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Student-Centered Learning Environment Based on Multimedia and Intelligent CAD Tutoring Systems

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Abstract. Student-centered comprehensive and healthy development means that in the process of education, students' physical and mental healthcare and personal growth are put in the first place, and comprehensive measures are taken to promote the balanced development of students in all aspects, such as physical, mental, emotional, social and intellectual. How to effectively improve the overall teaching quality and level of higher education has become an urgent problem for colleges and universities in our country. In order to build a student-centered learning environment, this paper uses big data technology to improve multimedia technology and establish a VMP multiobjective planning model. Moreover, this paper introduces the resource similarity and affinity model used in solving goal planning. The multimedia data analysis system constructed in this paper can visualize teaching resources, make students become the center of teaching, and effectively enhance students' sense of immersion. In addition, this paper combines the status quo of university teaching to construct a functional structure of a student-centered learning environment. Finally, this paper verifies the effect of this paper through experimental research. From the research results, it can be seen that the student-centered multimedia teaching system constructed in this paper has a good effect.

Keywords: Multimedia big data; CAD Tutoring Systems; learning center; learning environment;
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1 INTRODUCTION

With the innovation of Internet technology, online education has been continuously developed, and consequently, the cost of national education has become lower and lower, educational channels have become more convenient, educational resources have become more abundant, and educational thresholds have become lower and lower. Therefore, the launch of online education has not only greatly improved the educational opportunities of the people but also greatly reduced the national education expenditure, which is also the main reason why online education has become more and more popular. In classroom teaching at home and abroad, the network is used as an important teaching tool in the teaching process, and network teaching equipment such as electronic whiteboards, computers, and even tablets are gradually being favored by education workers. Teaching is no longer confined to the classroom, teaching content is no longer confined to the knowledge reserve of teachers, and teaching methods are no longer confined to traditional lectures. However, teaching in an information environment is not only the inheritance of traditional teaching but also the exploration and construction process of teaching design in a technical environment, as well as the "integration process" between the structural components of various instructional designs and technical application conditions [16].In the process of "integration," network teaching design as the "software" that affects the quality of network teaching plays a vital role, and it is of great importance in promoting the development of network teaching [20].

Teaching design includes teaching content, teaching media, teaching content, teaching strategies, and so on. However, from the above, many contradictions need to be resolved, and it can be seen that the reform of teaching strategy design is particularly important. As an important part of instructional design, instructional strategy is systematic decision-making, taking into account the organization of various elements in instructional design and the selection and application of various teaching modes and teaching methods. Therefore, the research on network teaching strategy has certain theoretical and practical help for the development of network teaching design [3].

Looking for a network teaching strategy design suitable for the current goal of talent training has become the starting point of this article. But what is the concept of talent training in the information age? How can we combine the concept of talent training with the design of network teaching strategies? These questions need to be answered in the research process. The core concept of modern distance education, "student-centered," is now recognized by more and more researchers and teaching workers, but in the field of education, the true meaning of "student-centered" is still worth exploring. "Student-centered" is essential to answer the question of the concept of talent training in the information age, but it cannot be just a slogan or a trend of thought "hanging in the air." The concept needs to be implemented, and the core values need to be used to guide the design of teaching strategies and implement the teaching ideas in the teaching process.

With the continuous development of computer technology, the United States has gradually begun to use multimedia teaching models to replace traditional teaching models. Later, the development direction of multimedia teaching forms showed a diversified trend, such as computer-assisted teaching, computer-assisted training, and computer management teaching. The use of multimedia teaching methods has greatly improved the teaching quality of teachers, effectively promoted the subjective initiative of students' learning, and significantly enhanced students' absorption of the knowledge they have learned. The management of multimedia classrooms relies more on the popularization and use of management information systems, especially in Western countries such as the United States, which have adopted feature-rich management information systems to manage multimedia classrooms, multimedia equipment, and other related resources.

This article combines multimedia technology and big data technology to construct a student-centered learning environment based on multimedia big data analysis to improve the existing teaching model and improve teaching effects.

2 RELATED WORK

The literature [17] believed that in the past two decades, the way of teaching and learning in higher education has undergone fundamental changes. On the one hand, it is shifting from teacher-centered to student-centered, and on the other hand, it is shifting from a traditional classroom to a virtual classroom. The literature [18] adopted the interview method to interview students and teachers in terms of learning motivation, interest, course content, learning environment, and adaptability, and the similarities and differences between their opinions were presented. In the field of information and communication technology, rapidly changing subjects require frequent curriculum revisions, making students unsure of their curriculum content. Moreover, teachers are not sure how to meet the learning needs of students and to be student-centered, and the teaching mode enhanced by information technology affects the teaching practice and the way students accept learning [21]. The literature [4] shows that it is difficult for teachers and students to achieve the ideal education model, and there is a tension between the expectations and behaviors of teachers and students. When teachers operate within the time and space constraints of physical campuses, they seem to be trapped in a teacher-centered model. At the same time, an online learning environment must be provided. When students realize learning through the increasingly developed learning environment of communication technology, they are often more willing to choose independent learning, away from the guidance and influence of teachers [2]. By requiring students to take more responsibility for their learning, it is seen that online technology can promote student-centeredness, but the way students choose to use it seems to conflict with this core principle of student-centered learning. The research conclusion shows that universities need to work hard to solve the difficulties faced by students and teachers under the student-centered education model and the continuous enhancement of information technology [8]. The literature [5] proposed that teachers should change their mentality when facing technology teaching and concluded that information and communication technology education has only achieved limited success. Moreover, it explored teachers' attitudes towards pre-employment education in South Africa using ICT. The literature [13] believed that teachers are designers, and students are their main clients. Moreover, it integrates a multi-faceted approach, proposes six aspects of understanding, and combines with curriculum reverse design to provide a powerful and practical framework for curriculum design, evaluation, and guidance. The literature [19] pointed out that learning goals are used by learners to express what they expect to achieve and how they will prove the achieved achievement. Moreover, it summarized the curriculum design of the development of higher education in recent decades and designed a user-friendly method for setting curriculum learning goals based on the latest practical experience. Regarding learning feedback, the literature [15] studied how to help students control their own learning so that they become self-regulated learners and put forward seven principles for how students can get better feedback. In order to provide timely guidance when students cannot complete the requirements of college teachers in the learning process, the literature [23] proposed a mental map model. This model is used to assess the degree of consistency between theoretical learning and higher education and its support, and a framework is proposed in this model that highlights the key role of student practice and feedback. Regarding learning evaluation, literature [6] believes that formative evaluation can effectively monitor student learning. One of the goals of higher education is the development of learner autonomy so that students can become effective and efficient learners with lifelong learning abilities and the ability to participate actively in the development of a knowledge society. Literature [9] believes that the use of a learning management system is conducive to promoting the transformation of education and teaching from teacher-centered to student-centered. Through the investigation of undergraduates, the formation of self-evaluation can stimulate and improve students' performance. The results show that the academic achievement of students who conduct self-evaluation is higher than that of students who do not conduct self-evaluation , so the teaching evaluation tool can be used as a monitoring tool for teachers and students.

3 MULTIMEDIA BIG DATA ALGORITHM

This article uses multimedia big data technology to improve the processing effect of teaching resources. Considering QoS constraints, in order to facilitate the measurement of QoS, this paper establishes a QoS utility function that maximizes the overall QoS utility value as the goal and establishes a VMP multiobjective planning model. Moreover, this paper introduces the resource similarity and affinity model used in solving the goal planning [22].

If there are m VMs and n PMs, we use vi to express the i-th virtual machine, and pj to express the j-th physical host. If it is assumed that there are kinds of standardized resources, it is expressed as $p_j^1,\ldots,p_j^s$, $p_j^k \in 0,1$.

The goal is to minimize the PM resources used (formula (1)). The resources of each dimension should comply with the resource capacity constraint (formula (2)) with a probability greater than 1-ɑ.xij, which is a boolean variable that represents whether the virtual machine vi can be allocated to the physical machine pj. If vi is assigned to pj, xij is equal to 1, otherwise equal to 0 (formula (5)). Formula (3) indicates that the virtual machine must be deployed on a host, and yj indicates whether pj is used as the host of at least one virtual machine (formula (4)). If pj is used, yj is 1, otherwise it is 0 (formula (6)). This is a goal programming problem. The problem is formalized as a mathematical programming MP [14]:

$$min \sum_{j=1}^{n} y_i \sum_{k=1}^{s} w_k p_j^k \tag{1}$$

$$P\left[\sum_{i=1}^{m} x_{ij} v_i^k > p_j^k\right] \leq \alpha; k = 1,\ldots,3; j = 1,\ldots,n \tag{2}$$

$$y_i \geq (\sum_{i=1}^{m} x_{ij}) \,/\, m; j = 1,\ldots,n \tag{3}$$

$$\sum_{i=1}^{n} x_{ij} = 1; i = 1,\ldots,m \tag{4}$$

$$x_{ij} \in \{0,1\}; i = 1,\ldots,m; j = 1,\ldots,n \tag{5}$$

$$y_i \in \ 0,1 \ j = 1,\ldots,n \tag{6}$$

When considering the attributes required by the QoS of the service s, it is represented by the attribute vector $qs = \ q_1 \ S \ , q_2 \ S \ ,\ldots, q_Q \ S \quad S = \ s_1,\ldots,s_l$ .Similarly, all the attribute vectors of the set S containing I types of services can be expressed as: $QS = \ q_1 \ S \ , q_2 \ S \ ,\ldots, q_Q \ S \quad S = \ s_1,\ldots,s_l$ The QoS aggregation functions of the services are listed in formulas (7)-(9).

$$\text{Response time:}\ q \ S \ = \max_{i=1}^{l} q \ s_i \tag{7}$$

$$\text{Throughput:}\ q \ S \ = \sum_{i=1}^{l} q \ s_i \tag{8}$$

$$\text{Reliability:}\ q \ S \ = \min_{i=1}^{l} q \ s_i \tag{9}$$

Each service involves multiple QoS attributes, and each has different units or ranges, which makes it difficult to represent global QoS. Therefore, we need to design a QoS utility function to map the qs in the QoS vector to an actual value. In addition, we consider that the data center is composed of n servers, denoted as $PM = \ p_1, p_2, \ldots, p_n$, where m VMs are deployed, denoted as

$VM = v_1, v_2, ..., v_m$. A service will be realized through the installation of a VM, and this virtual machine should meet certain resource requirements and QoS constraints. We use the QoS utility function to normalize all attribute values and define the unified calculation of multi-dimensional QoS attributes according to the server, as shown below[7].

Assuming there are Q QoS attributes, the i-th service s; running on the VM of the j-th server p, then the QoS utility function definitions of all services S are defined in formulas (10)-(12).

$$U\ s_i = \sum_{k=1}^{Q} \frac{Q_{j,k}^{\max} - q_k\ s_i}{Q_{j,k}^{\max} - Q_{j,k}^{\min}} \omega_k \tag{10}$$

$$U\ S = \sum_{k=1}^{Q} \frac{Q_{k}^{\max} - q_k\ S}{Q_{k}^{\max} - Q_{k}^{\min}} \omega_k \tag{11}$$

Among them,

$$\left.\begin{array}{l} Q_{j,k}^{\max} = \sum_{k=1}^{Q} Q_{j,k}^{\max}\ \ Q_{j,k}^{\max} = \max_{\forall s_i \in ps_j} q_k\ s_i \\ Q_{k}^{\min} = \sum_{k=1}^{Q} Q_{j,k}^{\min}\ \ Q_{j,k}^{\min} = \max_{\forall s_i \in ps_j} q_k\ s_i \end{array}\right\} \tag{12}$$

If the maximum resource required by the virtual machine is allocated, the cloud multimedia service can achieve satisfactory results when the virtual machine is running. Through formula (1) and formula (13), a multiobjective constrained optimization problem with resources and QoS as the target values in VM placement is established, that is, a problem of maximizing the overall QoS utility function and a problem of minimizing overall resource consumption (global QoS guarantee) [1].

$$Max \sum_{k=1}^{Q} U\ S \tag{13}$$

Therefore, it can be transformed into a formula (14).

$$Max \sum_{k=1}^{Q} \frac{Q_{k}^{\max} - \sum_{j=1}^{n} \sum_{i=1}^{m} x_{ij} q_k\ s_i}{Q_{k}^{\max} - Q_{k}^{\min}} \omega_k \tag{14}$$

According to QoS constraints and resource capabilities, the constraints that determine the allocation are satisfied, that is, the formula (15).

$$\sum_{j=1}^{n} \sum_{i=1}^{m} q_k\ s_i\ x_{ij} \le C_k, 1 \le k \le Q \tag{15}$$

Formula (15) indicates that the QoS aggregation value of all services must be less than the limit value.

From formulas (1) and (14), we find that resource consumption and QoS-aware virtual machine layout is an NP-hard problem. Finding the best virtual machine placement problem is considered to be an optimization problem.

If $v_i = \ v_i^1,...,v_i^k,...,v_i^s$ is used to represent the demand for resources of each dimension of virtual machine i, and $r_j = \ r_j^1,...,r_j^k,...,r_j^s$ is used to represent the remaining capacity of the resources of each dimension in physical host j at the current moment, then the similarity Sim(i.j) of PMj and VMi can represent the variance of the ratio of each dimension resource of VM to the remaining capacity corresponding to PM, expressed as formula (16) -(17) [11].

$$M = \frac{\frac{v_i^1}{r_j^1} + \frac{v_i^2}{r_j^2} + ... + \frac{v_i^s}{r_j^s}}{s} \tag{16}$$

$$Sim\ \ i,j\ = Var\ \ v_i^1 \,/\, r_j^1, v_i^2 \,/\, r_j^2 ..., v_i^s \,/\, r_j^s \tag{17}$$

If r(i,j) = 0, each dimension of vi is exactly proportional to each dimension of rj, and then they are most similar. Generally, the smaller r(i.,j) is, the more similar the remaining capacity of VM and PM is. Although "similarity" can be used to reduce the generation of resource fragmentation, it cannot reduce the peak of the total resource demand of the VM. To this end, the resource complementary relationship between VM and VM is used[10].

In actual scenarios, the resource usage of each VM has peak and peak periods. Good statistical multiplexing means that the peak value of one VM may be exactly the peak and valley of another VM. Or, as the demand for resources of a certain dimension by one VM increases, the demand for resources of the same dimension by another VM will correspondingly decrease. At this time, the two VMs are said to be complementary. If these two complementary VMs are loaded into the same PM, the peak resource consumption is much smaller than the sum of the peak demand for a single resource of the two VMs. The resource demand of VMi and the resource demand of VMj are then the correlation coefficient pij (formula (18)) of the resource demands of two VMs, which can reflect the complementarity of the resource demands of the two VMs.

$$p_{ij} = \left(\sum_{k=1}^{s} p_{ij}^k\right) / \ s = \left(\sum_{k=1}^{s} \frac{\text{cov}\ \ v_i^k v_j^k}{\sigma_i^k \sigma_j^k}\right) / \ s \tag{18}$$

Considering the concept of correlation coefficient, it can be seen that pij∈[-1,1]. As the value of the correlation coefficient gets closer to 1, it means that the resource demand of virtual machine i is more directly proportional to the resource demand of virtual machine j. If there is no correlation between the two different virtual demand setting ranges for resources of each dimension, then pij = 0.

Among all VMs, VM pairs will be selected in the order of the correlation coefficients from small to large, and they will be loaded into the same PM. Among complementary VM pairs, the optimal VM pair has the same σ. At this time, when the two VMs are loaded into the same PM, the peak resource value is only equivalent to the peak demand of one VM, and therefore, the best statistical multiplexing effect is obtained. This enlightens us that for VMs with the same and small correlation coefficients, we should choose VM pairs with the same σ as much as possible and load them into the same PM.

When some new VMs are turned on, they can only be analyzed and placed based on the VM resource requirements set by the user. For the VMs that need to be migrated, the historical usage of the VM resources can be used for analysis to achieve a better placement effect [12].

First, the resource monitor is used to continuously monitor virtual machine resources (i.e., CPU, memory, network, I/O capacity, etc.) running multimedia services within a certain period of time and use historical resource data as input for computing VM resource usage characteristics. Then, the global resource monitor adjusts the size of the virtual machine according to resource requirements according to the overload or low load of the PM physical host, and at the same time, coordinates with the local monitor residing on each physical host and decides when and which VM should be removed from Physical host migration. If the physical host is overloaded, the local monitor will select the VM to be migrated. The VM allocator collects information from the local monitor to maintain the overall situation of resource utilization. Finally, the VM placement manager depends on the affinity between the VM and the PM, decides which migration VM should be placed on which host, and then issues the VM migration command.

Before discussing the problem of VM migration, some parameters need to be briefly described: There are n physical hosts and m virtual machines in the assumed data center. The physical host pj has D-dimensional resources $r_j = r_j^1, r_j^2, \ldots, r_j^D$, and the remaining capacity $rc_j^d\ t$ of the host pj at time t is represented by $j \in 1,2,\ldots,d\ , d \in 1,2\ldots,D$ .Therefore, all hosts in the data center can be represented by a matrix as shown in formula (19).

$$PM_{dc} = \begin{bmatrix} PM_1 \\ PM_2 \\ \vdots \\ PM_n \end{bmatrix} = \begin{bmatrix} rc_1^1\ t & rc_1^2\ t & \cdots & rc_1^D\ t \\ rc_2^1\ t & rc_2^2\ t & \cdots & rc_2^D\ t \\ \vdots & \vdots & rc_j^d\ t & \vdots \\ rc_n^1\ t & rc_n^2\ t & \cdots & rc_n^D\ t \end{bmatrix} \tag{19}$$

The representation method of VMs in the data center is similar to that of physical hosts. We define a matrix Vi and express the D-dimensional resource demand counted in time T as formula (20).

$$V_i = \begin{bmatrix} v_i^1\ t-T & \cdots & v_i^1\ t-1 & v_i^1\ t \\ v_i^2\ t-T & \cdots & v_i^2\ t-1 & v_i^2\ t \\ \vdots & \vdots & v_i^d\ t-\delta t & \vdots \\ v_i^D\ t-T & \cdots & v_i^D\ t-1 & v_i^D\ t \end{bmatrix} \tag{20}$$

Given the above parameters, the problem of VM migration is to find a pj for vi that meets VM resource requirements under the premise of satisfying some constraints. Therefore, an effective virtual machine migration needs to accurately record the historical data of resource usage, which is part of the resource monitoring problem of the cloud platform. The issue of resource monitoring will be covered in the next chapter.

The affinity model is defined as the relationship between VM and PM in the cloud environment. For each resource D, an A is used to indicate the affinity of the resource relationship (Affinity). When it is assumed that we have obtained the resource monitoring data of the VM to be migrated and the candidate PM in the time interval T, if there is a PM that meets the VM resource requirements in the candidate PM group, the one with the most similar VM resource historical usage characteristics and PM resource remaining characteristics is selected as the target host. This variance of resource matching is defined as the affinity value A4 between the resource requirements of the virtual machine and the remaining resources of the physical server. The smaller the variance, the higher the affinity between xi and pj.Therefore, the calculation of a xi-pjaffinity is shown in formulas (21) and (22), where u is the average value of the total demand of the two virtual machines.

$$u_{ik}^{d} = \frac{\sum_{\Delta t=1}^{T} rc_i^d \; t-\Delta t \; + v_k^d \; t-\Delta t}{T} \tag{21}$$

$$A_{ik}^{d} = \left[\frac{\sum_{\Delta t=1}^{T} rc_i^d \; t-\Delta t \; + v_k^d \; t-\Delta t \; - u_{ik}^{d} \;{}^{2}}{T}\right]^{\frac{1}{2}} \tag{22}$$

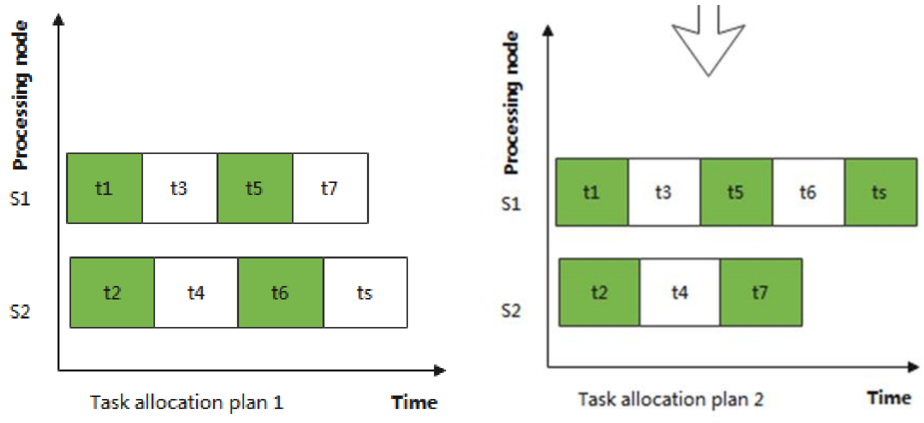
Therefore, VMi and PMj can be expressed as a variable Ax, and the affinity can be calculated according to the formula (23). A high-affinity mapping pair represents a more suitable matching result.

$$A_{ik} = \sum_{d=1}^{D} A_{ik}^{d} \tag{23}$$

4 STUDENT-CENTERED LEARNING ENVIRONMENT BASED ON MULTIMEDIA BIG DATA ANALYSIS

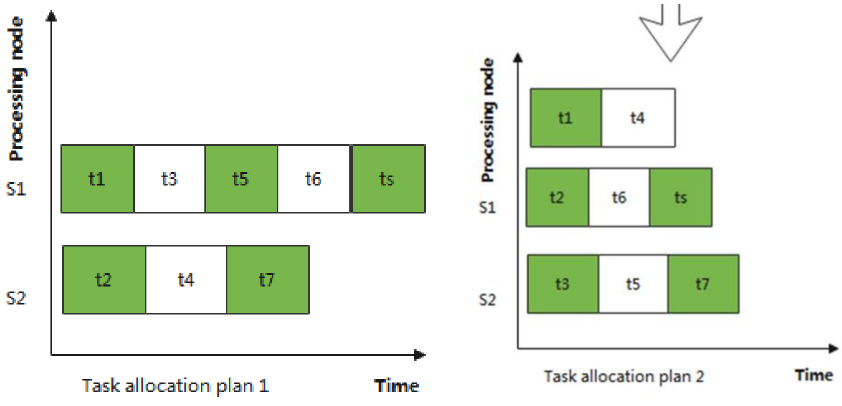
Take two processing servers as an example, denoted as S1 and S2, and their computing power is the same. Assuming that task set T contains 8 media computing tasks, the computing time of each task is different, and they are respectively denoted as t1-t8. T is scheduled to be executed by the processing node. Figure 1 shows two different task execution schemes. It can be seen that scheme 2 saves ¢t compared with scheme 1 to complete T. When the number of media tasks is large, the number of processing nodes is large, and the computing capabilities of processing nodes are different. The completion time of task T can be determined according to the performance of the scheduling algorithm.

Assuming that the user's latest completion time in the task set T is tf, no matter how the task is scheduled, it is impossible to complete it in two processing nodes. Therefore, only the processing node s3 can be added, as shown in Figure 1, and the task T can be completed in tf after the task is properly scheduled.



(a) (b)

Figure 1: Comparison of two scheduling schemes.



(a) (b)

Figure 2: Comparison of two schemes under completion time limit.

Resource elasticity refers to the degree of automatic adaptation in resource allocation as customers' tasks and needs continue to change. It is basically achieved by automatically assigning, zooming in, or zooming out the resources allocated to a certain customer. Therefore, dynamic resource allocation can avoid the problem of excessive and insufficient supply of resources.

When the customer's reserved resources exceed their needs, over-allocation problems may occur, as shown in Figure 3 (a). The black line in the figure represents resource allocation based on peak load. Resources are not elastic during off-peak hours, and the upper part of the red line represents wasted resources. On the other hand, when the reserved resources are not suitable for the current user's needs, the problem of insufficient resources may occur. This problem leads to SLA violations, resulting in lost revenue and reduced customers. As shown in Figure 3(b)(c), there may be multiple situations for insufficient situations. The upper part of the red line represents SLA violations. These violations may change over time, depending on customer needs. Dynamic resource allocation can solve the problem of resource allocation. As shown in Figure 3 (d), the resource capacity is enlarged or reduced over time.

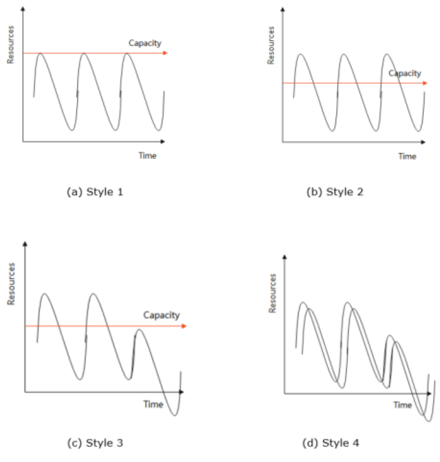


Figure 3: Resource demand and supply relationship.

As shown in Figure 4, a collection of different types of virtual machines provide services for media computing tasks, and virtual machines can work together as virtual clusters to provide more powerful resources. The service process is described as follows: When the request is sent to the cloud data center, the request scheduler distributes the user request to different clusters for processing. The resource allocation module optimizes the resources of each cluster according to the system status information (data obtained by the resource monitor) to achieve the minimum resource cost. In each cluster, the task scheduler assigns jobs to different VMs for distributed processing.

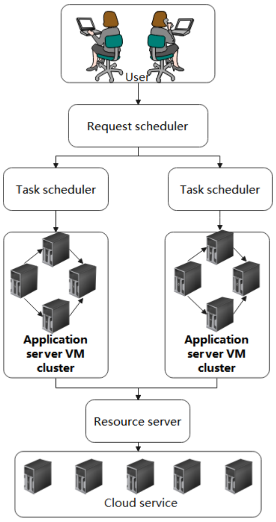


Figure 4: Task scheduling and resource allocation framework.

Figure 5 shows the proposed queuing model. When a user submits a task request to a task agent, the task arrival rate and task size fluctuate. Moreover, users have certain restrictions on the completion time of each task. At the same time, due to different user identities, the priority of the submitted tasks is also different. In theory, tasks with higher priority are assigned to processing nodes for execution.

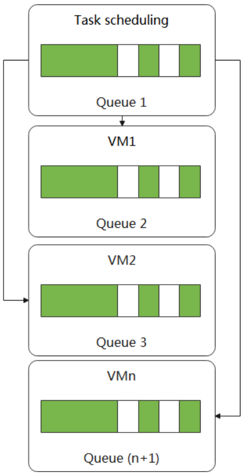


Figure 5: Task queuing model.

The multimedia teaching model constructed in this paper is shown in Figure 6. It can be seen from Figure 6 that the multimedia data analysis system constructed in this paper can visualize teaching resources, make students become a teaching center, effectively enhance students' sense of immersion, and have a good teaching effect.

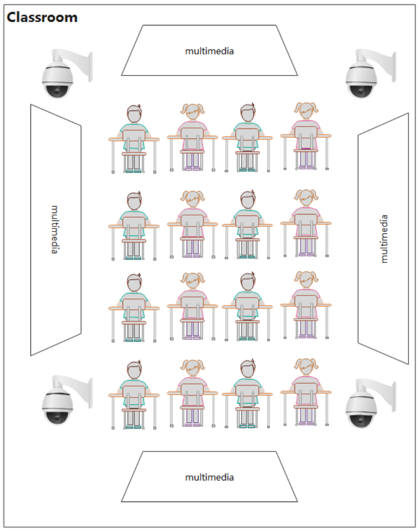


Figure 6: Layout of the multimedia classroom.

On this basis, the simulation teaching evaluation of the system in this paper is carried out. The results obtained from multiple sets of data statistics are shown in Table 1.

Number	*Teaching Evaluation*	*Number*	*Teaching Evaluation*	*Number*	*Teaching Evaluation*
1	*89.3*	*21*	*89.5*	*41*	*87.4*
2	*92.2*	*22*	*86.8*	*42*	*94.7*
3	*96.3*	*23*	*96.8*	*43*	*89.9*
4	*93.9*	*24*	*96.7*	*44*	*90.1*
5	*96.0*	*25*	*94.8*	*45*	*88.4*
6	*96.7*	*26*	*89.5*	*46*	*96.1*
7	*96.2*	*27*	*86.2*	*47*	*90.6*
8	*89.2*	*28*	*94.3*	*48*	*86.6*
9	*91.6*	*29*	*91.1*	*49*	*90.0*
10	*91.0*	*30*	*89.8*	*50*	*93.6*
11	*92.7*	*31*	*91.0*	*51*	*88.0*
12	*90.3*	*32*	*95.2*	*52*	*87.8*
13	*92.1*	*33*	*86.6*	*53*	*95.1*
14	*96.9*	*34*	*86.5*	*54*	*93.1*
15	*91.6*	*35*	*94.7*	*55*	*89.1*
16	*95.6*	*36*	*90.3*	*56*	*92.0*
17	*94.0*	*37*	*92.9*	*57*	*94.8*
18	*91.8*	*38*	*88.8*	*58*	*93.5*

19	*89.2*	*39*	*90.3*	*59*	*91.1*
20	*86.8*	*40*	*90.0*	*60*	*86.4*

Table 1: Teaching Evaluation of Student-Centered Multimedia Learning Environment.

It can be seen from the above research that a student-centered learning environment based on multimedia big data analysis has good teaching effects.

5 CONCLUSIONS

As my country's higher education enters the "post-popularization" era, how should higher education transform from "extensional" development to "intensional" development, how to solve the problems of higher education quality that are gradually exposed, and how to effectively improve the overall teaching of higher education Issues such as quality and level have become urgent issues for my country's colleges and universities? Moreover, the development of society and the progress of the times have also put forward new requirements for talent training. The traditional undergraduate teaching model needs to deepen reforms to release the inherent motivation for talent training further. In recent years, the student-centered undergraduate teaching model has been continuously promoted and practiced in my country, which provides a new perspective for the reform of higher education in my country, especially the undergraduate teaching model. This article combines multimedia big data technology to construct an immersive multimedia teaching system in colleges and universities. Moreover, this paper verifies the effect of this system through experimental research. From the research results, we can see that the system constructed in this paper has good results. The envisioned student-centered e-learning environment holds immense promise. It not only enhances personalized learning experiences but also fosters collaboration, engagement, and effectiveness in education. As this technology continues to evolve, it has the potential to reshape the landscape of education, catering to the diverse needs and learning styles of every student.

Multimedia and data analysis to promote student-centered healthcare can be achieved in the following ways: First, the use of multimedia technology to provide a wide variety of educational resources, including video, audio, animation, and interactive software, to adapt to different learning styles and preferences, to increase the interest and attractiveness of learning; Secondly, data analysis techniques are used to monitor and evaluate students' academic performance, engagement, and psychological status, and identify students' needs and potential problems. Then, based on the results of the analysis, personalized learning plans and interventions are tailored, such as adjusting teaching content, providing mental healthcare support, and stress management guidance. In addition, the intelligent recommendation system is used to recommend suitable learning resources and activities according to student's interests and abilities so as to enhance students' autonomous learning abilities. At the same time, an open feedback mechanism should be established to encourage students, teachers, and parents to participate in the healthy growth process of students and to form a good environment for homeschooling and social cooperation in educating people. Finally, data visualization tools are used to present students' learning progress and healthcare status in an intuitive and understandable way, helping all stakeholders to understand students' development better and make timely responses.

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