Optimization Theory of College Mathematics Teaching Mode Based on Information Technology and Multimedia Platform

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Abstract

With the rapid development of modern information technology, network information technology has become an important means of application in mathematics teaching; certain extent prompted the change of mathematics teaching content, form and concept. In this paper, the author analyzes the multimedia teaching platform application in mathematics teaching, and makes comparative experimental analysis. The result shows that the test scores is significant difference between control class and experimental class, the scores of the experimental class were significantly higher than those students in control group(t=-10.986, P=0.000<0.001). Obviously, the mathematics teaching strategy based on the three-dimensional goal can not only improve the students' cognitive performance, but also promote the students with poor chemical learning foundation.

Keywords: Multimedia platform, MVC software, mathematics teaching, three dimensional methods

1. Introduction

With the rapid development of modern information technology, network information technology has become an important means of application in mathematics teaching, certain extent prompted mathematics teaching content, and form and concept have changed [1]. Present of multimedia classrooms of colleges and universities basically can be divided into two categories, a class of non-network centralized control type, mostly early completion of the multimedia classroom are generally the central controller itself not connected to the Internet, will not be able to achieve multimedia classroom network centralized control and management, this type because of the many problems, especially management inconvenience, with development also gradually eliminated [2-3]. Another kind is the centralized control type, the multimedia classroom is based on campus network and control network, and the application of multimedia network in control to achieve total control room centralized control and management of classrooms and classroom equipment [4]. Now most of the colleges and universities have realized the centralized control and management of multimedia classroom network, the main function is implementation, end equipment remote centralized control and management, such as video, audio signal multiplexers, all kinds of multimedia equipment control, computer self-start up and shut down, the power of the multimedia device of opening and closing, automatic control screen projection falls and rises.

Network centralized control type general classroom multimedia equipment production integrator developed, because the development goal is to achieve better control the multimedia equipment and before the development and use of personnel, the lack of communication needs [5]. Therefore, system function have largely ignored the multimedia classroom equipment management and maintenance information management and for teachers, service information module. And control system, most of the C/S model design and development, from the perspective of the use and maintenance, C/S mode

because the business logic are written in a fat client application, obviously not as good as B / S mode to download the client only use the browser more convenient and expansibility of the system from the point of view, is not conducive to the expansion of system function. Many schools of multimedia classroom management system, only for equipment control and management development, lack of opposite to teachers teaching technical service support function, system and educational management system and assets management system cannot be connected [6-7]. Data requires a lot of manual input, and prone to error.

At present, the main multimedia administrators and teachers to communicate by phone and face directly face to the two forms of communication, as the traditional methods, many problems, teachers in the use of the problems encountered, has not been able to get the comprehensive technical support, coupled with the multimedia classroom management personnel shortage, given the class with the teacher's help [8]. With the improvement of school information, the use of campus network to build a new non real-time problem solving approach, as a supplement to traditional methods. The choice of teachers is also beneficial to the communication between the teachers and the teaching management staff.

2. Multimedia Education Service System

2.1. Software Development Architecture

Multimedia computer sports information processing system is a multimedia technology and application technology such as computer, video and communication comprehensive produced by an information processing system. The system model of software development mainly experienced three stages: Client/Server and multi-layer model based on Browser/Server. Centralized model, has not adapted to the requirements of the development of information technology. C/S and B /S are the two mainstream technology of architecture of technology in today's world development mode, C/S also known as client / server mode, server usually uses high performance PC, workstation and minicomputer and using large databases such as Oracle, Sybase, Informix, or SQL Server, the client needs to install a dedicated client software, C/S system architecture, such as shown in Figure 2.
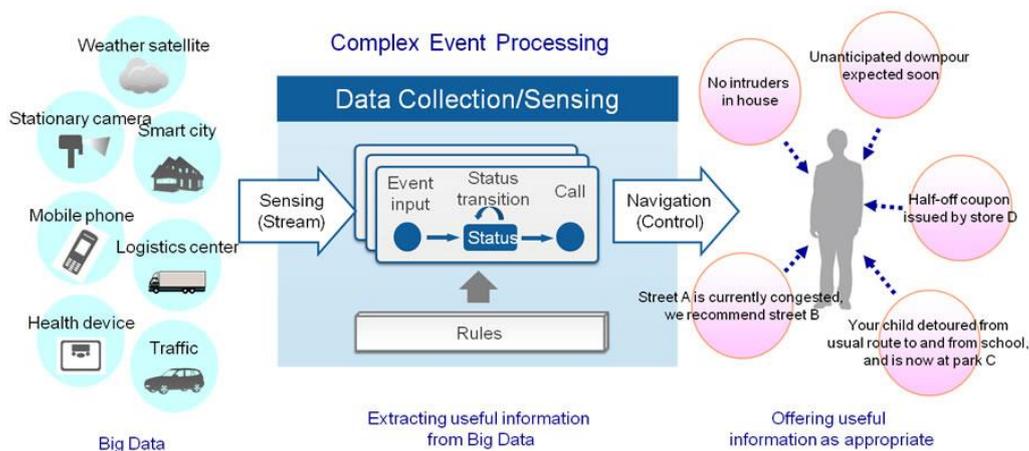

Figure 1. Data Collection and Processing

Three layers of B/S system structure with three layers client / server structure, three layer patterns, the system divided into three layers: presentation layer, also known as user interface layer, application layer, also known as application layer and data store layer. The

three layer B/S system architecture as shown in Figure 3, the presentation layer is processing information interaction between the user and the system interface, it undertakes the dialogue and interaction function between user program and system; business logic layer is a part of the function to make intelligent decisions in the program, which includes business process all applications as the data source; data layer, data layer is a direct relationship with the data layer, is responsible for the management of the database to read and write data, a database and database management system in the normal conditions; the three layer structure between layers are independent of each other, each layer to complete the corresponding functions, the loose coupling between layers through the interface, any changes in one layer will not affect the operation of the other two layers.
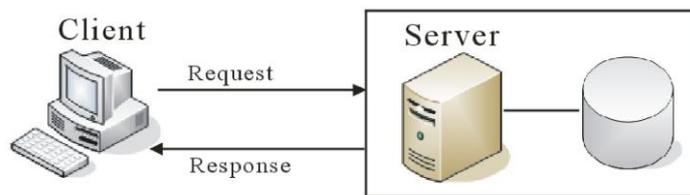

Figure 2. C/S System Architecture
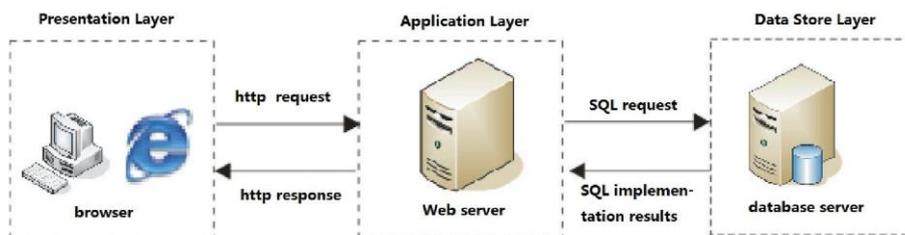
Figure 3. Schematic Diagram of the Three Tier B/S Architecture

2.2. System Development Technology Based on WAMP

WAMP is defined in the Windows platform using Apache, MySQL and PHP. Generally speaking, we are accustomed to Apache, mysql, PHP installed under the Linux system, because they are open source software systems that use this combination can greatly reduce the cost of operation of the web site, so this is the ideal approach to web site to build, and more and more site used in this way. With LAMP gradually mature, LAMP also quietly evolved out of the WAMP. There is no denying that Windows has its advantages, is easy to use, friendly interface, the operation is very aspect, so for the novice to learn Windows platform PHP is indeed a good choice. There is now an increasing number of iT users who believe that this approach can provide the better of the two camps. WAMP and LAMP platform is composed of several components, which are layered structure. Each layer provides a key part of the entire software, WAMP and LAMP platform layered structure as shown in Figure 4.
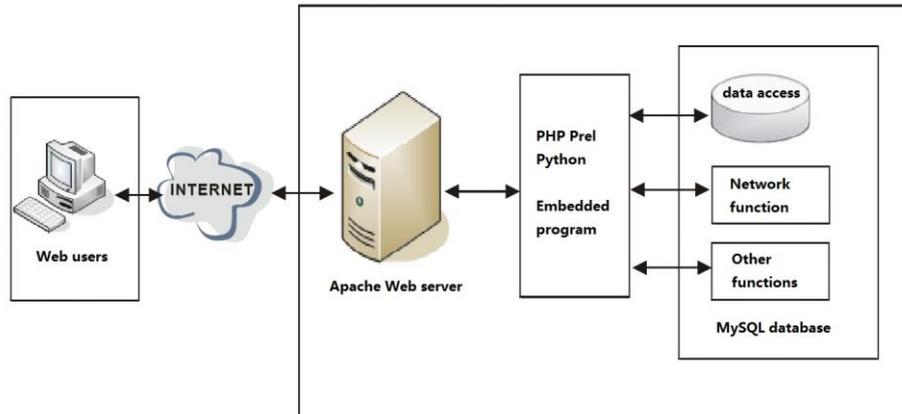
Figure 4. Hierarchical Structure of WAMP and LAMP

- Linux and windows: Linux and windows are at the lowest level, providing the operating system. Each other component is actually running on it. However, it is not necessarily confined to Linux and windows, if necessary, the other includes: OS X Mac or UNIX.

- Apache is a high performance HTTP service program, which uses prefork and other technologies to achieve a large user amount of concurrent access to the response. Apache provides a mechanism to allow users to access the Web page. Apache is a stable, support mission critical server; Apache is widely used in the Internet industry and ICP, such as Yahoo, Sina, NetEase and other large websites. According to the authority of the Internet statistics agency netcraft.com latest statistics, Apache market share in a leading position.

- MySQL: MySQL provides data storage side of WAMP system. A lightweight relational database is mysql, Mysql to as dynamic web database has a very strong performance advantages, and the Perl and PHP programming language are mature interface to the database design and development of high efficiency.

- PHP: PHP is a simple and effective programming language, it is like a binder, can be all other components of the WAMP system together. PHP can be used to prepare the data and operating system to access the MySQL database to provide some of the characteristics of the dynamic content.

2.3. MVC Software Design Patterns

Model-View-Controller to an application of the input, processing, output in accordance with the Model, View, and Control way to separate. Applications that use MVC are divided into three core components: the model, view and the controller, which are separated from each other, each is dealing with their own tasks, MVC mode design ideas as shown in Figure 5. Three parts correspond to internal data, data representation and input and output control. Model for packaging and application of the business logic data and the data processing method; the view is model of the external representation, a model may correspond to one or more view, the view is program system and external system interface; controller communication model and view the role for the application of process control. It handles events from the user's behavioral events and data models, and responds to events.
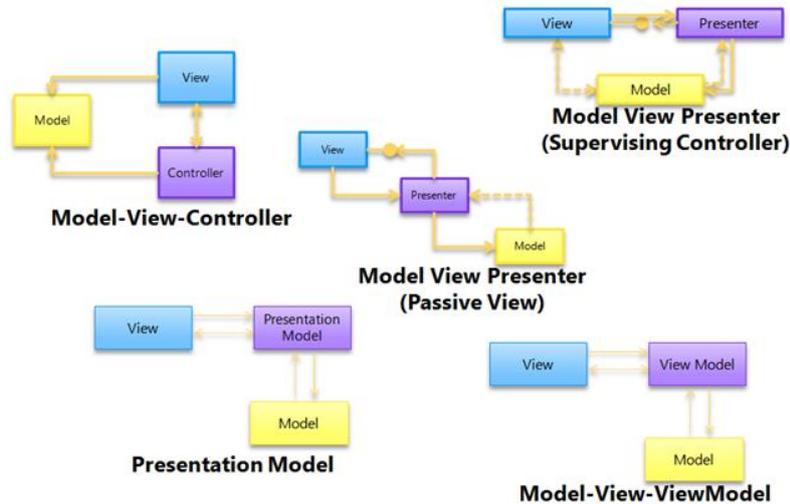
Figure 5. Schematic Diagram of MVC Design Pattern

3. Empirical Analysis

3.1. Research Design

The independent variables in the experiment are based on the three-dimensional target teaching strategies of Mathematics "embodied in: in teaching strategies embody 3D target and classroom teaching focus on three-dimensional target implementation. Dependent variables included students with the knowledge and skills to improve the level of students learning method mastery and ability change, the student to study the interest, emotion, attitude and value outlook change. In order to accurately verify whether the experimental results caused by the independent variable and the adopted the following measures of independent variables were controlled: the experimental class and the control class are school according to the entrance examination and homogeneous preparation of two general classes, two classes of students in mathematics study the same level; the experimental class and the control class were by the same teacher teaching; the teaching of the experimental class and the control class hours are basically the same, not in any form of experimental class make up a missed lesson or increase learning time, and did not to the students in the experimental class that they as the experimental object.

Figure 6. Multimedia Mathematics Teaching

Hypothesis testing new curriculum three dimensional goal as the instruction, through in the teaching implement and chemical strategy based on 3D objects, can make the students' knowledge and skill, process and method, emotion, attitude and value conception have been all-round development, embodied in improvement of the students' mathematics learning achievement, mastery of the mathematics thinking method, interest in learning the excitation and the cultivation of scientific literacy.

3.2. Experimental Results and Analysis

Before the experiment of two classes a student's final exam score results of descriptive statistics and final exam scores paired samples t test results. The test results show that two classes final chemical test scores mean difference was not significant (t=-1.755 P=0.084>0.05). At the end of the two teaching schedule of school examination results no significant difference, which indicated that before the experiment, the two classes of students overall level is quite.

Table 1. Test Results before the Experiment

	Category	Mean value	N	Std. Deviation
Pair 1	Control class	74.3833	60	19.88619
	Experimental class	74.0476	63	14.23423

Table 2. Test Results of Different Test before the Experiment

Mean	Std. Deviation	Std. error Mean	95%Confidenee		T	df	Sig.(2-tailed)
			Lower	Upper			
-1.9000	8.38421	1.08240	-4. 0658	.26587	- 1.755	59	.084

The experiment content is over, the unit test, we through the two classes of this chemical unit test results to illustrate the differences between the control class and the experimental class. The table shows that, after the end of the experiment, the control class and experimental class tenth unit mean scores difference was significant (t=-10.986, P=0. 000<0.001) and the scores of the experimental class is significantly higher than that of the control class. Through the experiment of mathematics teaching strategy based on the three dimensional objective for two weeks, we can see that the overall trend of the experimental class have exceeded the control class, especially in the head and tail largest increase, indicating that the three-dimensional teaching strategy can make students and poor students at the same time based on the progress, the effect is significant. From the result of comparison, the performance of the experimental group was significantly higher than the control class. Obviously, the 3D object teaching strategies can not only improve the cognitive performance of all students, and the promotion of the students with poor chemical learning foundation is more obvious.

Table 3. Test Results after the Experiment

	category	Mean value	N	Std. Deviation
Pair 1	Control class	64.7222	54	18.82140
	Experimental class	75.5283	53	13.28041

Table 4. Test Results of Different Test after the Experiment

Mean	Std. Deviation	Std. error Mean	95%Confidenee		t	df	Sig.(2-tailed)
			Lower	Upper			
-9.81132	6.50165	.89307	-11.6034	-8.0192	-10.986	52	.000

3.3. Correlation Test

The control class and the experimental class students at the same time the closed questionnaire survey, the questionnaire is composed of three parts, one is investigation of knowledge and skills in the students to grasp the situation, second is the investigation on the process and method of the students to grasp the situation, three is to investigate students' emotion, attitude and values change. We used the scores of the closed questionnaire to examine the relationship between the three dimensional targets.

Table 5. Correlation Test between Three Dimensional Degrees of Control Class

Control class	factor	test	Knowledge and skills	Process and methods	Emotional attitude and values
Spearman's rho	Knowledge and skills	Correlation Coefficient	1.000	.671(**)	.342(*)
		Sig.(2-tailed)	.	.000	.041
		N	36	36	36
	Process and methods	Correlation Coefficient	.671(**)	1.000	.459(**)
		Sig.(2-tailed)	.000	.	.005
		N	36	36	36
	Emotional attitude and values	Correlation Coefficient	.342(*)	.459(**)	1.000
		Sig.(2-tailed)	.041	.005	.
		N	36	36	36

Questionnaire results show that the experimental class knowledge and skill, process and method of extremely significant (r=0.577, p=0.000<0.001), knowledge and skills and emotional attitudes and values related is extremely significant (r=0471, P = 0.001), process and methods and emotion, attitude and values related to the very significantly (r=0.687 p=0.000<0.001). The description of knowledge and skills in role, process and methods and emotion, attitude and value conception of mutual promotion, the experimental class than the control class has significantly improved the sensibility, attitude and value conception.

Table 6. Correlation Test between Three Dimensional Degrees of Experimental Class

Experimental class	factor	Test	Knowledge and skills	Process and methods	Emotional attitude and values
Spearman's rho	Knowledge and skills	Correlation Coefficient	1.000	.577(**)	.471(*)
		Sig.(2-tailed)	.	.000	.001
		N	44	44	44

		Correlation Coefficient	. 577(**)	1.000	.687(**)
	Process and methods	Sig.(2-tailed)	.000	.	.005
		N	44	44	44
	Emotional attitude and values	Correlation Coefficient	. 471(*)	.687(**)	1.000
		Sig.(2-tailed)	.001	.000	.
		N	44	44	44

In the control class and the experimental class, the T test was carried out for the closed questionnaire, and the students' mastery of the process and method goal was understood.

Table 7. Descriptive Statistics of Process and Method

	category	Mean value	N	Std. Deviation
Pair 1	Control class	3.8405	37	.48777
	Experimental class	4.1908	37	.47193

Table 8. Test Results of Different Test of Process and Method

Mean	Std. Deviation	Std. error Mean	95%Confidenee		t	Df	Sig.(2-tailed)
			Lower	Upper			
.35027	.64958	.10679	.13369	.56685	-3.280	36	.002

The control class and the experimental class students conducted interviews from the interview that the enthusiasm of the students in the experimental class was significantly better than that of the control class; from student feedback can also see students to learn mathematics learning requirements and interest in learning:

1) From the point of view of mastery knowledge and skills, students in the experimental class to the memory of knowledge and skill and summarized comprehensively, and even security consciousness, comprehensive dialectical point of view things and truth. sensibility, attitude and value view of understanding are profound also learning to the learning method, while the control class students of knowledge and memory is one-sided, only memory to life and is closely related to problems, knowledge memory less, few goals of learning methods, emotional attitude and value view of understanding.

2) The students in the experimental class notes on thinking, the interaction between teachers and students in class, the study of multi-sensory representation, the relationship between learning and real life, hands-on experiments, put forward questions and questions, and other teaching strategies. Indicating that the change of teaching method, knowledge show changes, teachers of learning strategy learning attention caused improve students' interest in learning and memory of knowledge, stimulate students' learning motivation, and from the control class students responses that control a single class activities, in addition to experimental teachers, knowledge related to life and teacher characteristics of lead to students' interest in learning, there is no other learning exciting point "the learning needs of students is not high.

3) From the students in the experimental class feedback that 3D object teaching strategies such as induction of knowledge, the establishment of knowledge network system, multi-sensory characterization of learning and scientific experiments explore the process, teaching content with life, teacher's style plays on students' learning role, teaching activities are interactive. While the control class students to

ask teachers effective teaching is the embodiment of traditional routine teaching behavior, teaching is not new, teacher based teaching, students participate in little or almost no student activities"

4) Experimental class students put forward suggestions more deeply, more demanding, more specifically, their participation in the consciousness of the classroom activities to further enhance, requirements for teachers of higher, while the control class students to put forward suggestions, such as to the teacher explain the contact life, inductive knowledge, teach some learning methods *etc.* These are some of the teacher's basic teaching requirements. Because they have no chance to realize the opportunity to release their potential, so they are not aware of their potential and creativity, because we do not give them a higher learning platform.

4. Conclusion

Network information technology with computer technology and the Internet to make up for the deficiency and drawback in the traditional mathematics education, through chemical professional software and computer terminal reform traditional mathematics education, extent changed the mathematics talents culture concept. Deepening the theory of mathematics curriculum is beneficial to optimize the preparation of teachers and the quality of teaching. The application of network and information technology in education for students brought a large number of chemical research and consulting, enrich the teaching information, make the theory curriculum depth increasing, also allows the teacher to continuously improve the quality of teaching, compared with the traditional mathematics education, can achieve the goal of modern mathematics professional talent training. The cause of the rapid development of chemical, chemical data lack of old textbooks theory to worldwide update network information technology to a proper extent to make up for this, will be the new trend of chemical theory of real-time tracking, achieve rapid spread to the education information, reducing the different countries in mathematics in the study of the theory of the gap.

The multimedia teaching method is directly reflected in the application of network information technology in chemical education, a number of software applications are able to support mathematics education needs, but also has a very rich teaching picture and audio and video data in the vast network of the world, all of which can be directly applied in the process of teaching practice, make training more dynamic and image, which can serve as valuable teaching resources sharing among teachers and students. Teaching resource sharing to a certain extent, to cultivate self-learning ability to create the relative quality of the environment, through the use of network information technology, can in the talent cultivation in the process of strengthening the ability of self-study, to consolidate the theoretical knowledge, lay the system knowledge base for the research work. Theoretical knowledge of mathematics with the rapid development of chemical industry in diners update, professional courses taught only selected the most basic knowledge of the contents of as a teaching subject, difficult to reach deep subject, self-learning ability is postgraduate training important content, the introduction of network information technology just created the conditions.

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