Research on the Application of Blockchain Technology in Analog Circuit Teaching

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Abstract：The key benefits of blockchain technology are decentralization, openness, independence, security, and anonymity. Blockchain is getting more and more attention in education and it is a new venture. The use of blockchain technology can efficiently improve teaching analog circuits, such as inaccurate knowledge point placement, a lack of pertinence and personalization, and low teaching accuracy. More researches are needed in order to actualize the use of blockchain technology in education fields.

Keywords: Blockchain Technology, Analog Circuit, Teaching

1. Introduction

In essence, blockchain technology is a database system that creates a shared, public database to store data. Its key advantages over conventional database technology are its high level of anti-counterfeiting, open and transparent communal maintenance, and other features. Based on its benefits, blockchain technology has established a strong "trust foundation" for collaboration between various disciplines and offers a wide range of potential real-world applications. The financial sector, the Internet of Things and logistics sector, the public service sector, the digital copyright sector, the insurance sector, and the public welfare sector have all been significantly impacted by this technology [1-3]. Research on this technology will advance the future development of teaching analog circuits and is crucial to effectively implementing blockchain technology under actual circumstances.

2. Problems faced by traditional teaching assessment

2.1 Lack of interactivity

Traditional classroom instruction typically involves writing on a blackboard, using electronic course materials, playing back images and videos, etc. In order to teach and learn book knowledge, teachers and students primarily use this teaching method. The traditional teaching approach concentrates on how teachers instruct students while ignoring the issue of how students learn, which causes the classroom to lack effective interaction and results in poor student engagement and interest. Exams-open or closed-examinations are frequently utilized both during and after courses. The majority of these assessment techniques are created by students after they have understood and absorbed the material in class. There aren't enough opportunities for students to interact and communicate with one another, for students and teachers to guide and talk, and for teachers to share their teaching expertise.

2.2. Single assessment mechanism

The assessment's objectives are to ascertain the students' mastery of the relevant courses and make it easier for the teachers to get feedback on the classroom experience. Using only the assessment findings during or after the course is challenging to fully depict the true condition of the course effect. Professional theoretical knowledge serves as the foundation for the course instruction in the classroom, while practical ability serves as the foundation for the actual needs of the industry. Applying the assessment mechanism throughout a course's learning process, with the capacity to solve practical

problems as a key signal, is beneficial for thoroughly assessing students' mastery.

3. Blockchain technology

The blockchain was created from the widely used cryptocurrency bitcoin. The Bitcoinprotocol used blockchain technology to address the issue of trust in traditional money transactions and recognized the benefits of network currency, such as its invulnerability to fraud, tampering, and traceability [4]. In its simplest form, blockchain can be described as a new type of information technology that enables multi-party sharing and maintenance, dynamic storage, openness and transparency, high levels of trust, traceability, etc. A technical system that consists of a consensus mechanism, smart contracts, distributed storage, encryption algorithms, incentive systems, and more [5-8]. Since the blockchain does not need a central authority or a reliable third party to coordinate, interact, verify, and oversee the corresponding operations, its smart contracts and high autonomy present fresh ideas for numerous links in higher education.

3.1. Smart contract

In its most basic form, a smart contract is a kind of computer system that uses information to distribute, validate, or carry out contracts. Smart contracts not only ensure the legitimacy of transactions but also permit the unmodified tracking of transaction data without the requirement for third-party supervision. A smart contract is a digital contract developed through multiparty negotiation. The protocol is protected digitally by the blockchain and is enforced using encryption technology. A piece of software could be used to compare the smart contracts. Related activities may explore the intricacies of the smart contract's clauses. Without needing to be evaluated or approved by the central authority, it may automatically check the performance and even put the agreed-upon terms into force after approval.

3.2. Distributed storage

With parent blocks and child blocks, the distributed storage blockchain is a point-to-point distributed accounting system. Through the use of hash pointers, the child blocks are connected to the parent blocks, forming a chain structure. Each point has a space for information storage. To meet the goals of decentralized deployment and centralized execution, the distributed blockchain structure is used for data storage and operation record storage. Each user or terminal is a node in the blockchain system. Without the use of a third-party server, any node can record data and connect directly to another point. In order to prevent the information about an interaction between two nodes from being altered, each operation that takes place will notify all other nodes.

4. Application of block chain in analog circuit teaching

The use of blockchain in analog circuit education has the advantages of covering a wide range of topics, having a sophisticated theoretical foundation, and being extremely useful. There are real-world counterparts to the devices and circuits mentioned in the course material. It is frequently possible to understand the relevant course theories by examining the operational features of real-world devices or circuits. This research examines a blockchain-based reform of analog circuit education in light of the drawbacks of the conventional teaching method for analog circuit courses.

4.1 Improving students' enthusiasm with "learning ledger" technology

"Learning ledger" is a concept jointly proposed by famous think tanks in the United States based on the characteristics of blockchain technology "point-to-point distributed ledger". The "learning ledger" can use the blockchain distributed ledger technology to comprehensively record the learning process of registered users, intelligently generate individual learning paths according to the user's learning behavior records, so as to push personalized learning resources for them. Therefore, on the one hand, the "learning ledger" can use its block chain bookkeeping to record in detail the courses and knowledge units learned by students, which provides unalterable original data resources for later teaching evaluation and improvement; On the other hand, it can form the utility distribution of different knowledge for students based on intelligent analysis, formulate corresponding education plans according to their age, psychological characteristics and cognitive level, guide students to formulate appropriate learning plans according to their learning needs, and enhance the initiative of self-management.

4.2 Enhancing the participation of teachers and students in the form of "point-chain decentralization"

The decentralized management of learners' personal resources, which means that schools cannot monopolize learners' personal resources and determine the content of resources, has become a consensus in order to improve the participation of teachers and students in the form of "point chain decentralization" in the current social environment with an endless stream of diverse economic forms. With the conventional authority and center gone, equal access to educational resources is now possible thanks to the decentralization of blockchain technology. This disrupts the conventional fixed educational model and decentralizes educational activities, allowing for greater resource exchange and replacement between various schools and areas.

4.3 Promoting teaching effect by "distributed teaching" mechanism

To encourage the transformation of the teaching effect, the "distributed teaching" mechanism is employed. The general solution framework is provided, and teachers provide tasks. Students work in groups to finish the particular implementation scheme. Each group of three to five students will work on a different project during the implementation phase. The students in the project group will fairly divide up their labor, work together as a team, search for task-related material, create a strategy for task implementation, finish task content, summarize project reports, etc. Every group functions as a node in the blockchain, finishing all responsibilities after interconnection. The task's completion allows for the organic integration of students' independent and group learning, which not only encourages independent learning but also strengthens teamwork skills.

5. Conclusion

Blockchain technology may successfully meet the information security, dependability, and timeliness needs of the Internet big data era and can assist in preventing potential dangers in the teaching process. Though it is still in its infancy, blockchain technology has endless potential for advancement. Because of this, a lot of businesses are expanding their investment in and use of blockchain technology. The pace of businesses must be followed, talent development programs must be improved, the curriculum must be changed to reflect these changes, and blockchain technology must be incorporated into traditional education. The only way to prepare students for primary and secondary education, society, and the nation as a whole while also developing talent for cutting-edge technological application is in this manner.

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