

# Design and Research of Data Visualization Teaching System Based on Web

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**Abstract:** With the in-depth development and widespread application of educational informatization, digital education has also become one of the important features of educational modernization. Designing and completing a visual teaching system based on Web technology is of great significance for promoting further reform and development of teaching, especially for achieving remote education, which has great application value. Based on visual teaching needs analysis and B/S architecture, effective system development is achieved through Access database. According to the specific needs of teaching functions, the system can be divided into multiple modules, and the management and login of teaching resources for users can also be smoothly achieved. This has important research value for achieving the goal of remote visualization of teaching.

**Keywords:** Web; Data Visualization; Distance Education; Teaching System Design

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## 1. Introduction

Remote education is a teaching mode based on computer and network communication technology. This teaching mode is of great significance in improving the uneven distribution of educational resources and is one of the important trends in future education development. At present, web-based remote education is becoming increasingly widely used in remote education due to its advantages such as flexibility, convenience, and reliability. This educational method effectively breaks through traditional time and space limitations, making learning and knowledge acquisition easier and easier. Building information transmission channels through network platforms, we can achieve resource sharing, make communication between teachers and students easier, and continuously improving the efficiency of interactive learning, which can overcome time and space constraints, promote teaching development and optimization<sup>[1]</sup>.

## 2. System requirements analysis

The design of a web-based digital visualization teaching system, with the web development technology of the NET platform as the core and the Access database as the system storage unit, can effectively meet the needs of system development and design. To achieve the economic efficiency of the development and design of this teaching system, effective system development can be carried out based on the existing relevant equipment of the school and the principle of cost saving<sup>[2]</sup>. This digital visualization remote education system is mainly used for teaching scenarios. Considering the potential problem of using a huge amount of data in remote education, it is necessary to solve the problem of many learners learning online at the same time. Therefore, it is necessary to promote the continuous improvement of data storage capacity to meet the needs of a large number of simultaneous online learning. In addition, this teaching system also needs to meet the basic requirements of system stability and fast response.

## 3. System module design and implementation

### 3.1 Main modules of the system

Based on the actual needs of data visualization teaching system design, the corresponding functional modules of the teaching system are designed, which mainly include five modules: user login module, background management module, teaching resource

module, test management module and teacher-student interaction module.

## **3.2 Module function implementation**

### **3.2.1 Implementation of system login module**

The system login module is an important part of system design, which can ensure that users cannot illegally enter the system without authorization, ensuring system security. This is also a problem that must be solved in the login module design. In the login module of the teaching system, the main requirement is to meet the login needs of teachers and students. Therefore, it is necessary to distinguish between them through category selection in the login page design to ensure that teachers and students can jump to the corresponding login interface and perform corresponding operations. After selecting the login category as either a teacher or a student, we can enter the system's original account and password to successfully log in to the system and perform corresponding operation permissions. Generally, students log in with their own student ID as their account, and their password has initial settings. After logging in as required, students can modify their password on their own. The username for teachers to log in needs to be set by themselves, and the password is the same. After completing the first setting, the next login can directly enter the system interface. After students and teachers log in to the system, there are also certain differences in the corresponding operating permissions. When teachers log in to the system, they can view students' message information and respond accordingly. They can also view relevant teaching resources, test questions, etc. according to their own needs, manage student grades, publish homework, view homework completion status, and modify, delete, and add student related information. This can be done according to actual needs. After students log in to the system, they can search for and download resources based on their specific learning needs. They need to complete homework tasks according to the teacher's assigned requirements and submit them to the system. The teacher can grade and grade the homework in the background. After completion, students can log in to the system again to view their homework grades, correct any errors in a timely manner, and leave a message in the message bar, we can also view the message information of other students.

When the user logs in to the system, the system will use the effective connection between the OLD building and the background database to confirm the user's path and query the user account independently. In the database comparison, if corresponding account information is found, the user can log in to the system smoothly. If there is no corresponding account information, the system will prompt the user to register the account and set a password.

### **3.2.2 Implementation of background management settings module**

This module is mainly designed for the background administrator. This module can meet the daily maintenance and upgrade needs of the background administrator for the teaching system, and facilitate the administrator to carry out relevant system management operations, so as to ensure the normal and orderly operation of the system, and formulate system operation rules.

### **3.2.3 Implementation of reaching resource management module**

This module features both teachers and students, providing necessary resource support for education and learning. In the teaching resource management module, users can upload or modify relevant teaching resources through this module, and students can browse relevant teaching resources through the teaching resource module. In combination with the teaching task arrangement and requirements of teachers, they can do a good job in searching and downloading relevant preview resources, learning resources, and completing the corresponding preview and consolidation review after class. Relatively speaking, teachers have more authority in this module. Teachers can also use the teaching resource management function to realize the work of lesson preparation and teaching design before class, and provide necessary support for online distance teaching.

### **3.2.4 Implementation of test management module**

The purpose of conducting testing management is to enable remote teachers to timely grasp students' online learning situation, understand their effectiveness in teaching and learning related courses, and optimize teaching design and make reasonable adjustments to teaching methods based on students' learning status, progress, and grades. With the help of test management, students can also be aware of their own learning shortcomings in a timely manner, and do a good job in identifying and filling in relevant classroom learning content. Through specific test management, teachers can publish and manage test content in corresponding modules, as well as log in, input, and view students' academic performance. Student users can use online testing in the classroom or online learning after

class to effectively review classroom knowledge and consolidate teaching content.

### **3.2.5 Implementation of teacher-student interaction module**

This module is mainly for the convenience of interaction and discussion between teachers and students in class and after class. Teachers can realize real-time communication with students through teacher-student interaction in this module, view and browse students' messages, while students can also use this module to put forward their own open opinions and views on classroom teaching content, and can also ask questions about their difficulties and problems in learning. Teachers can respond online in a timely manner, which can play an important role in promoting effective communication and interaction between teachers and students.

### **3.3 Database design**

In the design of the teaching system, the database is an important basis to ensure visualization. Effective education resource management is achieved through the MS Access database. At the same time, based on the need to save the system's user account information, the database module information includes a variety of basic user information, homework information, examination information, etc. In administrator information, the basic information of the system administrator is entered into the database, which can generally be completed before system development. This task sets the highest system permissions for administrators to facilitate their overall management and control of the system. The input of information related to teachers and students is done after the system is operational, after they create accounts and log in to the system, they independently input the information and save it to the database system.

### **4. System debugging**

The data visualization distance learning system designed for this time is debugged mainly by using PROTEUS software for simulation debugging to verify whether the corresponding system design meets the requirements. This type of simulation and debugging software can simulate the corresponding operation of the system, analyze and simulate the internal and external circuit states of the system, verify the effectiveness of system use, timely identify faults and problems, prompt for improvement, and determine the reliability of system design. Through the debugging of the data visualization distance learning system designed this time, no obvious problems were found in the operation, which indicates that the system design is effective. In subsequent use, if problems are found, they can be modified and improved in a timely manner.

### **5. Conclusion**

The research on data visualization teaching is based on the specific teaching needs. Through the application of web technology, the B/S architecture is constructed to provide support for the realization of visualization teaching. Design user login, background management, teaching resource management, test management, teacher-student communication and other functional modules according to the needs of different users. Through the design and application of web data visualization teaching system, and effectively reflect the advantages of network teaching, in order to promote the construction of digital classroom, and provide effective support for distance education.

### **References**

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