Visualized Teaching Management System Based on Model Library and Knowledge Base

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Abstract. The paper discusses a visualization-based teaching management system that is founded on a model repository and a knowledge base. This system is designed to enhance student learning outcomes and teaching efficiency by integrating a variety of educational resources to provide real-time diagnostics, personalized education, and instructional feedback. The objective of the research is to develop a new teaching management system that utilizes model repositories and knowledge bases for the visual management of educational resources, thereby offering a more comprehensive educational experience to both teachers and students. The significance of this research lies in its ability to improve the accessibility and manageability of educational resources, aiding teachers in better managing these resources to meet the individualized learning needs of students more effectively. This paper is primarily based on artificial intelligence and data mining technologies to develop this visual educational management system. It uses model repositories and knowledge bases to integrate educational resources and has designed adaptive learning and real-time diagnostic modules to provide a better learning experience and instructional feedback. In the development process, it is first necessary to analyze and categorize teaching requirements to provide different types of students with various learning resources. Then, a programmatic approach is adopted to manage educational resources for better visualization. Correspondingly, machine learning and artificial intelligence technologies are employed to analyze and diagnose students' learning conditions, helping them to better understand the learning process and rapidly improve their learning outcomes. The research results indicate that the developed education management system based on model repositories and knowledge bases provides improved management of educational resources, student learning diagnostics, and adaptive learning, effectively enhancing students' learning and educational outcomes. Therefore, it is concluded that the visualization-based teaching management system, grounded in model repositories and knowledge bases, has a broad application prospect and is poised to exert a positive impact on the improvement of the educational sector.

Keywords: Model library, Knowledge base, Visualization, Management system.

1 Introduction

1.1 Research Background and Significance

With the development of the times, education information has also been continuously innovating. Teaching methods and content have also changed in the process of innovation [1]. Modern management in schools and other related institutions uses knowledge models and knowledge bases to save time for students in the learning process and improve students' learning efficiency [2]. Therefore, the establishment of models has become a hot topic in the era, and according to

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the comparison between traditional and modern education models, it can be concluded that today's campus is a relatively large network database. The entire database is not only composed of course libraries, but the quality of students and equipment also plays a major role in the education field. Therefore, in the future, attention still needs to be paid to the implementation of education model technology.

1.2 Research Status and Development Trends at Home and Abroad

So far, most universities in China have adopted digital teaching models, and the management status of universities is relatively prominent. The problem of immature technology caused by starting late is a problem that needs to be solved.

For some management experiences, foreign universities can be used as a reference. Compared with China, foreign universities have relatively mature conditions and have a lot of experience worth learning. The education in foreign countries started earlier, and some management concepts are worth learning. Web2.0, which is widely accepted, also comes from this, but China's Web2.0 is still in its infancy, and more information needs to be studied in the future.

The current research process is still based on the classification of data knowledge bases, focusing on a specific problem as the core of the research. Therefore, it is necessary to propose better application of ideas and technologies for the methods involved in the teaching process, and to assist teachers in understanding students and managing them through some intelligent methods [3].

The research content of this paper is divided into two parts. First, the specific problem established, and second, the specific analysis of the module of the design technology applied to the specific object, and finally, the model library is visualized.

2 Visualized Teaching Management Knowledge Representation Based on Model Library and Knowledge Base

2.1 Ontology-based Visualized Teaching Management Knowledge Modeling

Ontology-based visualized teaching management knowledge modeling is the most widely used and practical method for teachers in the process of education informatization. It converts complex problems into simple and easy-to-understand and memorable ones [4].

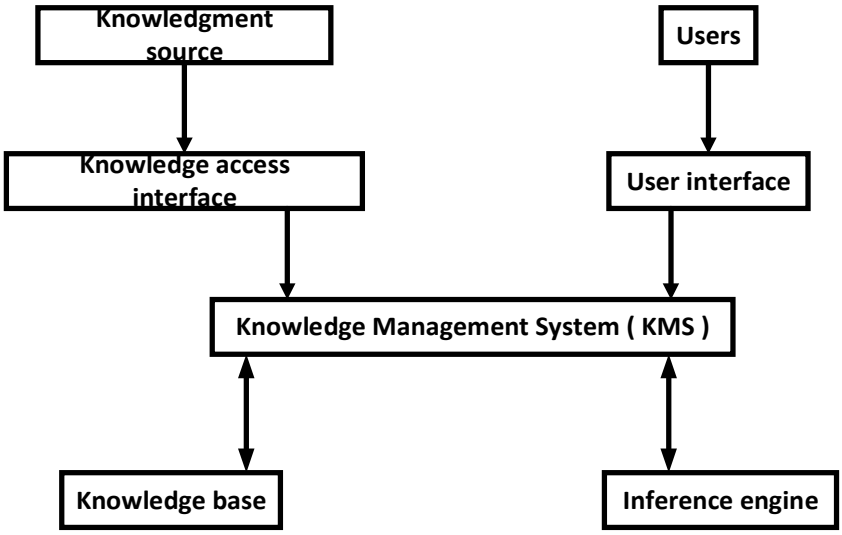

Fig. 1. Basic model of knowledge base

There are many examples in this system that can be used as template libraries for reference, such as:

(1) Abstract and Generalization;

(2) Intuitive Thinking Algorithms;

and other high-level visualization modeling technologies, which are effective tools and means for knowledge management based on ontology models and are also a way to provide guidance for other methods [5].

Ontology-based visualized teaching management knowledge modeling is a process of data calculation, storage, and analysis based on course requirements and students' actual situations. In the specific design process, relevant data storage, processing, and analysis need to be carried out according to the students' situation [6]. Data processing, including storage and queries, is mainly done using the software as shown in Fig. 1.

2.2 Detailed System Function Design

To meet the needs and requirements of the system, the following principles should be followed in the system design as shown in Fig. 2:

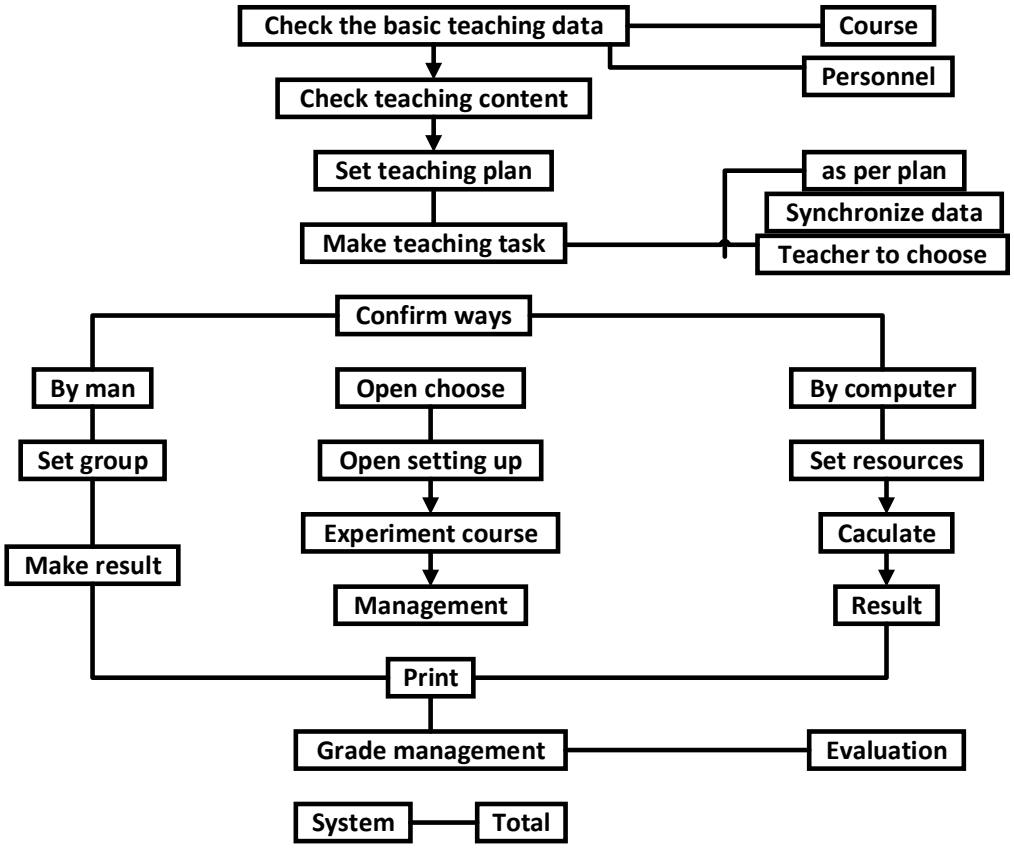

Fig. 2. Overview of Detailed System Function Design

- Modular design: The system should be divided into different modules for easy management and maintenance.
- User-friendly interface: The interface should be easy to use and understand for both teachers and students.
- Real-time data update: The system should update and display data in real-time to reflect the latest information.
- Personalized learning: The system should provide personalized learning resources and feedback based on the students' learning progress and needs.
- Data security: The system should prioritize data security and prevent unauthorized access to student information.
- Adaptive learning: The system should provide adaptive learning based on student performance and feedback, adjusting the difficulty and pace of learning accordingly.

(1) Simplicity: For a software, it generally consists of several parts. First, the interface should be clear and easy to operate. Second, the program code should be as minimal and redundant as

possible. Third, the input and output devices must have high requirements for fault tolerance, readability, and reliability. Fourth, the input and output channels should ideally meet users' needs for functionality and performance [7].

(2) Compatibility and universality principle: The system should have a friendly and easy-to-expand and maintainability [8].

3 Implementation of Visualized Teaching Management System Based on Model Library

3.1 Overall System Architecture

The system in Fig. 3 mainly adopts the B/S structure, and the three-tier architecture is used for accessing the database. First is the data management module. It includes information resources such as usernames, passwords, and permissions. Second, the program is developed using the C language development tool. Third, the process implementation layer: this interface consists of the main control page module, course creation function module (selecting question bank), and process control operation module. The progress control class mainly introduces the running results and achievement analysis methods of the knowledge points in this chapter and provides corresponding processing suggestions [9]. Finally, the effect is evaluated. Evaluation is an analysis of the effect results, that is, whether the expected goals have been achieved in this interface.

3.2 Relationship between Model Library and Knowledge Base

First, the model library is the data stored in the knowledge base.

Second, theoretically speaking, an excellent case must have a certain quantity and quality of basic database support to truly achieve its function (i.e., management information system); it also needs to have high-level, completeness, and good maintainability. Therefore, it is enough to build a basic model based on the knowledge base and be able to apply it in practice, but if these basic conditions are not met in practice, the stored data cannot be effectively used to solve the problem [10].

In the model library, the type and quantity of data are determined by the database. Therefore, it is very important and meaningful to establish a visualization system based on the knowledge base. At the same time, it is also necessary to ensure that the stored information has some differences from the actual needs (i.e., different levels, different content), and it should have strong logical relationship capabilities to truly achieve this functional module.

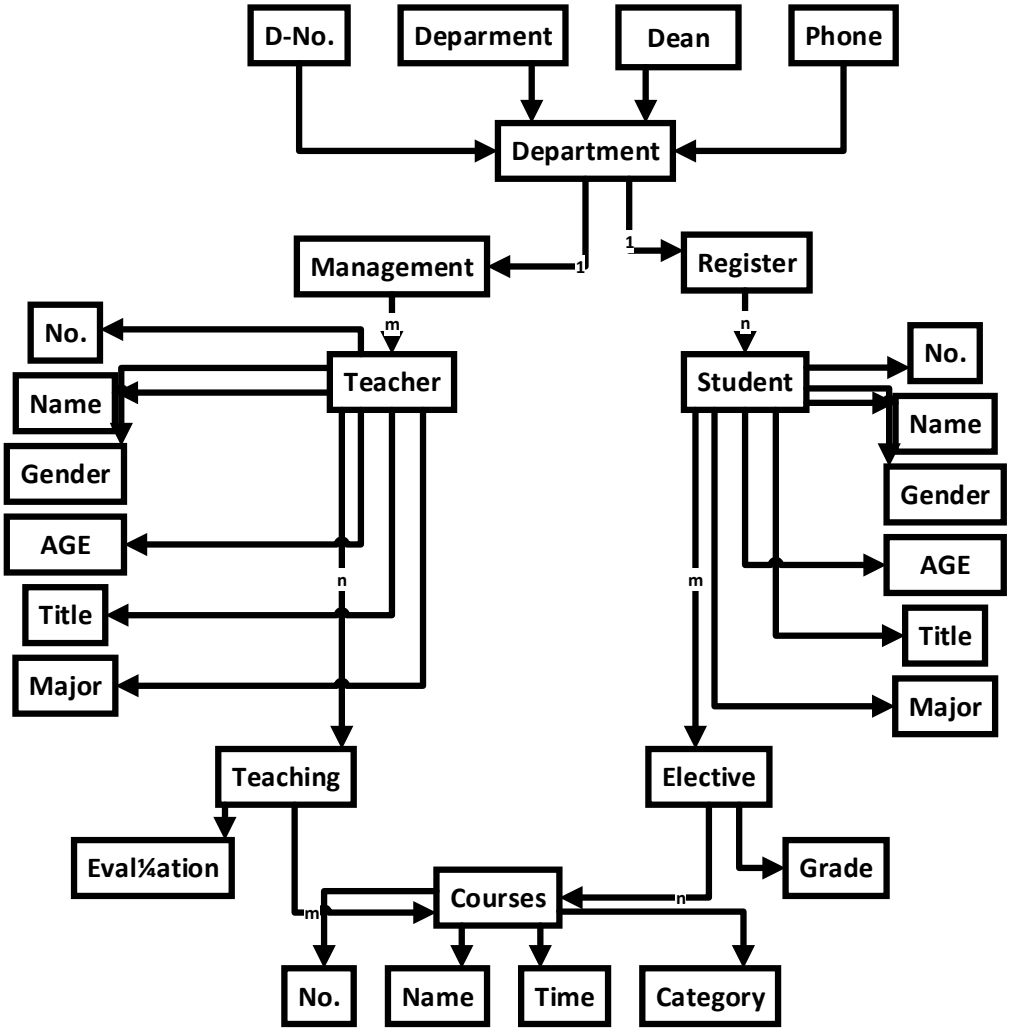

Fig. 3. Overall framework

4 Design and Development of Visualized Teaching Management System Based on Model Library

4.1 System Overview

This system is a visualization teaching management system based on SYB2012 and knowledge base library. Using this software, users can manage students, teachers, and other resources, and also record all content into the database as shown in Tab. 1.

(1) Function modules: First, the basic course resources are classified according to the course

category, and different types of schedules are allocated to each classroom to generate the required textbooks for each subject to learn or master. Second, the sharing of teacher course resources and textbook knowledge is achieved, allowing teachers to learn other relevant basic theories outside of the schedule. Finally, management is divided according to different types of classes [11].

(2) Relationship module: The main functions include the following aspects:

Tab. 1. System design diagram

	Module name	Main classification	Sub-cassification	Module link	Status
2191	terminal type distribution	System management	Terminal Service	.0stat/index/onpie	Valid
2192	Member purchase situation	System management	Member Service	/Stat/index/onlime	Valid
2193	Member purchase type	System management	Merber Service	Stat'column/on-stacked	Valid
2194	Box activation statistics	System management	Terminal Service 2.0	/StatJIindexfonline	Valid
2195	User login statistics	System management	Member Service	/Stat/index/oniine	in-alled
2196	Wechat statistics	System management	Member Service	/Statindex/online	Valid
2197	Classification statistics	System management	Video Service	/Stat/indeonpie	Valid
2198	Storage statistics	System management	Video Service	/Stat/index/onpie	Valid
2199	New statistics	System management	Video Service	/Stat/index/onlime	Valid
2200	Application statistics	System management	Video Service	/Stat/indexfonpie	Valid

The system design includes two main aspects:

Query relationship: It includes retrieving class-related information and finding connections between teaching content and students based on their student IDs.

Auxiliary association rule library system: This application supports the SYB2012 course resource library, textbook knowledge database management system, and other related basic data storage and operations. Secondly, it assigns different textbooks according to the course category and generates schedules for each subject. Finally, teachers can manage classes, query grades, and add knowledge points for students [12].

The system adopts the B/S structure.

4.2 Model Library Establishment

The establishment of the model library is mainly based on actual teaching needs, combined with specific databases, to abstract and dataize the research content as shown in Fig. 5.

For course management, the most fundamental and core aspect is the student learning environment and knowledge. Therefore, in this system, the "pre-class preview-classroom Q&A-teacher-guided learning-problem summary" method is adopted [13]. The first step is to check the student situation and prepare related question banks at the beginning of each class. The second step is to follow the teaching materials, teaching outlines, and then summarize and draw conclusions [14].

In actual classroom teaching, teachers can use the following methods to establish a model library:

1. Design question banks based on student situations.

2. Use post-class assignments.

3. Store the questions as knowledge points (such as "course learning booklets" and "theme activities") in learning tools and toolboxes.

4. Solve relevant problems by completing exercises through setting questions (for example, placing the questions directly on paper media to listen to) or inputting relevant information on documents.

5. Use SPSS 6.0 to summarize all questions and store them in the corresponding knowledge points of the model library for students to understand [15].

To modify the model library, the number of questions can be increased on the basis of the original, and corresponding auxiliary questions can be added to solve these problems [16].

5 Conclusion and Future Work

In conclusion, this study aimed to improve the efficiency of teaching through the use of modern network technology and the establishment of a scientific, practical, and effective knowledge

database system. The analysis and sorting of relevant literature on teaching resource database models and knowledge database design at home and abroad have revealed the challenges of large and diverse data volumes, incomplete or inaccurate teaching materials, and insufficient understanding of the teaching process.

To address these challenges, this study proposed the following strategies: 1) the use of modern network technology to achieve interactivity between school subject curriculum construction and student learning processes [17], and 2) the establishment of a scientifically reasonable, practical, and effective knowledge database system that includes data analysis, processing, and statistical work to ensure the sharing and higher visual degree of data information resources [18].

Overall, this study contributes to the development of a more efficient and effective teaching system. However, there is still room for improvement, and future research could focus on optimizing the knowledge database system and exploring additional methods to improve teaching efficiency.

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