



## Digital Resource Sharing for Early Childhood Art Education: A Web-Based Approach

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### KEYWORDS

Internet Background, Art Education, Network Resources, Sharing Platform.

### ABSTRACT

With the rapid advancement of information technology and the accelerated digitization of preschool education, various teaching resource platforms have emerged accordingly. This study focuses on constructing an online resource-sharing platform for preschool art education in the Internet context, employing SQL Server as the database management system to establish a comprehensive digital education resource integration framework. The proposed solution provides teachers with an optimized resource application approach, effectively enhancing work efficiency and instructional quality.

### 1. Introduction

In the current era of rapid technological development, information technology has been deeply integrated into all areas of the economy and society, bringing revolutionary opportunities and challenges to education<sup>[1]</sup>. It not only expands the coverage of high-quality resources and injects the concept of sustainable development through innovative technical means, but also promotes changes in teaching methods and improves the quality and efficiency of education<sup>[2]</sup>. Educational informatization has become the only way to achieve leapfrog development in education. Focusing on the actual needs of teachers and students and exploring digital resource supply strategies are of epoch-making significance for providing high-quality educational services. As a key link affecting teaching quality, teaching

resource sharing faces the need for transformation in the Internet era: the traditional sharing model is limited by time and space, exacerbating the uneven distribution of resources and restricting the development of teachers; the rise of online education breaks down barriers and enhances the fun of learning through real-time interaction and resource sharing<sup>[3-4]</sup>. Therefore, it is urgent to develop a new teaching resource sharing service system to innovate the traditional model and alleviate the problem of resource imbalance<sup>[5-6]</sup>.

Foreign researches on teaching resource sharing service system have summarized the characteristics of current similar systems as follows: developed countries in Europe and the United States have gradually shifted from focusing only on resource construction to not studying the integration and systematization of resource construction, practice

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and sharing<sup>[7]</sup>; Eu countries for the application of the open sharing of teaching resources in the university teaching has gradually improve, and the normalized application system, the business functions on the discussion of concrete cover high quality teaching resources and open sharing of teaching resources sharing service provided by application technique, effect and method, evaluation methods such as policy support, different operation<sup>[8]</sup>; teaching resource sharing service in the United States mainly constructs the use of teaching resources from the perspective of students, covering the reorganization and redesign of resources<sup>[9]</sup>.

The research of this paper is always guided by the analysis, design and practice of how teachers use digital resources suitable for activities in an efficient and convenient way.

## **2. Pre-school Art Education Network Resource Sharing Platform**

### **2.1 Practical Strategies of Network Art Resources in Preschool Art Teaching**

#### **(1) Change the concept of education**

If preschool children want to continue to develop and progress in the art teaching, it is necessary to change the traditional educational concept, pay attention to the application of network art resources. Network art resources have the characteristics of more resources, rich content and diverse forms, which are more "fresh", more diverse and more in line with the development and trend of the Times than the teaching resources used in traditional preschool art teaching. Today, such a huge amount of art resources on the network has been enough to meet the needs of preschool art

teaching, but how to use these resources, how to use these resources is the need for every educator to think about. However, no matter how to use it or how to use it, we should first keep an open and positive attitude to accept such a trend -- the application of network art resources in teaching is becoming more and more extensive and necessary. Therefore, to understand the trend, step up, and constantly attach importance to the application of network art resources in preschool art teaching is the new basis for the faster development of preschool art teaching.

#### **(2) Resource sharing**

It is an effective and quick way to solve the problem to establish a network art resource sharing website in the school. On the one hand, in the gardens building group, to set up the repository of fine arts, art teaching communication can collect art teaching resources, for the preschool teachers share their production, gathering network to facilitate the art resources channels, can also convenient and other teachers using resources for teaching, for preschool teachers save a lot of preparation time, improve the utilization rate of resources, It also gives a better play to the role of online art resources in teaching<sup>[10-11]</sup>. On the other hand, taking preschool as the construction unit will not cause the potential waste of large-scale platform construction, and it can be implemented quickly in a small unit, providing valuable practical experience for the further construction of online art resource website platform in a large range of provinces and cities<sup>[12]</sup>.

#### **(3) Construction of network art hardware facilities**

In the aspect of teacher training for the construction of network art resources, the policy on the cultivation of information technology ability of preschool art teachers is far from enough, which greatly limits the application of network art resources in preschool art teaching. Should increase the intensity of teacher training, not only in preschool internal information related to the teaching technical ability training, using case analysis form such as specific learning, let technology to quickly master the application of network resources of fine arts preschool teachers, in addition, the government also should strengthen training, training, focus on training and so on a variety of ways through the network deeply for technical training of teachers.

#### **(4) Formulate network resource regulation policies**

Network art resources as a new form of art resources, with the help of the network to spread and popularize, the prospect is very great, can bring a new development opportunity for the new era of preschool, primary and senior education and teaching. Network, however, it is a "double-edged sword", it bring convenient and quick for the teaching at the same time, also spread with numerous repeated mad, quality is low, vulgar, unhealthy information resources for the popularization of network art education has brought more than obstacles, so the author suggested that the government education department to develop as soon as possible to the network resource sharing, fine arts, download and other related policies, on the one hand, this can greatly improve the quality of online art resources.

Currently, the quality of online art resources is uneven. Under the constraints of laws and policies, the network environment is gradually getting better and at the same time, the quality of resources will be gradually improved through selection. On the other hand, front-line teachers can also provide teaching guidelines and norms to prevent preschool teachers from popularizing superstandard or inappropriate network resource content and provide policy guarantee for the healthy development of teachers.

## **2.2 System Architecture Design**

### **(1) System technical architecture**

In order to complete the development and design of the system, considering the cross-platform and easily portable characteristics of Java, the system uses the Java high-level programming language, the system applies the MVC design pattern, the application of SSH framework, the use of jQuery to optimize the interaction of the system interface, and the use of JavaScript to design and implement the foreground interface. The database management software of the system adopts SQL Server.

Considering the cross-platform and easy transplantation of JAVA, the art education network resource sharing platform uses JAVA high-level programming language for system development and design, and uses JavaScript for the design and implementation of the front interface. In order to facilitate management, the art education network resource sharing platform applies the MVC design pattern and divides the program development into different levels such as data Model layer, business logic layer and foreground display layer according

to the concept of Model, View and Controller, so as to conduct phased development and reduce the difficulty of project management. At the same time, the system applies SSH framework, Struts is responsible for program function scheduling, accepts user requests, and calls the corresponding business logic to complete the request, and returns the processing results. Spring is responsible for specific business processing, analyzing user requests, completing corresponding operations, and returning the results to Struts in form or other formats. Hibernate is responsible for the relevant operations of the data model, including the interaction between the system and the database, the modeling and encapsulation of the data and the persistent storage. Finally, the database management software of the system uses SQL Server.

## **(2) System functional architecture**

The art education network resource sharing platform is designed with eight major functions, namely personal space management, thematic teaching and research management, boutique course selection management, online course management, famous teacher classroom management, micro-teaching and research management, simulation teaching and research management, and sunshine classroom management. Personal space management. Personal space management function is mainly for different roles of users can be used to create a learning, communication and teaching research work space, to help users use spare time to teach and learn, improve learning and work efficiency, mainly divided into basic information management,

personal resource management and discipline resource management.

Themed teaching and research management function for the school teachers and other users to provide a network teaching and research platform, so that they cannot be limited by space and time and other conditions at any time and place to carry out teaching and research communication, forming a community of teaching and research community. Among them, the theme teaching and research management function is mainly divided into independent teaching and research management and school-based teaching and research management two parts.

The function of quality class evaluation management mainly provides quality class evaluation activities for teachers to help them improve the quality of teaching and research, which is mainly divided into three parts: activity management, registration activity management and evaluation activity management.

The online lecture management function mainly provides an online lecture platform for teachers, so that they can listen to lectures anytime and anywhere. According to their teaching tasks in this semester, they can arrange their time reasonably, so as to avoid being affected by the time and place restrictions of offline lectures.

Classroom management of famous teachers. The function of classroom management of famous teachers is mainly to provide demonstration classes for the majority of teachers and help them improve their teaching quality, which is mainly divided into two parts: teacher management and album management.

Micro teaching and research management. Micro-teaching and research management function is mainly for teaching and research staff to provide a platform to organize small teaching and research activities, can be anytime and anywhere for a topic of teaching and research discussion, improve the quality of teaching and research. Micro teaching and research management function is mainly divided into two parts: friend management and micro teaching and research management.

The function of simulation teaching and research management is mainly to solve the problems existing in the management and control of teaching and research resources of teachers in different places, so that they can participate in the teaching and research conference instantly through the network video conference or voice chat, so as to realize teachers' long-distance communication and resource sharing.

Sunshine classroom management function is mainly the course of this semester for unified management, according to the different objects of operation, can be divided into teacher management and schedule management and other two parts.

### 3. System Simulation Test

#### 3.1 Testing Environment

Good test environment can imitate the real use environment, as far as possible to reduce changes in system performance caused by changes in the external environment, improve the quality of system testing. Therefore, in order to make the test process of the art education network resource sharing platform as realistic and perfect as possible, this paper uses two servers to deploy the system, and uses the campus network to test in real time on

campus to simulate the real use environment of the system.

#### 3.2 Function Testing

In the test of art education network resource sharing platform, this paper mainly adopts the method of unit test and integration test. Firstly, the specific implementation of the eight functional modules of the system was tested, and multiple test cases were designed for each functional module from multiple different angles, and the completion of each functional operation was repeatedly tested.

#### 3.3 Mathematical Statistics

The purpose of this stress test is to conduct performance testing on the core business of the system by simulating a number of concurrent users close to that of the production environment, in order to examine the platform performance and verify the server load capacity. The collected test results will serve as the basis for the stable operation of the system and provide guidance for tuning.

The relevant test formula is as follows:

$$F = \frac{N_{PU} \times R}{T} \dots\dots\dots(1)$$

$$C^u = C + 3\sqrt{C} \dots\dots\dots(2)$$

### 1. Simulation Test Results

#### 1.1 System Function Test

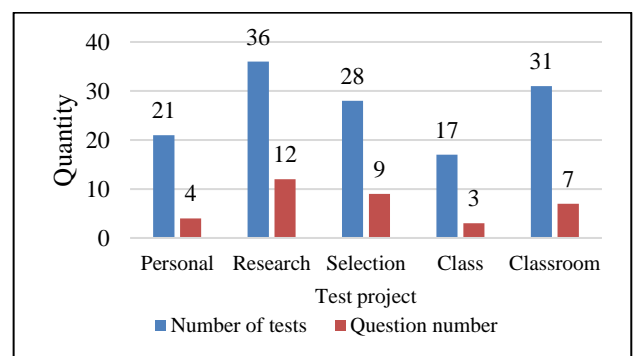


Figure1. System function test results

As shown in Figure 1, 21, 36, 28, 17, and 31

functions were tested for personal space management, teaching and research management, course selection management, online courses, and classroom management, respectively. Among them, the number of functions with problems was 4, 12, 9, 3, and 7, respectively. The problems mainly focused on the database link not being opened, garbled information, insufficient reserved length of extended fields, and incomplete correspondence between the old and new codes and individuals. In response to the above defects, the project team made thorough modifications one by one according to data standards and functional requirements until the platform ran stably.

1.2 System Performance Testing

Table1.System processing quantity

	60	120	180	240
Concurrent users	20	50	100	200
Response time	21	28	43	64
System processing quantity	19	17	14	11

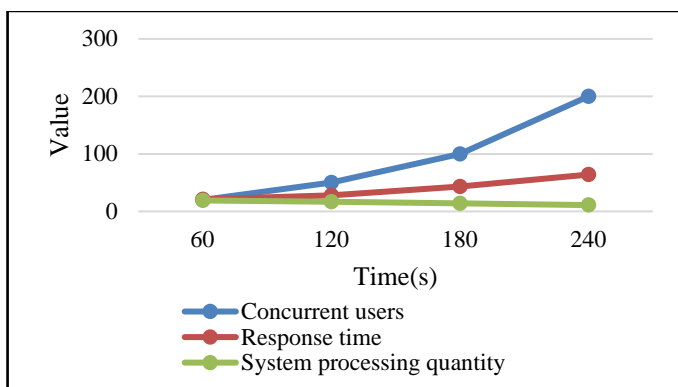


Figure2.System processing quantity

As shown in Table 1 and Figure 2, after the LoadRunner software was used to test the responsiveness of the system, the number of concurrent users at the peak of the test could reach 200, and the time from sending operation request to receiving result feedback was less than 3 seconds.

After testing, it is found that when there are tens of thousands of users accessing the system at the same time, the running speed of the system is significantly slower, and it takes longer time to display the operating results. At this time, the temperature of the processor rises sharply, the system is prone to crash and other conditions, and the reliability needs to be enhanced.

5. Conclusions

This article first explains the system development background and the current status of foreign research, points out the purpose and significance of the development, and then focuses on the design and implementation of the art education network resource sharing platform, covering the development background, domestic and foreign research comparison, user needs analysis, architecture and detailed design, system implementation and testing, etc. The digital education resource sharing service solution provided is helpful to integrate high-quality resources and achieve balanced supply. It has significant social benefits in expanding the coverage of high-quality education resources, promoting educational equity, and improving teaching quality. It can also reduce repeated resource investment and improve economic benefits.

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