

Retraction

Retracted: Research on Interactive Art Online Teaching System Based on BS Mode and Internet of Things

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

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- [1] Y. Ying and W. Hongyan, "Research on Interactive Art Online Teaching System Based on BS Mode and Internet of Things," *International Journal of Antennas and Propagation*, vol. 2021, Article ID 7391634, 9 pages, 2021.

Research Article

Research on Interactive Art Online Teaching System Based on BS Mode and Internet of Things

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Traditional online art teaching system has problems such as poor score improvement and low system throughput. Therefore, this paper designs an interactive online art teaching system based on BS mode and IoT. Design the overall structure of the art teaching system according to THE B/S structure, build the interactive art online teaching model according to the system role use cases, introduce the RFID technology in the Internet of Things to control the information transmission of the interactive art online teaching system, and complete the code development of interactive art online teaching function. Complete the interactive art online teaching system based on BS mode and the Internet of Things. The experimental results show that the designed system can improve the scores of students in art colleges and improve the throughput of the system.

1. Introduction

Art courses require strong learning ability from the very beginning; the school established the fine arts course website, and teachers can use the traditional classroom teaching and modern multimedia teaching, through the method of combining the classroom by adopting the combination of electronic lesson plans and blackboard writing way, and according to the needs of curriculum content with some animation, audio, and video, giving full play to learn students' interests in learning [1]. At the same time, the construction of the course website has the following significance. The development and construction of the art course website are one of the important contents of our school's art course construction, but there are few special art course websites present, and many things are related to art, including some art interest schools. Moreover, these websites have the problems of low click rate and low usage rate [2]. This is mainly because the website construction is not perfect, the content is monotonous, there is not enough system, and there is no website construction according to the needs of specific groups of

people. They are greatly limiting the effectiveness of these course websites. If some websites do not have an online communication platform, it is not conducive to the exchange of students and teachers. As a course website, it must be curricular as the center, provide services for classroom teaching, and provide support for extracurricular and in-class teaching interaction. From the perspective of web-based autonomous learning mode, it should be student-centered and provide help for autonomous learning.

The teaching website spreads the information related to the course through the network to realize the sharing of course resources, so the course website is required to operate and play a leading role in the actual teaching [3]. But throughout the existing course website it is not difficult to find that most of the course website construction still has many problems, mainly in the following aspects.

1.1. The Construction Quality of the Website Is Not High, and There Is a Lack of Overall Understanding and Planning for the Construction of Network Courses. There is disorderly page

production in the website's construction, and style is not unified, in addition to other problems. Such website construction did not form a unified style, giving a chaotic feeling, and it is difficult to form independent modules, which seriously affect the expansion of the system and reduce the flexibility of the system. Secondly, the content organization of the website is cumbersome. Content is the soul of the course website, and the quality of the content determines the website's success. However, many course websites are just conventional piles of simple content, monotonous, and boring, lack diversity and flexibility, and give little consideration to the actual needs of learners, which cannot really attract the use and participation of students and teachers.

1.2. The Interactivity of the Site Is Not High. In order to realize the interaction between teachers and students, interactive communication spaces such as a question-answering mailbox and teacher-student garden should be built on the course website. Interactivity is one of the basic requirements of website construction, so it is a goal of course website to build interactivity website. In order to make the course website have the interactive function of network teaching, the most common ways of website design include online communication, E-mail, and electronic announcement, through which the interaction between teachers and students can be realized [4]. However, the author found that in many websites, of course, this interactive function application is not good. Secondly, the course website should be interesting and entertaining. In order to improve students' initiative and enthusiasm, in the course website construction process, we should play the role of modern information technology and make full use of animation and other image modes and means, to deepen students' understanding and cognition, let students be more interested in using the course website to learn knowledge, so as to achieve better teaching effect. But in reality, many course websites do not have this function, and the form of website implementation is relatively single and boring. As a result, the website's utilization rate and visiting rate are not high, which does not play the role that the course website should play.

By analyzing the research results and study cases of online teaching reforms of arts courses, Reference [5] also interprets the purposes, meaning, and value of online teaching of arts courses. Meanwhile, according to the talent training objectives of colleges, policy guidelines, economic effect, and technical measures involved, this paper explored the challenges facing online teaching reforms of arts courses and attempted to make a breakthrough in terms of the development direction and ways of the reforms based on statistical analysis, students analysis, and major development analysis. Reference [6] collected large amounts of log data, based on the technology of data mining in the fine arts professional learning in the process of learning behavior data, through the study of artificial intelligence algorithm analysis to construct characteristic model, to recommend learning path, the object, and effectively use the established online learning system to improve the learning efficiency of learners.

Internet of Things (IoT) refers to the real-time collection of any object or process that needs to be monitored, connected, and interacted with through various devices and technologies, including information sensors, RADIO frequency identification (RFID) technology, global positioning system (GPS), infrared sensors, laser scanners, and so on. Collect the sound, light, heat, electricity, mechanics, chemistry, biology, location, and other required information, through all kinds of possible network access, realize the ubiquitous connection between objects and objects, and objects and people, and realize the intelligent perception, recognition, and management of objects and processes. The Internet of Things is an information carrier based on the Internet, traditional telecommunications networks, etc. It enables all ordinary physical objects that can be independently addressed to form an interconnected network.

Aiming at the above problems, this paper designs an interactive art online teaching system based on BS mode and Internet of Things.

The contributions of this paper include the following three points:

- (1) Traditional online art teaching system has problems such as poor score improvement and low system throughput. Therefore, this paper designs an interactive online art teaching system based on BS mode and Internet of Things.
- (2) Design the overall structure of the art teaching system according to THE B/S structure, build the interactive art online teaching model according to the system role use cases, and introduce the RFID technology in the Internet of Things to control the information transmission of the interactive art online teaching system.
- (3) Complete the interactive art online teaching system based on BS mode and Internet of Things. The experimental results show that the designed system can improve the scores of students in art colleges and improve the throughput of the system.

2. Overall Design of Interactive Art Online Teaching System

2.1. B/S Structure of Art Teaching System Overall Structure Design. B/S structure has certain advantages in system design, development, and implementation. The information system based on B/S structure has good openness and expansibility. B/S structure is easy to realize in modular design and management. The B/S structure (browser/server) is widely used in the development and utilization of modern information technology and is a kind of network structure mode that emerged after the development of the Web [7]. Used in the installation of a Web browser and other related database software, you can input every aspect of the information in the system to achieve operations. Its main features are simple maintenance and upgrade and low development and use costs.

B/S structure has a strong operation and is conducive to the maintenance of the system; the system is open and a little

more prominent and in view of ASP.NET technology has flexibility, security, scalability, user-friendly access, and browser independent characteristics. This test adopts the browser server structure, composed of client and database servers [8]. As the system adopts Internet related technologies, the art teaching and research system based on B/S mode adopts the Web solution proposed by Microsoft based on ASP.NET technology, which is shown in Figure 1.

In the process of designing the art teaching system, this paper fully examines the characteristics of art teaching and integrates the characteristics of art teaching into the design of each module. The specific design module is shown in Figure 2.

2.1.1. Registration Module. Art teaching and research system can provide students and teachers with two identities of registration; students and teachers must be set according to the school of learning number or teacher's number of registrations; if it does not meet the registration it will fail; students need to fill in their basic information in the registration.

2.1.2. Student Management Module. Log in to the web system in the background of the student management module, the student background page will automatically pop up in the system, students can view the teacher's courseware, as well as the homework assigned by the teacher, and, according to the content of the homework, complete the related homework and works but also can modify the registration information and communicate with teachers and students through the forum.

2.1.3. Teacher Management Module. After a teacher logs in as a teacher, a teacher background page will pop up in the web system, where the teacher can issue courseware or not, assign homework, and view students' works or homework [9]. Teachers can check homework at any time according to the list of students and also can publish relevant information on the website, assign homework, and communicate through the forum.

2.1.4. Administrator Module. After the administrator successfully logs in as the administrator, the administrator background page will automatically pop up in the system. As the administrator, the administrator has the right to view and manage the website information and data information [10]. First, the administrator can view the relevant information of the website and has the permission to delete the information. Second, administrators can publish relevant information. Third, administrators can post relevant links to the relevant web pages or systems. Administrators can also publish related courseware and learning videos.

2.1.5. Online Test Module. This system includes the function of online test. Testing plays an important role in education and teaching. The traditional test is a paper-based test with

low efficiency and requires many steps. Students cannot take the test at any time and can only examine their learning status through their usual homework [11]. And realize the online examination of the information system to help students pass timely examinations and understand their own learning situation, both pertinent and comprehensive. To develop interactive, dynamic, and efficient online testing function, we must rely on the support of database technology.

2.1.6. Forum Management Module. Forum management module is the main platform for students and teachers to communicate; its function is mainly to provide a real-time communication platform for teachers and students, through the way of posting-reply communication.

2.2. System Role Use Case Analysis. In the art teaching and research system, there are three login identities authorized by the system: system administrator, teacher, and examinee. Next, we use UML to describe the roles of the system, as shown in Figure 3.

According to the three methods of system client, the total subsystem can be divided into three subsystems: administrator, teacher, and student. The administrator's functions are mainly login and management of teaching. The teacher subsystem mainly realizes the management of teacher login, information release, and forum. The main functions of the student subsystem are login, online learning, viewing homework, forum communication, and other functions [12]. Based on the above analysis, the three roles of the system are students, teachers, and administrators, and each role has its own different functional requirements.

The system administrator plays an important role in the entire art teaching information system. As the administrator of the whole system, the main roles are user management, role management, grade management, class management, and course management. An example for system administrators is shown in Figure 4.

3. Interactive Art Online Teaching System Software Design

3.1. Interactive Art Online Teaching Model Design. Throughout the new system through the whole information is the key to coping with the increasing complexity of dynamic web pages. The design process of the whole system model is divided into presentation, business logic, and data access layers, as shown in Figure 5. In terms of deployment, the presentation layer corresponds to the server, the logical layer corresponds to the application layer server, and the data layer corresponds to the data layer server.

Presentation layer: the presentation layer realizes the function of providing customers with dynamic Web pages, and customers can easily access the dynamic web pages. This layer is in the form of Web projects in the system, and all pages are deployed under the Web folder.

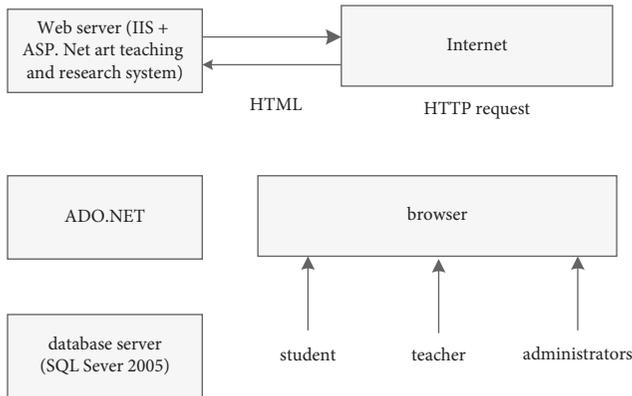


FIGURE 1: Structure design of the overall functional modules of the system.

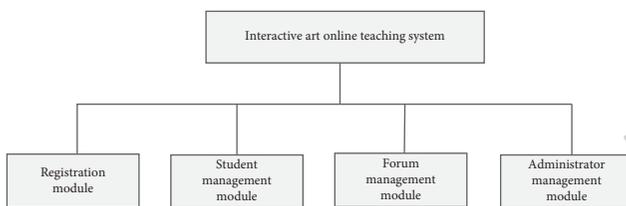


FIGURE 2: Overall structure module of the system.

Business logic layer: some business functions of the system can be realized in the form of BLL suffix in the system.

Data access layer: this layer provides related data access services for the above two layers.

3.2. Interactive Art Online Teaching Function Design. In the learning system, certain navigation and search functions can be provided, such as arranging the location of the network courseware in a certain order and providing the search function of the subject words according to certain knowledge points, so that users of the system can easily and quickly find the learning resources they need [13]. The learning system can also record the individual learning situation of learners at any time so that learners and teachers can master the relevant learning progress and make teaching arrangements. The most important design of the online learning function module is the upload of the course resource function, and the technology used for the production function of the course resource is ASP.NET. ASP.NET is a programming framework, which is a new framework based on the operation of the common language and can realize the establishment and generation of Web programs. Web programs have powerful functions [14]. Net under the condition of building generated Web program compared to the traditional Web program in the function and operation has a great progress:

- (1) Simplicity: ASP.NET makes it easier to perform a variety of common tasks.

- (2) Security: within ASP.NET, there is a Windows authentication that greatly improves application security.
- (3) Power and flexibility: SP.NET is built on the common language runtime, and software developers can use its power and flexibility to develop powerful Web applications. And, in solving Microsoft.NET framework class library and other operations it can be very good. Realize seamless connection with the Web. In addition, ASP.NET ends programming language restrictions and can operate in any programming language, thus greatly enhancing the programming staff's choice of programming language tools [15]. In addition, the common language runtime's tomb-house feature ensures that ASP.NET maintains existing investments in COM-based development to a large extent.
- (4) Enhanced performance: ASP.NET is a common language runtime code that has greatly improved performance even before the lines of code are written.
- (5) Manageability: one of the biggest characteristics of ASP.NET is that it belongs to a text-based hierarchical configuration system. This configuration system greatly simplifies the program's development process and facilitates management when setting up the application server environment and Web applications. Since ASP.NET stores configuration information in plain text, we can deploy ASP.NET framework applications to the server by simply copying the necessary files to the server, which has the benefit of not having to repeatedly restart the server, greatly improving management performance [16].
- (6) World-class tool support: the ASP.NET framework has been supplemented by a number of toolkits and designers from the Visual Studio integrated development environment. ASP.NET provides many powerful features, including drag-and-drop server controls, WYSIWYG editing, and automated deployment.
- (7) Scalability and usability: ASP.NET was designed with scalability in mind and added a feature to improve performance in a variety of application environments.

3.3. The Transmission of Art Teaching Information Based on Internet of Things. The Internet of Things is the third wave in the development of the world's information industry. Generally speaking, the Internet of Things is a network that connects objects and objects based on the Internet. It can connect any object to the Internet through sensors, positioning systems, and other information devices according to certain protocols, realize all kinds of information exchange and communication between interconnected objects, and finally realize intelligent management of objects [17]. A typical RFID system consists of three parts: (1) a reader,

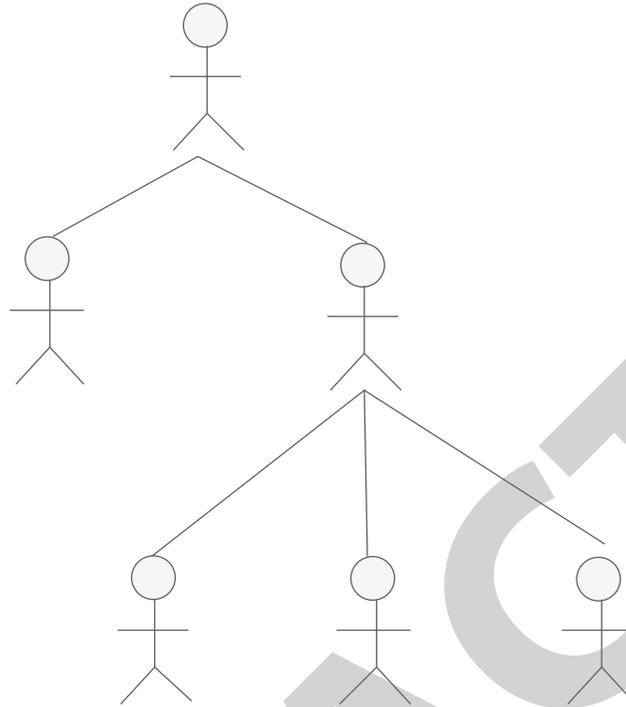


FIGURE 3: System roles use case diagram.

composed of a control module and an antenna, is used to read and write the information of the RFID tag and control its communication with the RFID tag, with signal encoding and decoding, data encryption and decryption, anticollision algorithm, authentication, and other functions; (2) RFID tag, which consists of a chip and a coupling element and contains a built-in antenna that can communicate with the RADIO frequency antenna; (3) a host mainly processes the RFID tag information obtained by the reader. The basic workflow of the RFID system is shown in Figure 6.

In practical application, the data of each artwork will be input into the tag in advance, and the reader can automatically identify the target object of the artwork by reading the tag information through the RADIO frequency signal and then transmit it to the control center wirelessly, so as to complete the fast tracking of the artwork and the fast exchange of data. It should be pointed out that RFID can identify the tags of artworks and identify multiple artworks at a time. When RFID technology identifies tags, if there are more than one electronic tag in the area, it will respond at the same time, and the signal will overlap, and the reader cannot accurately read the data. The anticollision algorithm can solve this problem. There are two types of collisions in RFID: the collision of multiple readers and the collision of multiple tags. The former is relatively easy to solve: just put the reader in the right place. The latter cannot read the information correctly because multiple tags are responding to the reader instruction at the same time.

Art teaching information needs multi-layer transmission. In order to realize the length value of the Internet of Things module, it is represented by M . Multi-layer linear art teaching information needs to be encrypted. The data

encryption test length is M . Art teaching information is designed through the use of algorithms linear programming binary bit sequence programming design bit sequence flow can be divided into $N = \lfloor n/M \rfloor$ time window. The binarization P value of multilayer transmission control of art teaching information is defined as follows by using the block-feature matching technology:

$$P \text{ value} = \text{igamc}\left(\frac{N}{2}, \frac{\chi^2(\text{obs})}{2}\right) = \frac{1}{\Gamma(N/2)} \int_{\chi^2(\text{obs})/2}^{\infty} e^{-t} t^{N/2-1} dt, \tag{1}$$

where $\Gamma(N/2) = \int_0^{\infty} t^{N/2-1} e^{-t} dt$. Assuming that the plaintext number of art teaching information pieces to be transmitted is $X = (0, 1/M, 2/M, \dots, 1)$, the random distribution probability of packet forwarding is $X = (0, 1/M, 2/M, \dots, 1)$, the detection characteristic quantity of coding sequence is $P = (p_0, p_1, p_2, \dots, p_M)$, and the transmission function of art teaching information can be obtained:

$$\begin{pmatrix} a & b & c & d \\ d & a & b & c \\ c & d & a & b \\ b & c & d & a \end{pmatrix} \begin{pmatrix} a & b & c & d \\ d & a & b & c \\ c & d & a & b \\ b & c & d & a \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}. \tag{2}$$

Using the elliptic curve block encryption method, we can get $\begin{cases} a^2 + c^2 = 1, \\ b^2 + d^2 = 0 \end{cases}$; that is, $\begin{cases} g^{2\alpha} + g^{2\gamma} = 1, \\ g^{2\beta} + g^{2\rho} = 0 \end{cases}$. Since the first character of the plaintext sequence satisfies $g^{2\beta} + g^{2\rho} = 0$,

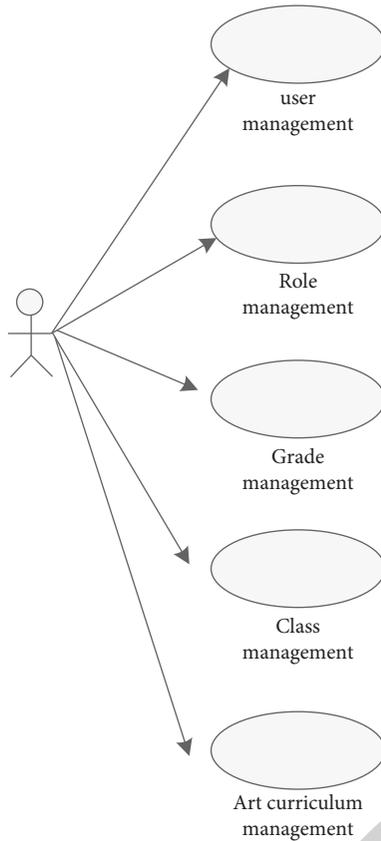


FIGURE 4: System administrator use case diagram.

$1 \leq \beta$, the chaotic key state characteristic equation is constructed, and the big data of the basic art teaching information communication of the Internet of things is loaded into the chaotic key state characteristic equation to obtain the chaotic key state characteristic equation:

$$\begin{aligned}
 c &= z \cdot \lfloor \frac{x_0}{2} \rfloor = (q_p(z)p + r_p(z)) \cdot \lfloor \frac{x_0}{2} \rfloor \\
 &= q_p(z)p \cdot \lfloor \frac{x_0}{2} \rfloor + r_p(z) \cdot \lfloor \frac{x_0}{2} \rfloor.
 \end{aligned} \tag{3}$$

The art teaching information is applied to the art online teaching system, and a feature group matches each group of information to realize the data transmission of art teaching information.

3.4. Interactive Art Online Teaching Function Implementation Code. The FileUpload control can be used to upload the art works file. Through the setting of the code, the program can upload the art works to the file. The main code is shown as follows:

```

try
{if (Filep Uploadl.PostedFile.FileName.Length == 0)
{Response.Write (“<script>alert (\“The upload path cannot be empty!\”);</script>”);
return;
}
}

```

```

String filename = this.File Uploadl.PostedFile.FileName.Substring (
this.FileUploadl.PostedFile.FileName.LastIndexOf (“\”) + 1);
String art = File Uploadl.PostedFile.FileName.Substring (
this.File Uploadl.PostedFile.FileName.LastIndexOf (“.”) + 1);
if (art == “gif” || art == “jpg,” || art == “bmp”)
{File Uploadl.PostedFile.SaveAs (Server.MapPath (”, image/, +filename));
Response.Write (“<script>alert (\”, Uploading the file succeeded!\”, );</script>”);
}
else
{Response.write (“<script>alert (\”Upload files must be IN GIF, JPG, BMP format!\”);</scriPt>”);
return;
}
}
catch (Exception ex)
{ResPonse.Write (“<script>alert (\”+ex.Message+“\”); serIPt>”);}

```

The file type can be changed slightly according to your needs. On the basis of the above code, the interactive art online teaching system is completed, as shown in Figure 7.

4. Experiment

4.1. Testing Environment. In order to ensure the true and effective test results, the real campus network environment and school hardware and software resources are used in the system test. The device configuration is as follows:

- (1) Hardware configuration: I5 series database server, CPU frequency above 2.8G, and memory capacity 4G. The hard disk capacity is greater than 500 GB, and Windows server operating system and gigabit network adapter are installed.
Two client computers: one requires E5300 series 2.6G processor, 2G or more memory capacity, 250G or more hard disk, Windows 7 operating system, and 100 m nic. The other one requires E2180 series 2.0G processor, 2 GB or more memory capacity, 160 GB or more hard disk, WinXP operating system, and 100 m nic.
- (2) Network environment: art colleges teaching network.

4.2. Improving Effect of Art Teaching Credits. In order to verify the performance of the design system, literature [7] system, literature [8] system, and design system are used to verify the teaching effect of the online art teaching system.

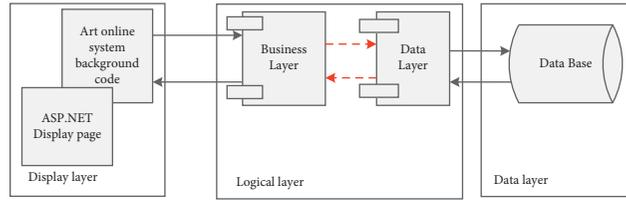


FIGURE 5: B/S pattern design model.

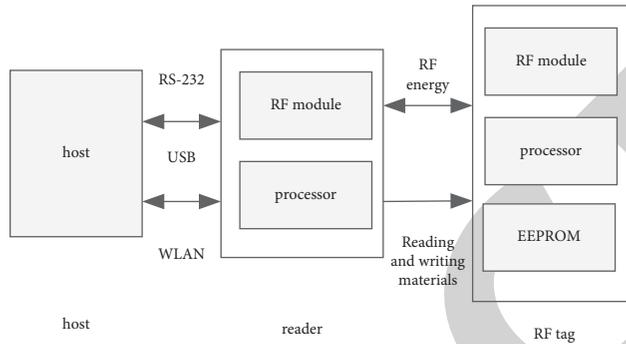


FIGURE 6: Working principle of RFID system.

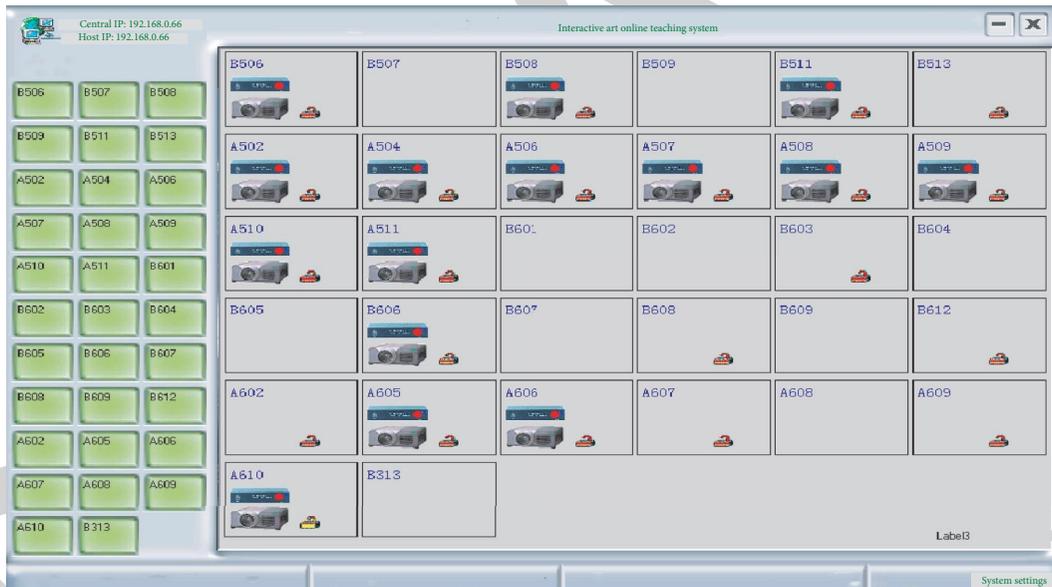


FIGURE 7: Interactive art online teaching system.

The teaching scores of art courses are compared, and the results are shown in Figure 8.

The improvement effect of online teaching system for art students is different under different methods. For the first group of students, the score before the application of the teaching system was 67, after the application of the literature [7] system was 76, after the application of the literature [8] system was 76, and after the application of the paper system was 96. For the third group of students, the score before the application of the teaching system was 65, after the application of the literature [7] system was 68, after the application of the literature [8] system was 85, and after the

application of the paper system was 95. In the eighth group, the score was 76 before applying the teaching system, 79 after applying the literature [7] system, 79 after applying the literature [8] system, and 96 after applying the paper system. After the application of this system, the improvement effect of the online teaching system for art students is obviously better than other methods.

4.3. *System Throughput.* In order to verify the effectiveness of the designed system and the throughput of the literature [7] system, literature [8] system, and the designed system, the results are shown in Figure 9.

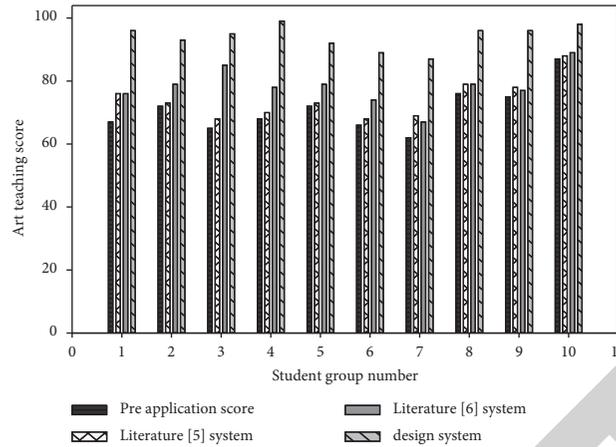


FIGURE 8: Improvement effect of online teaching system for art students.

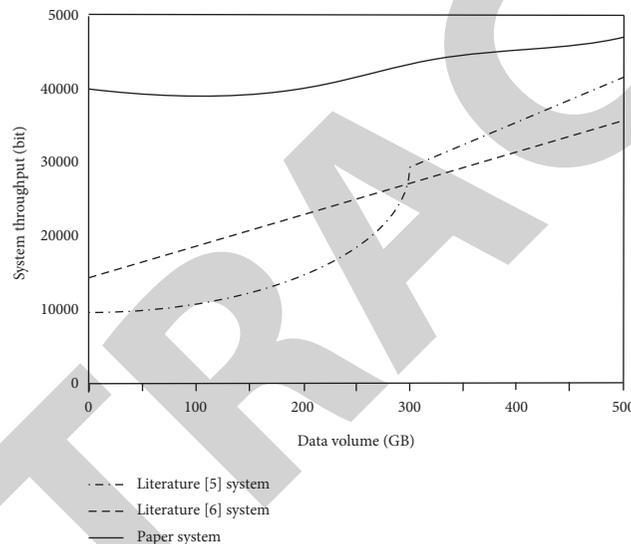


FIGURE 9: Data throughput of different systems.

As can be seen from Figure 9, when the data volume is 100 GB, the system data throughput of literature [7] is 10021 bits, the system data throughput of literature [8] is 20000 bits, and the system data throughput of the designed system is 38700 bits. When the amount of data is 200 GB, the system data throughput of literature [7] is 15200 bits, the system data throughput of literature [8] is 24000 bits, and the system data throughput of the designed system is 38700 bits. When the data amount is 500 GB, the system data throughput of literature [7] is 40000 bits, and that of literature [8] is 35000 bits, and the system data throughput of the designed system is 47700 bits. The data throughput of the designed system is much higher than that of other systems, which indicates that the system in this paper has good compression resistance and strong load capacity and can simultaneously meet the online teaching ability of students in more art colleges.

5. Conclusion

This paper designs an interactive art online teaching system based on BS mode and Internet of Things. The overall structure of the art teaching system was designed according to THE B/S structure, the interactive art online teaching model was designed, the RFID technology in the Internet of Things was introduced to control the information transmission of the interactive art online teaching system, and the interactive art online teaching system based on BS mode and the Internet of Things was completed. The following conclusions were drawn through the experiment:

- (1) The eighth group got 96 points after applying this system. After applying this system, the improvement effect of the online teaching system for art students is obviously better than other methods.

- (2) When the data amount is 500 GB, the system data throughput of the designed system can reach 47700 bits. This indicates that the system in this paper has a good compressive resistance and strong load capacity and can simultaneously meet the online teaching ability of more art college students.

Although the method proposed in this paper has achieved good results, in the development of deep learning today, the effect of this paper is not significant. In future work, we hope to integrate deep learning algorithm to build a more effective model.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this study.

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