Construction of Network Assisted Teaching System of Aesthetic Education in Colleges and Universities under Web Technology

Jingyi Huang

112413672@qq.com

Chongqing Aerospace Polytechnic , Chongqing City , china , 400021

Abstract: In view of the new demand of the network environment for aesthetic education teaching, the network aesthetic education assistant teaching system is designed to realize the information of aesthetic education teaching. The system adopts B/S architecture, which mainly includes three functional modules: resource base construction, process management and communication platform. The system makes full use of network technology, builds digital resource library, supports network teaching process control, and provides online communication platform. The experimental application of the system shows that the teaching resources are more abundant, the teaching is more standardized, the communication between teachers and students is more smooth, and the teaching quality of aesthetic education is improved to a certain extent. The research is innovative and achieves the goal of improving the effect of aesthetic education by using network technology.

Key words: network teaching; Aesthetic education; Web technology; System construction

1 Introduction

The widespread application of information technology in the field of education has made online teaching a significant direction in educational reform. The online teaching environment has brought new opportunities and challenges to arts education. On one hand, internet technology provides richer teaching resources and means, expands avenues for communication between teachers and students, and offers the possibility of innovative arts education models. On the other hand, traditional arts education methods face various constraints in an online environment, requiring both teachers and students to adapt to online teaching and learning. Therefore, the research and design of an arts education system suitable for online environments, harnessing the advantages of internet technology, supporting online arts education, and achieving reforms in arts education, are of great significance.

2 System Requirements Analysis

2.1 Characteristics of Online Arts Education

With the widespread application of computer networking technology in education, the online environment has presented a series of unique characteristics for traditional aesthetic education. Online teaching emphasizes a student-centered approach, providing a flexible and accessible learning environment. Students no longer passively receive education but can actively participate in learning, selecting their own learning paths and timings based on individual needs and interests[1]. This student-centric pedagogical philosophy grants greater autonomy and flexibility in learning. Network aesthetic teaching has transformed the role of teachers. Traditionally, teachers primarily played the role of knowledge conveyors, but in an online setting, they act more as organizers and guides of the learning process. Their task is not just to impart knowledge, but to assist students in effectively utilizing online resources, guiding them to think, explore, and solve problems. This role shift signifies an emphasis on fostering student participation and independent learning capabilities rather than simply transmitting information. The online environment offers a wealth of resources for aesthetic education. Teachers can utilize digitized multimedia resources to create a virtual teaching environment, encompassing various forms of artistic works and educational materials such as images, videos, and audio[2]. This not only enlivens and diversifies the content of aesthetic education but also better satisfies the diverse learning needs of students, enhancing their aesthetic literacy. The use of online platforms breaks geographical barriers, promoting remote teacher-student interactions and engagement. Students can learn alongside peers from different regions and backgrounds, sharing distinct cultures and viewpoints, enriching their aesthetic experiences. At the same time, teachers can collaborate with educators from other institutions or experts in the arts, accessing a broader range of educational resources and knowledge. Such cross-regional interactions expand the horizons of aesthetic education, fostering knowledge sharing and collaboration[3].

2.2 System Objectives

In the present digital age, the establishment of the online aesthetic education auxiliary teaching system is designed to better adapt to the challenges and new teaching demands that the internet environment brings to aesthetic education. The core goal of this system is to innovate and enhance aesthetic education, keeping pace with the times. In this endeavor, we are not merely seeking a basic teaching tool, but an integrated platform that can genuinely transform the model of aesthetic education and elevate its quality[4]. A prime focus of the system's design is to fully harness internet technology, amassing a plethora of digitized and diverse aesthetic education resources spanning various artistic domains and historical periods. This ensures students receive a comprehensive and in-depth learning experience, catering to their varied learning interests and needs. We understand that students have different learning modalities, and hence, the system employs a multitude of teaching methods and tools, aiming to bolster the adaptiveness of teaching and cater to diverse learning styles, actualizing truly personalized education. For educators, the system offers a sophisticated procedural teaching management toolkit, allowing them to adjust teaching strategies and content in real-time based on students' progress and feedback, ensuring teaching effectiveness and relevance. Furthermore, we have placed significant emphasis on establishing an online communication

platform, which not only facilitates constant interaction between teachers and students but also fosters students' teamwork capabilities and critical thinking skills. By integrating these features and philosophies, the online aesthetic education auxiliary teaching system is not just a technological product; it represents our vision and commitment to the future of aesthetic education, aiming to genuinely drive the modernization and high-quality development of aesthetic education.

2.3 Functional Requirements

In today's educational landscape, digital technology and the internet have ushered in boundless possibilities for arts education. In response to this, our designed system places particular emphasis on the digital integration of arts education resources. Firstly, the system should be capable of effectively collecting, curating, and organizing a wide array of arts resources, thereby creating a digital resource library supported by a robust database. The objective of this repository is to offer students a comprehensive online self-study platform. This library will encompass a myriad of digital assets, from images and audio recordings to videos, ensuring all essential course knowledge points are covered. These resources will be meticulously organized according to teaching modules, guaranteeing students can effortlessly retrieve and delve into the content they require[5].The establishment of this resource library is not just a mere data accumulation task. It represents a vital component that directly impacts the quality of student learning. Therefore, it necessitates ongoing updates and refinements to ensure its alignment with educational demands. Additionally, beyond resource management, our system furnishes educators with a full suite of teaching process management tools. These instruments empower educators to design online teaching activities based on predetermined teaching plans, such as setting and overseeing assignments, auto or manual grading, and orchestrating course reflection reports and knowledge evaluations.One of the true merits of online teaching lies in the enhanced interaction opportunities it offers between teachers and students. Embedded within the system are online forums and Q&A functionalities aimed at fostering real-time interactions and discussions between educators and learners. Instructors can utilize these platforms to disseminate course-related announcements, address student queries, while students can share their learning experiences, raise questions, and engage in dialogues with peers. This interactive mode not only enriches the engagement and interest in learning but can also assist educators in gaining a deeper understanding of student learning needs, leading to more targeted instruction[6-7].

3. System design and implementation

3.1 System Architecture

Table 1 System architecture

Characteristic/Advantage	B/S Architecture	C/S Architecture
Cross-Platform Compatibility	Excellent	Average
Maintenance Difficulty	Easy to maintain	Relatively difficult
Scalability	Strong	Moderate
Client Deployment Difficulty	Low	High

Characteristic/Advantage	B/S Architecture	C/S Architecture
Data Storage Location	Server-based	Distributed
Access Control and Security	Centrally managed	Requires distributed management
Scope of Use	More extensive	Limited
Overall Assessment	Suitable for online arts education	Suitable for specific environments

As shown in Table 1, when considering the construction of the Network Aesthetic Education Auxiliary Teaching System, given the system's primary needs to achieve shared teaching resources and remote communication, we selected the Browser/Server (B/S) architecture as its foundational network framework. The B/S architecture differs from the traditional Client/Server (C/S) architecture in that it concentrates more on server-side functionality, and users only need a browser to access, greatly simplifying the client deployment process. Additionally, the B/S structure provides users with cross-platform convenience, meaning no matter what operating system or device they use, they can easily access resources on the server. This characteristic gives the B/S architecture a notable advantage in today's network environment, especially in scenarios where there are high demands for real-time responsiveness and user-friendliness. Furthermore, since the server plays a pivotal role in the B/S architecture, all data storage, application logic processing, and security controls are centralized, facilitating unified access control and security management while offering robust scalability and ease of maintenance. When considering the specific application environment and functional requirements of the Network Aesthetic Education Teaching System, we found that the B/S architecture offers users a straightforward, secure, and controllable user experience. Therefore, we chose B/S as the network structure for the Network Aesthetic Education Auxiliary Teaching System.

3.2 Overall Design Approach

In modern software design, the layered design concept is widely adopted because it offers a clear guide and framework for the organization and expansion of a system. This system is designed precisely with this approach, ensuring that it can cater to current functional demands and adapt to the evolving technological and pedagogical needs of the future. The database layer serves as the foundation for all information and content. This layer is more than just a simple storage area; it employs advanced data management techniques to ensure the safety, stability, and efficient access to data. By utilizing a relational database, it assures that logical relationships between data are well-maintained while also providing robust support for advanced data queries and analyses. Given the diverse nature of aesthetic education resources, the database design also takes into account the storage and retrieval efficiency of multimedia content.The business logic layer acts as a bridge between the database layer and the presentation layer, and it is vital for executing the system's functionalities and business processes. Within this layer, the core algorithms and workflows of the system are realized. To ensure the system runs efficiently, this layer is designed with considerations for performance, security, and reliability. Moreover, through modular design, it guarantees the independence of each functional unit, making it easier to manage and modify.The presentation layer is where users directly interact with the system. An intuitive and user-friendly interface is crucial for enhancing the user experience[8]. This layer focuses not only on the aesthetics of the interface

but also on the intuitiveness and convenience of user operations. Collaborating closely with the business logic layer, it ensures that user requests are addressed quickly and accurately, presenting the results in a clear and comprehensible manner to the user.The interaction between the layers is achieved through predefined interfaces. Such a design strategy guarantees the modularity of the system, ensuring that modifications or expansions in one layer don't adversely affect the others, thereby significantly enhancing the system's stability and maintainability[9-10].

3.3 Implementation of Main functions

The main functionalities of the system are implemented in different modules. Here is an overview of how these functionalities are realized:

Resource Management Module:

```
from flask import Flask, request
app = Flask(__name__)


@app.route('/upload', methods=['POST'])
def upload_file():
    uploaded_file = request.files['file']
    if uploaded_file.filename != '':
        uploaded_file.save(uploaded_file.filename)
    return 'File uploaded successfully!'
```

The Resource Management Module handles the organization and management of digital resources, supporting the upload and categorization of various types of resources such as images, audio, and videos. It also involves metadata tagging, extraction of attributes, and full-text content analysis to facilitate resource management and retrieval. Resources are organized modularly and hierarchically, enabling users to quickly locate the resources they need. This module provides structured and rich resource support for teaching.

Teaching Process Management Module: The Teaching Process Management Module is responsible for advancing online teaching according to the curriculum plan. Teachers can design teaching activities, specify the timeline for online teaching, publish various types of assignments (e.g., design assignments, reading reports), and manage assignment completion. The system supports automatic grading, such as testing programming assignments with test cases, as well as manual grading with teacher feedback. It also includes in-process knowledge assessments and surveys to enhance the control of online teaching processes. The system automatically maintains student learning process data, providing feedback for teaching.

Communication and Interaction Module:

```
questions = []
```

```python
@app.route('/ask-question', methods=['POST'])
def ask_question():
    question = request.form['question']
    questions.append(question)
    return 'Question submitted!'


@app.route('/view-questions', methods=['GET'])
def view_questions():
    return '\n'.join(questions)
```

The Communication and Interaction Module offers a platform for online communication. It supports features such as teacher Q&A and student question submission. Students can ask questions during their learning process, and teachers provide answers. The module also includes a forum function, allowing students to discuss and share their learning experiences. Teachers can participate in discussions and provide guidance. The system maintains records of teacher-student interactions, enabling traceability in the teaching communication process. These interactive features enhance communication between teachers and students, ultimately improving the learning outcomes.

4 System Application Effect

4.1 Overview of Application

After the completion of the development of this online aesthetic education auxiliary teaching system, we selected two representative majors from our school for pilot application to better verify its functions and make minor adjustments based on real-world scenarios. During the pilot application, we ensured that there was a high level of communication and collaboration between system developers and frontline teachers. This close collaboration allowed us to adjust the system more specifically to meet the genuine needs of teaching, guaranteeing greater system applicability and practicality. Through this collaborative approach, the system was not only refined but also, upon the conclusion of the pilot phase, it was formally adopted as a network teaching tool within these two majors. The robust functionalities of the system support teachers in constructing rich online course content, effortlessly organizing and managing online teaching activities. Meanwhile, students can easily access and learn from various digital resources provided by the system, submit their online assignments, and engage in online discussions with peers and teachers. This design significantly enhances the interactivity and participation of learning. After a series of pilot tests, adjustments, and optimizations, the system has not only demonstrated its suitability for online aesthetic education but has also been widely accepted by a majority of teachers and students, yielding positive practical outcomes. The development and application of this system mark the entrance of our school's online teaching into a new, more efficient, and interactive phase, laying a solid foundation for future developments.
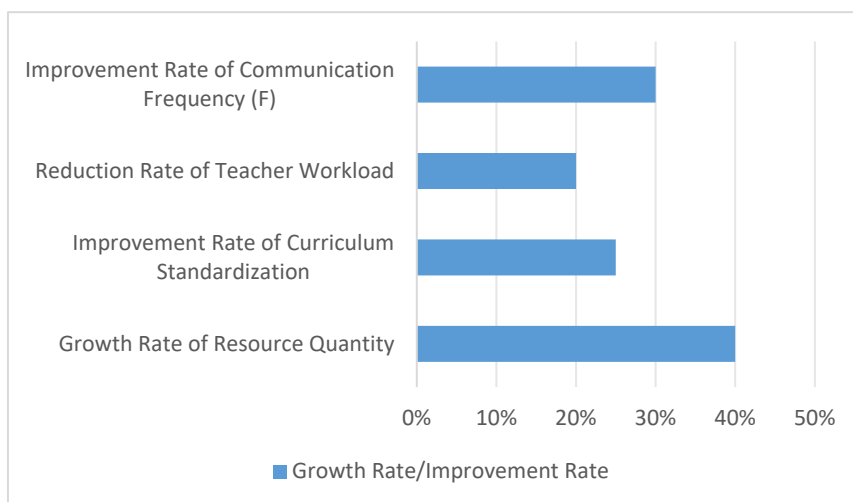
4.2 Effect Analysis

FIG. 1 Effect analysis diagram

Through the analysis of the application effect of the system, it can be seen that, as shown in Figure 1, the network aesthetic education auxiliary teaching system has played an important role in many aspects. First of all, the system integrates rich digital teaching resources, which have increased by 40% compared to before, and the formula is as follows:

$$R = \frac{A-B}{B} \times 100\% \tag{1}$$

Where R represents the growth rate, A represents the amount of resources after application, and B represents the amount of resources before application.

This not only expands the type and number of resources, but also makes it easier for students to access the learning materials they need. Secondly, the system realizes the process of network teaching management, and the standardization of teaching plans and homework links is increased by 25%, which significantly reduces the workload of teachers, specifically by 20%. In addition, the system also provides online question-and-answer and forum functions, and the communication frequency between teachers and students has increased by 30%. The formula is as follows:

$$F = \frac{X-Y}{Y} \times 100\% \tag{2}$$

Where, F represents the increase rate of AC frequency, X represents the AC frequency after application, and Y represents the AC frequency before application.

5 Conclusion

The proliferation and advancement of internet technologies have ushered in a revolutionary change in the field of education, paving new avenues for instructional innovation. Against this

backdrop, and in response to the myriad challenges and issues prevalent in aesthetic education, this study adopted cutting-edge design principles to systematically develop an online-assisted instructional system. This system not only establishes a comprehensive and detailed digital resource library but also optimizes aesthetic education through the formulation of online teaching procedures and by providing an accessible platform for communication. More specifically, the application of this system significantly enhances the variety and quantity of educational resources, streamlines the instructional management process, and offers a smoother channel of interaction between educators and students. This not only boosts instructional efficiency but also substantially elevates teaching outcomes and the overall student learning experience. However, despite the marked innovation this research brings to its field, we recognize that the system's degree of intelligence and adaptability still leaves room for enhancement, indicating directions for future development and optimization. In summary, through the system design and real-world application in this study, we have successfully achieved the objective of harnessing internet technologies to provide informational support for aesthetic education, and the anticipated educational results have been realized, laying a solid foundation for the further evolution of modern educational technology.

Reference

[1]Qi S , Yinghao G , Li M .Thinking on the Construction of Intelligent Construction in Applied Colleges and Universities under Double Cycle Based on BIM Technology[C]//International Conference on Big Data and Informatization Education.IEEE, 2021.

[2]Huang X , Huang X , Wang X .Construction of the Teaching Quality Monitoring System of Physical Education Courses in Colleges and Universities Based on the Construction of Smart Campus with Artificial Intelligence[J].Hindawi Limited, 2021.

[3]Wang X .Construction of Civil Engineering Teaching System Based on Data Mining Algorithm and Big Data Technology[J].Journal of Physics: Conference Series, 2021, 1852(3):032022 (6pp).

[4] Manera L .Art and aesthetic education in the Reggio Emilia Approach[J].Education 3-13, 2022, 50(4):483-493.

[5] Fuhuan M O .On Aesthetics Teaching Reform in Colleges and Universities under the Influence of Non-mainstream Culture[J].Journal of Liuzhou Teachers College, 2011.

[6] Smith R A .Aesthetic Education: Questions and Issues.[J].Arts Education Policy Review, 2004, 106(January):16.

[7]Huang X , Huang X , Wang X .Construction of the Teaching Quality Monitoring System of Physical Education Courses in Colleges and Universities Based on the Construction of Smart Campus with Artificial Intelligence[J].Hindawi Limited, 2021.

[8]Gu L , Cai M , Zhu L ,et al.Enlightenment of China University MOOC on the Construction of Network Teaching Platform in Colleges or Universities[J].   2021.

[9]Thomas,Adam,Regelski.Resisting Aesthetic Autonomy: A "Critical Philosophy" of Art and Music Education Advocacy[J].The Journal of Aesthetic Education, 2019, 53(2):79-101.

[10]Nler E , Zembat R .Examining the Effects of Aesthetic Education Program on Aesthetic Judgment Development of Five-Year-Old Children[J].Asian Journal of Education and Training, 2019, 5.