary to make use of the scientific method of system engineering, give overall consideration to both inside and outside, and create an influential teaching material resource system. The fourth is the three-dimensional principle. Today, with the rapid development of information technology, in the process of diversification of teaching material contents and carriers, digital resources, media means, courseware, E-textbook videos and new format teaching material systems need to be matched with them and kept pace with the times.

4.2. Development Strategies

Teaching materials are the way to achieve teaching objectives, and the level of textbook will have an impact on the cultivation of students' literacy, knowledge and skills. With the help of new engineering courses such as big data, artificial intelligence, robotics, etc., the construction of teaching material system is implemented, and combined with the characteristics of blockchain engineering talents training. And efforts are made to build a teaching material system with blockchain characteristics. The development strategies are as follows.

First, set up a teaching material system research and development group. Attract industry leading talents, senior experts, subject leaders and front-line teachers to form a team. They formulate the outline of blockchain talent development and training, carry out industry enterprise investigation and research, form a perfect dynamic model of talent demand, and explore the necessary processes, steps, implementation

schemes and evaluation strategies for each course construction. The second is to highlight the characteristics and improve the training mechanism. On the one hand, grasping the key points, deducing the teaching plan, optimizing the path between curriculum modules, introducing the tutorial system, and formulating the management incentive measures for students to embody the training characteristics; On the other hand, improve the talent training mode of school-enterprise cooperation, promote the integration of enterprise technology and school curriculum, promote the seamless connection between enterprise demand and school training, and realize the talent training to keep pace with the times[16]. The third is to introduce the dual supervision (theoretical tutor and practical tutor). At the beginning of major setting, the enrollment should not be too large, but the training orientation should be high, the process should be detailed, the knowledge supply should be comprehensive, and the technical skills standard should not be lower than the current needs of enterprises. In addition, it is necessary to set up academic theory tutors and enterprise practice tutors for undergraduates, give full play to the practical experience of enterprise tutors and academic skills of university theory tutors, promote teaching by academics, promote the development of scientific research by teaching, and integrate scientific research with industry applications. The fourth is to adopt a new model of blockchain + new engineering, Industry-education integration. Formulate the safeguard operation mechanism, closely combine students' needs, school infrastructure and blockchain scene construction, form a new sustainable school-enterprise cooperation model, enhance the new connotation of school-enterprise cooperation model. And integrate the highlights and key points of training into teaching plans and handouts, and form the necessary intellectual property rights and patents, on the one hand, form a training model with comparative advantages, on the other hand, make the teaching material system more novel and practical.

V. CONCLUSION

The development of teaching material system of blockchain engineering major is not only related to the construction and development of blockchain interdisciplinary, but also determines the quality of high-level talents training in blockchain. In the process of developing teaching materials, we should make full market investigation, implement certain measures and means from the specification and target orientation of talent training, set up a teacher development team according to the teaching plan and curriculum outline, mobilize the forces inside and outside the college, contact inside and outside the university, and mobilize domestic and foreign forces. Besides, we ought to make full use of modern educational technology, give full play to the advantages of self-media platform, comprehensively utilize the learning advantages of new formats such as video, micro-courses and fragmentation, and carry out necessary combing and platform operation. Build a more scientific and reasonable teaching material development platform and system, lead and promote the rapid development of blockchain engineering major, keep up with the new training mode and open up a new situation. Of course, the development and construction of teaching materials is a systematic process, and it is also a process of long-term exploration and implementation. We should fully understand the urgency and superiority of current education reform and innovation, gather all forces, and promote the rapid development of new engineering construction such as blockchain.

ACKNOWLEDGMENTS

REFERENCES

[1] General Office of the State Council, PRC. Circular of The State Council of the People's Republic of China on printing and distributing the 13th Five-Year National Informatization Plan, The Bulletin of the State Council of the People's Republic of China, 2017,(02),35-68.

[2] CHANG YL.IAKOVOUE. SHIWD. Blockchain in global supply chains and cross border trade: A critical synthesis of the state-of-the-art, challenges and opportunities. In- ternational journal of production research, 2020, 58(7):2082-2099.

[3] Wang, B. J.; Duan, Y. G.; Wang, Y. Q.; Yan, R. Q.; Chen, X. F. Exploration and Practice of Intelligent Manufacturing Talents Cultivation Facing on Dual Capability Integration of "Made in China 2025". Research and Exploration in Laboratory, 2021, 40(08), 140-144.

[4] Huang, M. C. An Analysis of the Reformative Effect of Blockchain Technology on the Development of Libraries. Library and Information Service, 2018, 62(13), 11-18. DOI: 10.13266/j.issn.0252-3116.2018.13.002

[5] Liu, K.; Dai, Y.; Zhang, Z. J.; Wang, H. X. Achievement and Strategic Analysis on the Guideline of the First Batch of Emerging Engineering Education Research and Practice Projects. Research in Higher Education of Engineering, 2021, (01), 31-38.

[6] Kong, D. P.; Lü, S. Y.; Gu, W. S. Research on the talent training of blockchain engineering under the background of new engineering. Journal of Zhejiang University of Technology (Social Sciences), 2020, 19(03), 324-329.

[7] Shen Zhuanghai; Dong Xiangbin. On Reform and Innovation of Ideological and Political Theory Courses for a New Era. Ideological & Theoretical Education, 2019, (5).

[8] WU Qing, LI Yi-tong.Tamper Proof Simulation of User Behavior Data Based on Blockchain Technology. Computer simulation, 2022, 39(1):362-365.

[9] Li, L. H. Evaluation of Wuhan's International Trade Competitiveness- a Study at the Time of Wuhan's Application for Free Trade Zone. Journal of Jianghan University (Social Science Edition), 2016, 33(3), 75-83+126-127.

[10] Chang, W. J.; Ma, H. B. Study on Teaching Reform of GlS Course in the Major of Hydrology and Water Resources Engineering. China Modern Educational Equipment, 2016, (17), 96-98. DOl: 10.13492lj.cnki.cmee.2016.17.032

[11] Zhuang Hong quan. Research on upgrading and transformation of teaching materials under new technology conditions. Science-Technology and Publication, 2020, (7), 56-61. DOI:10.16510/j.cnki.kjycb.20200706.001.

[12] Zhang, Y. S. Research on the development of teaching material of industrial robot foundation and application in secondary vocational school. Master, Changchun Normal University, Jilin, 2020.

[13] Allessie D, Sobolewski M, Vaccari L. Blockchain for digital government: An assessment of pioneering implementations in public services, Joint Research Centre (Seville site), 2019(9):27-26.

[14] Cui Yun wu, Yang Ying zhu. Technical Endowment and Application Path of Blockchain embedded in the Public Service Supply. Administrative reform, 2022, 1(1):55-65.

[15] Li, C.; Hong, W.; Yang, C. Y.; Yang, L.; Zhu, Y. X. Design of Training Program and Curriculum for Chemistry Majors Based on the Background of Enrollment and Cultivation. University Chemistry, 2018, 33(09), 1-7. DOI: CNKI: SUN: DXHX. 0.2018-09-001.

[16] Guo, M. J.; Xiong, X.; Zeng, L. Q. Research on Reform for Talents Cultivation Patterns of Science and Engineering Undergraduate by Taking "Practice+" as the Core. Research and Exploration in Laboratory, 2021, 40(08), 203-207+212.