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Research on the Development of Open Education Teaching Reform Driven by Blockchain Technology

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Abstract: Blockchain technology has significant application advantages in the field of open education. This article focuses on the application of blockchain technology in open education and the path of teaching reform. Combining with the current situation and deep-seated factors of open education teaching, it analyzes the deep-seated factors that constrain the quality of open education: vague teaching positioning, scattered and lagging resources, outdated teaching models, rigid management mechanisms, leading to a disconnect between education and regional economic needs, weak practical teaching, and utilitarian learning. On this basis, a reform path based on blockchain technology is proposed: firstly, reposition the teaching mechanism of open education and innovate the teaching characteristics of new open education under the background of blockchain. Secondly, this paper utilizes Blockchain b to integrate and share open educational resources and promote the supply-side reform of open education. Again, this paper updates the open education and teaching model based on modern bb0 information technology. Finally, this paper utilizes blockchain technology to optimize the management mode of open education and improve the efficiency of teaching management.

1. Blockchain Technology and Its Applications in Open Education

Blockchain is a chain data structure that combines data blocks in chronological order and ensures immutability and unforgeability through cryptographic means. It has features such as consensus mechanism, immutability, traceability, distributed ledger, and decentralization, and has unparalleled application advantages in the field of distance open education. Specifically, it is reflected in: (1) building a new ecosystem of shared, open, rich and efficient distance open education resources in Open Education. Distance open education resources provide learners with a large number of free and open digital teaching resources[1]. Educational resources are stored in different blocks in a distributed manner by utilizing the distributed ledger technology of blockchain.Through peer-to-peer propagation, all nodes will directly share learning courseware, tool software, and other resources through specific, consensus based software protocols. This not only helps solve the problem of resource customization, but also improves resource sharing efficiency and solves the problem of resource silos. (2) The learning process of students will be more precisely controlled, promoting the formation of personalized and self-directed learning models. Distance open education

combines face-to-face teaching with online self-directed learning. Due to the limitations of time and space under the reading conditions of students, it relies more on flexible mechanisms for self-directed personalized learning. Blockchain not only customizes various learning resources for students, but also creates a good opportunity for the intelligence of the educational process. By assisting in the visualization of information data, blockchain accurately depicting student data portraits, accurately evaluating student learning problems through data analysis, and providing targeted solutions, it enhances students' interest and initiative in learning. (3) Blockchain technology solves the problem of the lack of a student learning credit system and the disconnection between education and practice by establishing individual learning credit big data. It stores and records trustworthy learning data through distributed storage, and distributes the personal files, learning records, learning behaviors, academic performance, educational information, and other content generated by students throughout the learning process in the information system, and permanently saves them in cloud servers. Through the consensus mechanism and immutability of blockchain technology, it enhances the recognition and credibility of students' learning process, and solves the long-standing problem of the lack of open education students' learning credit system. (4) The cross temporal and spatial power of education has been further enhanced, teaching management has become more intelligent and efficient, and education and teaching assessments have become more comprehensive and holistic. With the maturity of credit bank construction, especially the mutual certification and recognition of various credits, learners are no longer limited to traditional fixed learning models, but engage in free flow learning across majors, disciplines, and even schools[2]. Along with the sharing and flow of high-quality educational resources, the school labels on learners are becoming increasingly blurred. School management is becoming more intelligent and efficient, and the management collaboration between remote open education systems is becoming more convenient and integrated. Education and teaching assessments have also shifted from being primarily based on schools to comprehensive evaluations involving schools, enterprises, society, government, and other stakeholders. Learners' dependence on authoritative educational institutions such as schools is decreasing. The application of blockchain further highlights the vitality of education, repositioning the role of schools and other educational institutions, presenting a "semi school" state, and increasing the release of new educational knowledge productivity.

2. Deep-Seated Factors Restricting the Improvement of Open Education Quality

Firstly, the teaching positioning is vague and does not reflect the characteristics of open education teaching. Traditional open education has no substantial differences from regular higher education institutions in terms of requirements, except for the teaching media having certain peculiarities. Especially, the educational goals have not been combined with the characteristics of regional economy and the needs of industrial development, and have not been scientifically, reasonably, and flexibly set up majors guided by the transformation of economic development mode and industrial structure adjustment. Due to the lack of specialized positions suitable for adult education, it is difficult to form an independent and distinct open education teaching characteristic as a whole. In terms of curriculum design, the core courses of the major are similar to those of ordinary universities, and the curriculum design has not changed much over the years, still mainly focusing on traditional theoretical courses. Open education urgently needs to design teaching positioning that accurately adapts to the needs of social and economic development in different regions, and formulate applied talent training goals[3] .

Secondly, there is a lack of integration of teaching resources, and the supply of teaching cannot meet the needs of regional social and economic development of open education. In the process of open education, online self-directed learning is a crucial link, so whether online learning resources

are scientific and abundant is very important. Based on the current resource situation, it is common to have a complete range of resources, but insufficient effective usage and scattered resources that are not integrated enough. The convenience of resource use is not strong, and the form of resources is single, with mostly textual materials, lacking interest and interactivity. Overall, teaching resources are still mainly composed of self built teaching outlines and course implementation plans by course teachers. The form of course resources is mainly online open courses, with limited integration with resources from other universities or course platforms, and the use process lacks convenience. In terms of teaching supply, it cannot meet the needs of regional social and economic development. .

Thirdly, the teaching mode is outdated and does not reflect the student-centered teaching philosophy. The target audience of open education is mainly working adults, who have accumulated certain knowledge and years of work experience before enrollment. In traditional open education, the method of exam oriented education is still often adopted, and teaching activities are simply regarded as one-way transmission of knowledge. Students passively receive lecture content, without reflecting the student-centered teaching philosophy, resulting in low learning enthusiasm, lack of initiative, and neglect of the cultivation of their abilities. Distance education uses modern information technology as a means to carry out teaching work, requiring teachers and students to complete teaching tasks through interaction[4]. However, in teaching practice, teacher-student interaction is very lacking. The entire learning process is complex, interrelated, and cannot be overlooked. Many students believe that this learning mode is rigid and rigid, which exacerbates the "contradiction between work and study". The teaching evaluation is single, focusing on summative evaluation, neglecting the evaluation of the teaching process, emphasizing the assessment of students, and neglecting the evaluation of teachers.

Finally, the outdated teaching organization and management model makes it difficult to stimulate students' learning initiative. The number of open education students is huge, the structure is complex, and the students present diverse characteristics. The "one size fits all" admission system under the traditional enrollment model can easily lead to "teaching one size fits all", "examination one size fits all", and "evaluation one size fits all" without distinguishing the types of student structures. This cannot achieve personalized teaching, and students lack internal motivation and initiative in learning. Learning has become a utilitarian behavior of "going through the process, coping with exams, and obtaining diplomas". This profit oriented learning model will inevitably lead to the lack of credibility of open education students' learning, and the recognition of open education by enterprises and society will be affected, which will inevitably affect the sustainable development of open education. In terms of monitoring and evaluating the learning process, the traditional one size fits all model does not distinguish between students' specific learning needs and backgrounds. Online learning only measures their learning behavior based on online learning time, posting and discussing, and completing assignments, combined with final exams to determine their learning results. This learning process monitoring and evaluation mechanism is one-sided and does not examine students' real learning level, practical skills, and job professional abilities. It is not a true reflection of students' learning ability and also restricts the objective evaluation of open education teaching level[5]. The recognition of students' final learning outcomes should abandon the current mainstream "achievement theory" and establish a flexible and comprehensive mechanism for recognizing learning outcomes. It should comprehensively evaluate students' learning attitudes, behaviors, processes, abilities, and effects, and involve multiple parties such as enterprises, governments, and society in the evaluation. The learning outcomes should be appropriately transformed to achieve the transformation from academic qualifications to "learning abilities".

3. Paths for Open Education Teaching Reform in the Blockchain Era

(1)Open education should repositioning the teaching mechanism of open education and innovating the teaching characteristics of new open education under the background of blockchain by open education . The decentralized nature of blockchain technology can break down institutional barriers between various open education entities, break down educational segregation caused by geographical restrictions, and transform the previous vertical education chain into a parallel education chain. At the same time, change the previous vertical teaching management mode to a flat one. The characteristics of the consensus mechanism of blockchain technology can effectively build a platform for industry academia cooperation, forming a collaborative community of industry education integration between schools, industries, and enterprises, with the goal of cultivating high-quality talents with good social adaptability, promoting the transition from single degree education to multi type education, and combining the goals of open education with regional economic characteristics and industrial development needs[6]. The professional settings are in line with the transformation of local economic development mode and industrial structure adjustment, and the course teaching meets the vocational skills needs of students, forming a diversified, multi-level, independent and distinctive new modern distance open education teaching feature.

(2)Open education can utilize blockchain to integrate and share open education resources, and promote the supply side reform of open education. Open education students can fully access a large amount of high-quality open education teaching resources according to their own learning needs, to meet personalized learning needs. In terms of teaching supply, a decentralized open education system is established through blockchain technology to adapt to regional social and economic development needs. Majors and courses that meet regional economic characteristics and industrial development needs are set up, and blockchain consensus, authentication, evaluation feedback and other mechanisms are used to collaborate with governments, industries, enterprises, etc. to design teaching content with the goal of cultivating high-quality talents with good social adaptability, and timely feedback and adjustment are made to accurately adapt teaching content to the needs of different regional social and economic development. In the teaching process, colleges and universities should increase the proportion of practical teaching and cultivate the vocational adaptability of students who work part-time to support their studies. Colleges and universities constantly improve the teaching methods of information technology, enhance the software and hardware conditions of information technology teaching, and promote the improvement of the teaching level of information technology.

(3)Open education should update the open education teaching mode based on modern blockchain information technology. The blockchain services for teaching are implemented in aspects such as learning resources, learning process, learning evaluation, and learning management, completing modular customization of professional courses[7]. Open education using blockchain information technology to improve open teaching methods and processes, promote the deep integration of information technology and teaching, enhance teachers' information technology teaching literacy and teaching level, and use teachers' teaching design ability, knowledge integration ability, information technology application ability, practical technology demonstration ability, etc. as comprehensive indicators for evaluating teachers' diverse teaching abilities. Blockchain information technology can encourage teachers to break through the boundaries of traditional teaching concepts and methods, boldly innovate teaching methods, comprehensively utilize teaching conditions, and truly achieve the deep integration of modern information technology and teaching.

(4)Open education can utilizing blockchain technology to optimize open education management models and improve teaching management efficiency. In terms of student admission management, differentiated management should be implemented based on students' educational background,

learning objectives, learning characteristics, etc., to eliminate one size fits all admission criteria review. By utilizing the decentralized and distributed storage capabilities of blockchain in open education, students can implement professional or course modular management during their learning process. Learning assessment and graduation review should also be measured based on the personalized learning process and results of students, introducing multi-party evaluation mechanisms such as enterprises, governments, and society to complete the evaluation from student performance evaluation to job competence evaluation, and sending the feedback force of student competence evaluation back to the curriculum to achieve continuous improvement of the curriculum. The distributed storage and consensus mechanism characteristics of blockchain can be used for daily teaching monitoring through data, traces, etc., to carry out comprehensive teaching management of teachers' teaching process, teaching organization, teaching evaluation, etc. Through the teaching and learning management of teachers and students, a comprehensive and detailed statistical analysis of the quality of open education teaching is conducted in real-time, from horizontal to vertical, static to dynamic, to fully ensure the scientific and effective management of teaching.

4. Conclusions

The new technology of blockchain is different from traditional digital education systems. Its decentralization and security characteristics make it very suitable for solving the difficulties faced by the current open education field. It can assist the teaching system in various aspects such as multi-party sharing and verification of education related information, learning process tracking, motivation and learning path shaping, learning evaluation, education management and decision-making assistance. It can play an important role in reconstructing the open education teaching ecosystem.

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