Design of General Integrated Teaching System for Operational Research

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Abstract. In order to solve the problems of fixed teaching mode and limited learning content, this paper puts forward the design method of general integrated teaching system for split class oriented to operational research. In order to improve the operation effect of the system and improve the hardware configuration of the system reasonably, the 64 MB video card of VRAM and AMD Athlon processor are selected to provide the hardware operation effect of the system, further optimize the software operation process of the integrated teaching system, and finally realize the reasonable design of the system. Finally, the experimental results show that the detection curve of the proposed system is higher than that of the comparison method, and it is maintained above 89%, which is more practical than the traditional teaching system.

Keywords: Operations research · Divided class · Integrated teaching · Teaching system · Hardware configuration

1 Introduction

In order to solve the problems of fixed place and limited learning content of traditional teaching mode, arouse students' interest and cultivate students' ability of independent learning and independent thinking, teaching institutions all over the world are trying to make use of the latest technology, such as multimedia technology and network technology to establish new teaching mode [1]. But for many kinds of courses with loose knowledge structure, rich knowledge points and wide knowledge scope, multimedia and network teaching still can not meet the needs of teachers and students. Based on this design and development of a set of teaching system based on the presentation and interaction of the sub-class, operations research as an example of this course teaching design and implementation [2]. It is necessary to consider the characteristics of the subject teaching in order to select the teaching content of the subject to be taught. The common physics classes are mainly divided into concept class, regular class, exercise class

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and review class. Because there are many physical models involved in co-ordination, paradigm selection in lectures is critical and should be flexible, simple or complex, but not too complex. Students can learn some basic knowledge, including basic concepts, basic laws and basic methods, through the analysis of examples, and students can be inspired by the original examples to think of some details or more in-depth and breadth problems, which can be taught to students to explore independently as a blank content [3]. To learn basic concepts, laws, or methods by observing or operating an experiment. It provides a new solution to improve the existing classroom teaching mode by the ability of real-time 3D spatial representation and human-computer interaction. The general integrated teaching mode of the divided classroom arouses the students' initiative with the visualized teaching content and the game-like learning mode. The students can look for the interest points and expand the knowledge from the points and areas. The general integrated course space of the divided classroom can be used for teaching and playing.

2 Universal Integrated Teaching System for Divided Classes

2.1 System Hardware Configuration

The general function design structure of the system refers to the composition of the whole system and the physical and logical relationship between the parts and elements of the system [4]. The main task of the overall structure design is to define each function module, the system combines Windows XP operating system and later version or Mac OS X10 operating system and later version. System requirements for running Maya 2013 (64-bit); Windows: 7 SP1 operating system or XP x64 SP2 operating system; Mac OS X 10. 7. x operating system; Red Hat Enterprise Linux 6. 0 WS operating system. AMD Athlon processors (or later) supported by Windows and Linux Intel Pentium with the SSE3 instruction set.

Macintosh: A Macintosh computer with an Intel 64-bit processor. Certified hardware accelerator OpenGL graphics card. Microsoft Internet Explorer 8 Internet Browser or later, Apple Safari Web Browser, or Mozilla Firefox Web Browser. Properly handle the internal relations of modules and the call relationship and data connection between them, and define the internal structure of each module to display the hardware configuration of the integrated teaching system as follows (Fig. 1):

In the integrated teaching system hardware configuration, the system requirements to run Unity3D 3. 5. 5 are: Windows: XP SP2 or later; Mac OS X: Intel CPU & "Leopard" 10. 5 or later (note that Unity3D is not tested on Windows or OSX server versions).

VRAM 64 MB graphics card and pixel shader and 4 texture units [5]. Any video card should apply [6]. Using occlusion culling requires GPU occlusion queries (some Intel GPUs do not support this). The rest only depends on the complexity of the project.

System requirements for Unity3 D content: Windows XP operating system or later. Mac OS X 10. 5 operating system or later [7]. Computer platform configuration requirements:

Core Duo Intel Core Duo processors or higher end models. 1 GB of memory and above. NVIDIA GeFore GTX_560 graphics card and higher configuration or ATI Radeon HD_58_50 graphics card and higher configuration (desktop); NVIDIA GeFore

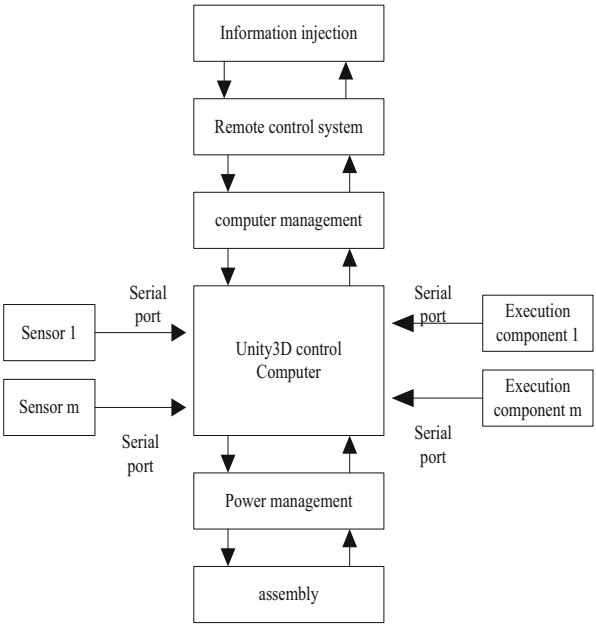

Fig. 1. Hardware configuration of integrated teaching system

GTX460 graphics card and higher configuration or AMD Radeon HD 7730M and higher configuration (laptop).

Unity3D iOS production system requirements: an Intel-based Mac. Mac iOS X Snow Leopard 10. 6 or later [8]. The rest only depends on the complexity of the project. Based on the above hardware structure, further optimize the system sensor interface circuit, the specific structure is as follows (Fig. 2):

Based on the above equipment, the system hardware configuration is optimized to improve system operation efficiency.

2.2 System Software Steps

Based on the above hardware structure, the software flow of the system is optimized. Because the sub-teaching mode is the teaching mode that completes the teaching task through teacher's lecturing, internalization, discussion and exchange. Its core philosophy is to allocate half of the classroom teaching time to lectures and half to interactive learning for discussions among students, so that each student can improve and achieve diversity at his or her previous level [9]. Therefore, in the process of system design, the teaching cycle is divided into three processes: teaching, internalization, and discussion. The sub-class teaching system requires students not to do the preview before class. It not only includes the characteristics of traditional classroom teachers teaching students before class, but also has the characteristics of student-student interaction, teacher-student interaction and promoting autonomous learning in the discussion class [10]. Combining with the

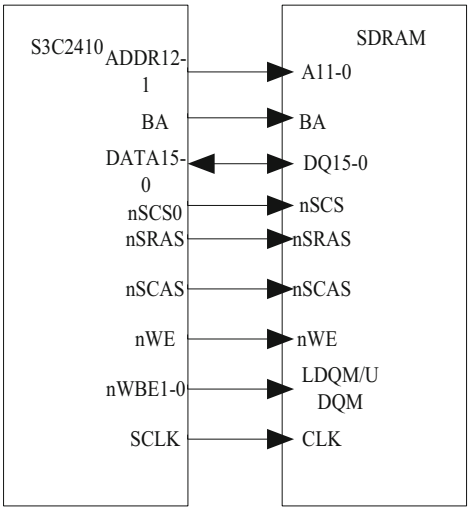

Fig. 2. Circuit diagram of sensor interface

teaching content of Operations Research, this paper optimizes the present integrated teaching mode of divided classes as follows (Fig. 3):

In the course of discussion and communication, students should have a full understanding of the information before teaching it to others. This requires students to go beyond simple repetition and process the information carefully. Fine processing of learning content, so it is easy to grasp the meaning of learning content, so as to enter the long-term memory, improve the retention time of information in the brain, thus improving the learning effect. Action research in education mainly refers to the research carried out by the actors themselves in order to improve their own practice [11]. System optimization has at least three key features: participation, improvement, and system disclosure. Participation means that the teacher is not only the practitioner but also the researcher, and the teacher should participate in the whole research process; improvement means that the aim of action research is to improve the teacher's educational practice and concept, and not only the researcher's tool; system and openness means that the action research differs from the solution of random problems, needs scientific research methods, and is carried out in a planned, systematic and self-critical manner, and the research process should be open to the public and enter the field of public criticism [12].

In the initial stage of implementing the design of the sub-classroom teaching system, the new class teaching is mainly adopted, and the students are assigned to finish the homework after class. According to the feedback from the students, the school requires the students to study the subjects of the College Entrance Examination first, which makes it difficult for the students to finish their physics homework. Then changed to use the classroom on the points, strict division of a class can be completed in the classroom learning content, so that students do homework in the classroom for internalization absorption. In the course of teaching, students should read the whole textbook according to the contents of the lectures, mark the key points on the textbook and make proper notes. Then they should think over the reference questions further. Over time, the number

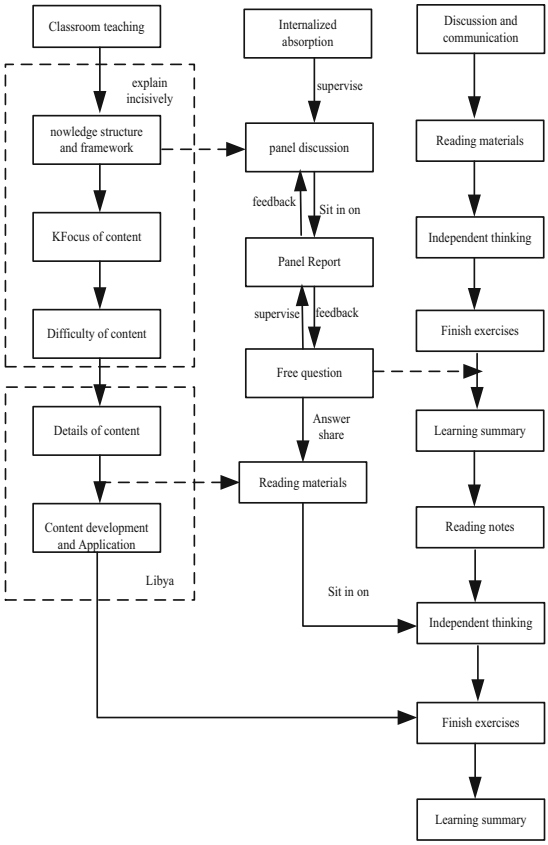

Fig. 3. Integrated teaching model with divided classes

of people with access to integrated learning systems has increased over a given period of time [13]. Some students fill in the knowledge frame by reading the textbook at the end of the lecture, and some students don't finish the arrangement of knowledge points, but do the title directly, and find the knowledge points again when they meet the title they won't do. Less than half of the students use the integrated teaching system seriously after finishing the knowledge points and practice. More than half of the students only mark or simply mark in the textbook or the original text.

In the application and communication of classroom teaching mode, students should fully understand the knowledge before teaching others, which requires students to go beyond simple retelling and fine processing of information. Such processing often involves the significance of information and deep processing such as analysis, comparison and judgment of information [14]. The specific processing steps are as follows (Fig. 4):

Based on the above steps, the knowledge base of teaching content is selected. The knowledge base is a regular aggregation to mine different effective data. In the process

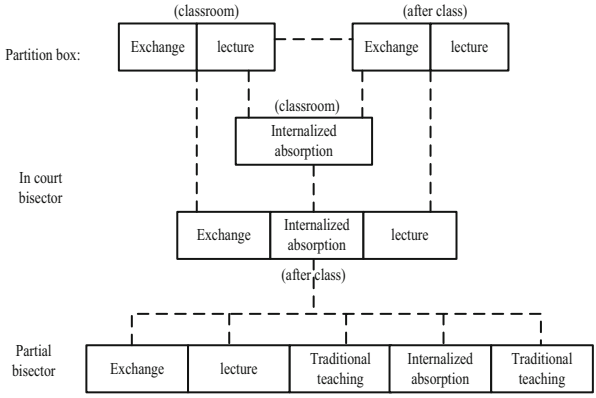

Fig. 4. Teaching information processing steps of co-ordination

of system design, considering that the model is ultimately imported into Unity for programming, we try our best to reduce the number of models, save computer resources, and reduce the hardware requirement of the teaching system, so as to improve the running speed of the system. In order to make the scene of the exhibition hall look more real, let the learners have a stronger sense of experience, and have a feeling of immersion, it is necessary to draw a map for the model, so that the teaching system can achieve a relatively perfect visual effect.

Data mining algorithm based on data entropy is used to optimize the system operation [15]. Let N = (Q, E, R, T) be the characteristic value of the information of the integrated database, and if the outliers $\frac{Q}{E} = \{a_1, a_2, \cdots, a_m\}$ and p are the entropy coefficients of the data, then:

$$H_a(E) = -\frac{N\{Q - (a_m)\}}{E} \sum_{i=1}^{m} \log[p(a_i') - 1] \tag{1}$$

Furthermore, the characteristic values of research object a are mined. If $H(E)$ is the information entropy of E, $H_a(E)$ is the information entropy of m after data mining object E. Let the collected data information be T, and the teaching content is classified as V and x as the students' learning progress. Then we can get the attributes of information a, b, c:

$$\Delta w = \prod \frac{x(a + \mathrm{b} + \mathrm{c})^m}{2 \lim\limits_{x \to \infty} VH(E)} \sum \log H_a(E) - Nm \tag{2}$$

Based on the above algorithm, the corresponding integrated teaching model function is established. In order to ensure the smooth design of the system, the classification of teaching content is designed according to the model function, and the system software running flow is improved by combining various coding mechanisms of the real agent to realize the optimization of the general integrated teaching system in the sub-classroom.

2.3 Realization of Integrated Teaching in Different Classes

Compared with the traditional teaching system, the general integrated teaching system does not require students to preview, and emphasizes the importance of teaching, but the content of teaching is different from the traditional teaching form. Classroom discussion is a well-prepared discussion based on the construction of the individuation of knowledge. Therefore, the biggest difference between the general integrated teaching system and the traditional teaching system is that it does not rely on teaching to make students make progress. To some extent, the teaching system provides students with learning situation, subject knowledge structure and direction of construction, but depends more on students' autonomous learning and group discussion to complete learning. Compared with the latter three teaching modes, the general integrated teaching in different classes does not need preview, and the students can learn directly from listening to the lectures, the lectures reflect the knowledge structure, provide the scaffolding for the students, and let the students learn independently after a certain height. There is a difference between the internalized absorption of general integrated teaching and the self-study process of efficient classroom. First, students are required to carry out independently. Secondly, allowing students to think individually can go beyond textbooks, syllabuses and even disciplines, not only for knowledge, but also across the realm of thought and emotion.

In the process of systematic teaching, administrators need to make PPT courseware and introduce the materials of the sub-class in advance, and introduce the general integrated teaching system to students during class time. First of all, the system does not encourage students to learn new content in advance in the classroom before the new content to reduce the burden of after-school work, not preview can reduce the occupation of students' after-school time. Second, improve the teaching module, tell the students that the teaching is different from the traditional teaching, the teaching content is only the framework of physical knowledge, key points and difficulties, do not introduce details, do not ask questions, do not discuss in the teaching process, the teaching style does not have the performance, leaving room for students to understand through independent learning. Thirdly, it introduces the module of doing homework, which is different from the traditional form of homework. Most of the traditional physics homework is in the form of exercises. This paper mainly introduces the connotation and significance of the homework of integrated teaching system, and gives some suggestions on how to complete the integrated teaching system. Fourth, optimize the discussion module, the discussion of the sub-class is prepared to discuss, after the completion of the homework process, for their own integrated teaching system within the group communication and discussion. At the end of the group discussion, some of the groups will report the results of the discussion. The group will not have a leader. A group member will be randomly selected to report the results of the discussion and the existing problems. For a group of existing problems, the other group can be resolved on the spot to give an answer, if the other group did not answer or the answer is not perfect by the teacher to give additional answers, but the speech and answer do not comment. Finally, you can give a certain amount of time for the whole class to ask questions freely. The answers to the questions can be classmates or teachers. Then the teachers make some summaries according to the discussion.

Based on the above steps, the original teaching software, teaching content and teaching modules are further integrated, and the error handling process in the system operation is investigated. In the process of system design, it is necessary to detect the user's identity, and authenticate the user when he logs on the system, so as to avoid logging failure and loss of information. Based on this, the user's course content browsing information and other learning information are recorded and stored. In order to reduce the problems caused by the ineffective operation of the teaching system, a new online message module and an online question answering module are added in the system link. When a user leaves a message or answers a question, he will be alerted that the message or the question answering connection fails. Combined with C+ language to optimize the system running code, to improve the teaching system running process, based on the teaching system running basis table for specification, as follows (Table 1).

Table 1. Flow chart of teaching system

Parameter type	Data	Field length	Meaning
Single precision	Int	8	Main key position
Floating-point	U-Int	4	Login account
Multi precision	Nvarchar	97	User status
Multi precision	Nvarchar	97	User password
Floating-point	U-Int	4	Remarks information
Multi precision	Nvarchar	199	User information

Based on the above table data, make the UV-Unfold utility do not overlap UVs. Be sure to put all the UV on the 1: 1 grid, as far as possible to occupy 1: 1 UV full box, but do not go beyond the edge of the box. Expand the UV. The last step is to export UV, select Polygons-UV Snapshot, export UV, and then according to need to be able to adjust the path, size, color of UV export and export UV image format, etc., as required, after these parameters are adjusted, export images, so that in other editing software in accordance with UV mapping, such as Photoshop can be mapping.

The original teaching software system backstage administrator work flow, take the teaching goal as the point of departure which needs to analyze, applies to all has the network study demand crowd, through watches the study video frequency, the correlation study picture way, consolidates the elementary knowledge. In order to ensure the efficiency of mass information transmission, the system and backstage management module are set up inside the system. The whole management module workflow includes: managing users' history browsing records, managing users' personal information and so on. The improved integrated teaching software system, the background administrator workflow, add the management of online message and online question answering module, the administrator in the background processing stage, according to the specific content of the message, analysis and processing, and then based on the user's questions, in-depth analysis, to get the satisfactory answer, and then through the formal translation software,

translation into English to reply to the questioner. Complete the improved background administrator workflow as shown in Fig. 5 below.

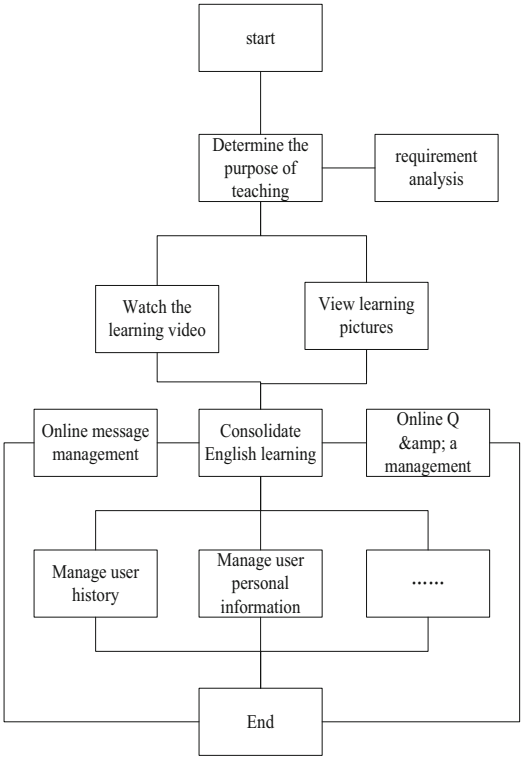

Fig. 5. Integrated teaching system background management process

Based on the above process, the optimization design of the general integrated teaching system must follow the standard system, data number and table information in the process of system optimization. Each student's learning progress can only be affected by the evaluation of the online system after the system memorandum, which stores the data of the student's learning progress and mines the data; the mined data is standardized to some extent, traced back to the data source, and the initial value of the online evaluation is obtained after analysis; and the final value is determined for online evaluation.

3 Analysis of Experimental Results

In order to verify the effectiveness of the general integrated teaching system in separate classes, a comparative detection experiment was conducted. Experimental research in the general sense is scientific Experimental research, consisting of three elements: the research questions and assumptions, the design of the research (including the control of

unrelated variables), and the testing and presentation of experimental results. Experimental research as part of educational reform and scientific Experimental research also include the same elements mentioned above. The difference is that experimental research on educational reform controls unrelated variables and does not test experimental results too rigorously, and aims to promote the new methods pursued by researchers. Most educational experiments are not standard experiments, but quasi-experiments, because they do not have all the elements of a standard experiment. For example, for the sake of not interfering with the experimental results, only a post-test is conducted for the experimental group, which can be implied in some previous routine tests. Sometimes the control group is not specially arranged to avoid the Henry effect, and the control group is implicit in the surrounding unreformed class or school, and can be compared in a certain way. Therefore, the quasi-experimental research is not a loose experimental research, but more in line with the characteristics of the educational phenomenon of experimental research. Based on this, the experimental environment is uniformly set up as follows:

3.1 Experimental Environment

Experiments using three-dimensional software and Unity3 D game engine design and production. The main content is from the course content of film history. Photoshop, Final Cut Pro, Adobe Premiere are used to complete the content and layout of pixel mapping and video mapping in the system. Maya is used to build a model to import into Unity 3D to realize interaction. After optimization, the program of virtual teaching system is exported. The teaching system of film history is divided into different classes. By adapting and reproducing the teaching content, the students can find their own interest points to study and understand the teaching content. After importing and opening Final Cut Pro, click on the file options in the toolbar, create a new event, customize the name, locate the import, click on the file, select the selected material, and Final Cut Pro imports the file. Click File Options, select New Project, and drag the imported movie material to the New Project bar. Click on the tool to select the item, use the cutting tool to cut the video material, slide over, find the part you want to keep, select where to start, and click Finish. When the cut is complete, click on the unwanted section and delete. Export Material: Select Share in Toolbar - Export Media. Export mode for video and audio, video encoder select H. 264, so that the encoding can be played on different players smoothly, click next, select the export location.

3.2 Experimental Results

Based on the above data, the operation effects of the two systems are judged and the inspection results are recorded as follows (Fig. 6):

3.3 Experimental Conclusions

It is not difficult to observe the test results in the above figure. Compared with the traditional operation research teaching system, the general integrated teaching system designed in this paper is oriented to operation research. In the practical application

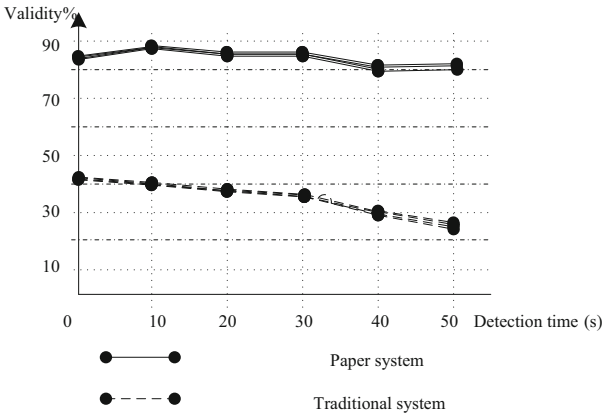

Fig. 6. Comparative experimental results

process, the operation effect test curve is significantly higher. And the validity was maintained above 89%, which was higher than 42% of the highest validity of the comparison method. It shows that the system designed in this paper has higher effectiveness and practicability, and fully meets the research requirements.

4 Closing Remarks

In our country's education, the traditional teaching method continues for many years, the people already gradually realized its malady and the insufficiency. In recent years, after the introduction of multimedia teaching methods, teachers are no longer limited to the blackboard, but can rely on computers, projectors, audio-visual equipment, through the visual, auditory, tactile and other ways to assist teaching, thus achieving excellent results. From the above findings, it is not difficult to predict: the split class will become an important tool of the teaching system, which provides a certain scientific basis for the teaching of operational research, and is conducive to improving the teaching efficiency.

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