

Research on the Construction of Examination System Based on Cloud Storage in Open Education Environment

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Abstract: The development of 5G technology and the deep integration of deep learning and education have brought technological changes to online education and services of open education. The education type, teaching activities, assessment methods and evaluation process of the open education system mainly rely on the network. Applied science, efficient, safe and fast technical means, based on the authorization mechanism of Cloud storage and blockchain, exploring the construction of an effective examination system in the open education environment and realizing the learning evaluation environment of efficiency priority, fair assessment and process supervision is a feasible way to improve the quality of open education, establish a multi role, multi-level and multi subject compatible examination platform, and build a standardized, long-term and multi-level open education examination management mechanism.

1. Introduction

The Outline of the National Medium and Long Term Education Reform and Development Plan (2010-2020) proposes to strengthen the application of information technology in higher education. With the development and application of Cloud storage technology [1] and blockchain technology [2]; From the perspective of examination subjects, there are mainly the design and application of network test platform for medical field, English major, vocational schools[3] and efficient mainstream majors in the distance open education environment[4]. Most of the Electronic assessment systems are independently developed by schools according to teaching needs. The Paperless office examination technology for the assessment of major courses in colleges and secondary vocational education, as well as English, medicine [5] and language courses, has become increasingly mature. The core key technologies mainly involve several aspects: intelligent test paper generation systems based on various algorithms, random examination venue sorting systems, and examination venue encryption chain management.

2. Problems in Examination Management in an Open Education Environment

2.1. The scale of the exam is large, and the traditional exam method cannot guarantee human and data security

There are many subjects or roles in the traditional examination process, and there are subjective risks in the traditional examination method. From the perspective of participation roles, the examination process mainly includes the following roles and behaviors: examination administrator, examination clerk, Exam invigilator and examinee; From the perspective of the examination environment, there are mainly anti cheating equipment, examination rooms, test paper transportation equipment, and test paper storage facilities; From the main process of the exam, it includes training for exam staff, preparation of the exam venue, pre exam inspection, invigilation during the exam, distribution and recycling of test papers, and grading. Taking Yunnan Open University as an example, the school is supported by information technology and mainly focuses on open education and vocational education. It has a teaching scale of over 200000 registered students and organizes a total of 15 exams for various types of students each year, totaling 779334 subject times. Whether in remote open education or full-time vocational education, the exams are mainly based on traditional paper and pencil exams. Paper exams are printed, distributed, and recycled. During the process of grading and grading, a large amount of human and financial costs were incurred, and there were issues with data security risks in paper storage, transportation, distribution, and supervision. There are problems in the quality of education and teaching evaluation, and the rationality, scientificity, and fairness of exams in an open environment are key measures to test the quality of open education. In addition, the majority of data transmission in the computer room environment is through USB flash drives and network transmission. Multiple users using mobile storage devices for transmission are prone to infection with backdoor viruses, which puts pressure on device security maintenance and poses security risks to campus data business information.

2.2. The centralized management of the computer room is not unified, and the utilization rate is low

Taking Yunnan Open University as an example[6], the available computer room slots are surveyed as follows: The computer rooms are scattered among various departments and colleges in different campuses, making it difficult to centrally manage and dispatch them. The college computer rooms are mainly used for professional teaching and training, while the academic affairs office public computer rooms are used for public teaching and training. The centralized management of scheduling is different, with personnel turnover, high wear and failure rates, high procurement costs for the machine body, few maintenance personnel, and cross regional areas, resulting in delayed response maintenance and increasing the workload and cost of system maintenance, At the same time, due to the lack of unified and centralized management, maintenance personnel are busy installing and using various shared peripherals all day.

2.3. Difficulty in switching teaching/exam application scenarios, high cost of technical maintenance time, poor spatiotemporal sharing and compatibility of hardware resources

The hardware environment required for the examination is mixed in teaching and examination applications. In the computer room managed by the college, the Old media computer room is mainly responsible for teaching tasks. In addition to daily teaching, most computer rooms also need to meet the use of different scenarios such as examinations, extracurricular training and experimental courses. When the examination needs to be organized, the examination software and environment need to be

installed and deployed every time, which repeatedly costs a lot of manpower and material resources. At present, there are high failure rates in the school computer room, high maintenance technology and time costs, poor compatibility and sharing of multi type application software, hidden dangers in PC data security and other problems, which cannot meet the needs of large-scale Electronic assessment work. Due to the traditional C/S model, the development of computer-based exam systems usually requires individual maintenance of the PC on site. Before the exam, it is necessary to suspend classes for a week for single machine deployment and debugging, install and configure each exam client, and set environmental variables. This incurs high labor costs and takes up a long time. After the exam task is completed, it is necessary to restore the software and system variables required for each teaching scenario one by one, Configuration vulnerabilities and human security risks are highly likely to occur throughout the entire process. In addition, professional teaching and exam application software run simultaneously on traditional devices, often interfering with each other and causing many compatibility issues, making it difficult to achieve device sharing in time and space. Therefore, teaching cannot be conducted during exams and exams cannot be conducted during teaching. The labor and time costs of multi terminal maintenance are high.

2.4. The software technology iteration and update cycle is short, and the construction of the computer room is aging and unable to adapt to the new exam software requirements.

Against the backdrop of expanding software functionality and increasing user demand, various types of application software updates and upgrades are rapidly changing with market development. The software's requirements for hardware are also increasing, resulting in clients needing to be upgraded synchronously within 3-5 years. However, upgrading and upgrading hardware is a great challenge to school asset management and disposal, which does not comply with actual management laws.

3. Countermeasures for the Construction of Examination Systems in an Open Education Environment

Taking Yunnan Open University as an example, in the open education environment, there are diverse levels of candidates, a wide range of candidates from different regions, a wide range of exam subjects, and decentralized exam time. In order to adapt to the mass and multi batch Electronic assessment under the open education environment, and the large number of users and various subjects, it is necessary to establish an open, safe, real-time and easy scenario switching Electronic assessment system. The system needs to have an examination system that does not rely on multi client maintenance applications with good application compatibility, safe data environment, friendly user experience, easy centralized unified maintenance and management, and easy scenario switching. From the technical perspective, it can meet the needs of large-scale Electronic assessment users in the open education environment through the blockchain technology with prominent centralized characteristics and OSS Cloud storage technology with front and rear business separation, and realize random test paper generation, real-time exam, subject compatibility, implementation supervision, anti cheating, anti substitution, anti plagiarism, real-time backup and other functions.

3.1. Analysis of the Functional Characteristics and Platform Application Design Strategy of the Examination System in an Open Education Environment

In the traditional exam process, the main roles include the paper producer, exam management personnel, invigilators, candidates, and reviewers. From a role perspective, the main business processes of the exam include the following processes and a list of their related businesses: The

candidate role business process includes pre exam, during exam, and post exam processes. Before the exam, it is necessary to register and understand the exam requirements. The list includes exam notices and exam venue instructions. Upon arrival at the exam venue, candidates must sign in, confirm and review their information, and place non exam items; The list of business involved includes ID card, candidate registration form, candidate information confirmation form, and exam venue commitment letter. Later on, the test paper needs to be collected. The business process of on-site examination personnel includes pre exam, mid exam, and post exam business processes: before the exam, test papers and supplies need to be configured according to the exam venue, the exam venue should be set up, the exam venue rules should be posted, and the admission information of candidates should be reviewed; During the exam, it is necessary to confirm the examination hall examination list, seal and display the test papers, distribute the test papers, review and recheck the candidate's examination hall information, supervise the exam, and issue examination hall instructions, collect the test papers, organize the examination hall examination list, and package the examination hall materials after the exam is completed. The business process of off-site examination management personnel mainly includes communication equipment management, communication equipment shielding management, and emergency management of events and personnel emergencies.

In combination with the above traditional examination process and business, the role of Electronic assessment can be simplified as Exam invigilator, examinee, marking clerk, and proposition maker. Multiple businesses in the traditional examination can be concentrated into the system business, for example, the information review and confirmation of multiple links can be handed over to the Electronic assessment system itself for completion, and the distribution and collection of examination papers can be completely handed over to the examination server for processing. However, the Electronic assessment system in the open education environment cannot manage the choice of test access terminals such as examinees' mobile phones or computers. The traditional computer room is uniformly deployed and managed by schools or test organizers. However, due to the size and time requirements of the test access terminal in the open education environment, in order to achieve everyone, everywhere and always available for examination, we must implement a decentralized test management mode, focusing on the actual teaching progress and time arrangement of examinees, As a result, exam organizers are unable to centrally manage the exam environment chosen by candidates. In order to ensure the fairness, scientificity, rigor, and assessment of the exam, the exam system must have the following basic functions:

3.1.1. The examination system must be able to confirm the identity of candidates' non textual information

This function can confirm the identity information of the examinee's face or fingerprint before the start of the exam by means of fingerprint recognition, iris recognition or face recognition, and by comparing and reviewing the identity information with the registration information, rather than simply comparing and identifying the ID number number; It can also realize cross Network domain access and audit.

3.1.2. The system must be able to monitor the behavior of candidates and answer data in real-time, and have strong bandwidth traffic to support business data access

Like traditional exams, candidates may exhibit behaviors such as being late, absent, or submitting their papers early, as well as leaving and returning during the exam. To effectively supervise the integrity exam, candidates can randomly use photography to answer questions, or transmit their identity information to the server at fixed intervals or take records of behavior switching for future reference in case of special needs. This requires the server to have professional bandwidth to support

the access of multi user and multi media data.

3.1.3. The exam system must have the function of preventing online plagiarism or cheating, and be able to intelligently monitor candidate behavior and abnormal exam data

In the open education environment of exams, students may engage in behaviors such as searching for answers or reference materials online, checking the answers provided by their seats, or finding someone to take the exam on their behalf. Online search behavior can cause the mouse control of the operating system to lose focus, and it can also cause candidates to open more desktop pages. To prevent online plagiarism or various cheating behaviors, the exam system's paper generation function can prevent plagiarism through random paper generation, repeated question filtering, random question types, and other paper generation strategies; Online cheating and other behaviors can be regulated by controlling the device's defocus event at the access end to remind candidates or limiting exam time by exiting the exam system. The confidentiality level of exam papers can also be strengthened through methods such as login passwords and fingerprint watermarks to prevent candidates from switching to the exam desktop and engaging in cheating.

3.1.4. The access terminal of the exam system must be compatible with multi terminal layout adaptation

Due to the fact that candidates in the open education environment have different regions and educational qualifications, and the access point for logging in to the exam is not subject to unified management restrictions, it is necessary to ensure that the system is compatible with multiple operating systems and screen size page layouts when accessing the access point. The development of front-end technology under the HTML5 standard can solve the problem of multi terminal adaptation.

3.2. Cloud storage based construction examination system is compatible with configuration environment switching of multiple application scenarios

Desktop cloud can significantly reduce the number of physical application terminals, save computer room space, reduce system construction costs, ensure efficient and stable operation of application terminals (student computers) in the "cloud", reduce investment in system operation and maintenance, simplify system operation and maintenance processes, ensure system performance, reduce operation and maintenance labor costs, and improve the efficiency of computer room use. Solve the bottleneck problem of the online examination hardware environment, realize the centralized management of computer room resources, unified planning, convenient deployment, and meet the needs of Electronic assessment in the open education environment of large batches and batches.

A computer network classroom with network terminals and servers as the main body, using terminal access mode, connects servers, teacher computers, and student computers through network cables and devices according to virtual desktop protocols to achieve resource sharing. Server unified management of resources, centralized storage and distribution of data and application software; The upgrade and maintenance work is only carried out on the server side. It can significantly reduce the number of physical application terminals, thereby saving costs in terms of computer room space and system construction costs. Fundamentally reduce users' investment in system operation and maintenance, simplify the system operation and maintenance process, and ensure system performance. Desktop cloud terminals replace traditional PC devices and combine protocols such as VAP to remotely connect to virtual desktops. The terminal does not perform processing work locally and transmits the keyboard and mouse using protocols to the virtual desktop in the data center. Redirect to the virtual desktop to meet specific application requirements through the redirection mechanism of external devices. Provide human-machine interaction interfaces for end users through desktop

virtualization technology.

4. Conclusion

Through the Cloud storage technology, a large number of exam businesses are concentrated on the server side, and the complex user end is realized through virtual technology, which saves huge labor and time maintenance costs. Using the authorization mechanism of the blockchain, exam process data and user behavior data are stored by a third party under the multimedia monitoring environment. We have ensured the demand for large-scale and multi batch exams in an open education environment, while also creating a fair and cheating proof exam environment, ensuring scientific learning evaluation methods. The next step will be further research and exploration on the implementation of specific technologies and the specific process of platform development.

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