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Physics Practice Teaching Evaluation System Based on Organization and End-User Calculation

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Abstract: The rapid development of computer technology has made more and more scientific research teaching practice projects. Traditional physics classroom teaching methods no longer meet the needs of information teaching. Therefore, it is necessary to reform the teaching content and teaching methods of the physics practice teaching system. Aiming at the problem of teaching methods, this paper designs a physics time teaching evaluation system based on organization and end-user calculations, uses this system to test physics teaching, and compares the effects of traditional teaching methods and practical teaching methods on students' physics performance. The experiment shows that the experimental class's Physics scores have been greatly improved, but the physics scores of the control class have not changed significantly, indicating that compared with traditional classroom teaching, physics practice teaching methods can effectively improve the quality of teaching.

1. Introduction

In order to meet the needs of open practice teaching, physics teaching advocates returning the classroom to students, students are the learning center. Students should give full play to their subjective initiative in the teaching process. Using the evaluation system to support physics practice teaching is an important way to improve physics teaching methods. It can provide students with learning tools and create rich physics learning situations, connect physics learning and life, and help students understand physics knowledge well. Therefore, it is of great significance to use the evaluation system for physics practice teaching.

Many scholars at home and abroad have conducted research on the physics practice teaching evaluation system based on organization and end-user calculations, and have achieved certain results. For example, based on the theoretical analysis of physics research learning, a scholar explored the necessity of computer technology in college physics research learning from both theoretical and practical aspects, discussed the basic theory of the integration of computer technology and physics courses, and analyzed physics. The subject integrates the application value of computers, combines teaching design and specific cases, and proposes college physics practical teaching methods and implementation strategies supported by computer technology [1]. A scholar researched the effective integration of the powerful functions of organization and end-user computing to support learning into physics practical teaching, and conducted research on physics practical teaching in the end-user computing environment, and found out the teaching defects from the nature, content, and implementation process of current practical teaching , And put forward the implementation strategy and evaluation method of college physics practice teaching in the end-user computing environment, which provides a reference for the reasonable application of the organization and end-user computing [2-3]. Although the research results of the physics practice teaching evaluation system based on organization and end-user calculations are good, modern technology should be introduced in the actual physics teaching process to increase students' interest in learning and improve the quality of learning.

This article describes an overview of organization and end-user computing, analyzes the characteristics of physics practical teaching, and establishes a physics practical teaching evaluation system based on organization and end-user computing according to the needs of the evaluation system, and applies the system to practical teaching activities. The test system improves the degree of students' physics performance and verifies the practicality of the system in teaching.

2. Overview of the Organization and End Users and Analysis of the Characteristics of Physics Practice Teaching

2.1 Organization and End User Calculation

(1) Program synthesis

There are two typical methods, one is demo programming, and the other is sample programming. Both methods have different focuses. The basic idea of demonstration programming is to speculate and generate a program by manually performing some operations by the user. Sample programming allows users to program by writing code. This is different from the traditional programming method, where the user writes a program by giving examples to illustrate what he wants the system to do. The system will record the sequence of actions performed by the user and reproduce these actions [4].

(2) Model evolution

The main idea of model evolution is to transfer the center of evolution from software to highly abstract models, and to drive full automation or overall evolution by switching the model to code or other devices. In other words, only need users to convey their own needs to the system, the system can automatically perform operations, provided that the system can generate appropriate code [5]. DSL is a language and method used in a specific field. The purpose of using a copy in a fixed domain is to more easily convey the operation or task that the system wants to perform [6].

(3) Simple programming

The essence of simple programming is to allow the user to enter a simple natural language as multiple keywords in the program, and the computer will understand the content entered by the user and generate the corresponding code.

2.2 Features of Physics Practice Teaching

(1) Physics practice teaching uses experiments as the basic teaching, but because many physics experiments are not effective in the experiment process, students cannot observe the changes in the

experiment. During the experiment, students can operate by themselves and combine with animation demonstrations. The subtle changes in the experiment are clearly observed [7].

(2) Physics is the profound content of studying the structure of matter, the interaction of matter and the law of motion. Different from liberal arts subjects, there are more knowledge to memorize. Physics practice teaching pays more attention to hands-on ability, cultivating students' logical thinking ability and building physical model ability. Physical model can be realized through computer technology and practical operation [8].

(3) Physics practice teaching should pay attention to teaching methods. In traditional physics teaching, teachers pay too much attention to the inheritance of knowledge and neglect students' independent inquiry ability. The purpose of traditional teaching is mainly to respond to exams, which leads to poor practical operation ability of students, also lack of interest. Wisely use the physics practice teaching evaluation system to allow students to apply physics knowledge to their lives in practice, and develop a habit of thinking that dares to explore through practice [9-10].

2.3 Physics Practice Teaching Evaluation System Demand Analysis

(1) System login

The system login performs the account and password verification operation of the logged-in user. When the user enters the address of the practical teaching management system, the login page will be displayed, and the user needs to enter the login account and password to verify the identity. System users are divided into two identities, teachers and students. When logging in to the system as a teacher, the system compares and verifies the account and password entered by the user from the information in the teacher information table. If the verification is passed, the system transfers to the main page of "Teacher Management"; When logging in to the system as an identity, the system will verify the account and password entered by the user from the student information, and after the verification, the system will switch to the main page of student management.

(2) System management

The system management module is a page designed for system administrators to maintain system operation. Only administrators can enter this page. The system administrator manages basic information such as user login, student teacher management, and class management through this page, and can also implement the settings of the current working semester. Through the system management page, the administrator can retrieve all sent reports [11].

(3) Teacher management

Practical teaching teachers can compile practice teaching materials, formulate practice report scoring standards, and review practice reports through the operation function of the teacher management module.

(4) Student management

The student management page is a functional page for students in the learning process of the practical course. Entering the student management module, students can inquire about their practice scores, modify personal information, and write practice reports.

2.4 Feature Selection Algorithm

Too many feature sizes will increase the cost of classifier training, and noise features will reduce the classification effect [12]. Therefore, after removing the attributes, the feature selection method is often used for further calculation.

(1) Feature selection method based on mutual information

Given feature set $D=\{d_1,d_2,...,d_m\}$, training text annotation set $X=\{X_1,X_2,...,X_k\}$, the mutual information of feature d_i is defined as:

$$MI(d_i,X)=\sum_{j=0}^{k}P(X_j)\log(\frac{P(d_i|X_j)}{P(d_i)}) \tag{1}$$

In the formula, $P(X_j)$ represents the probability that the class label X_j appears in the training document, $P(d_i)$ represents the probability that the feature d_i appears in the training document, and $P(X_j|d_i)$ represents the probability that the text labeled X_j contains the feature d_i.

(2) Feature selection method based on chi-square statistics

Given feature set $D=\{d_1,d_2,...,d_m\}$, training text set $Y=\{y_1,y_2,...,y_n\}$, training text label set $X=\{X_1,X_2,...,X_k\}$, the chi-square statistic value of feature d_i is defined as:

$$CHI(d_i,X)=\sum_{j=0}^{k}P(X_j)\frac{|Y|\times\left[P(X_j,d_i)P(\overline{X_j},\overline{d_i})-P(\overline{X_j},d_i)P(X_j,\overline{d_i})\right]}{\sqrt{P(X_j)P(\overline{X_j})P(d_i)P(\overline{d_i})}} \tag{2}$$

In the formula, |Y| represents the number of samples in the training text set, $P(X_j)$ represents the probability of the class label X_j in the training document, $P(d_i)$ represents the probability of the feature d_i in the training document, and $P(X_j,d_i)$ represents the combination of the feature d_i and the class label X_j Probability, including d means all the empathy probabilities of no feature d_i, including $\overline{X_j}$ means all empathy probabilities of no class label X_j.

3. Experiments of Physics Practice Teaching Evaluation System Based on Organization and End-User Calculations

3.1 The Purpose of the Experiment

Physics teaching is still mainly based on the teaching of teachers' knowledge. This learning method ignores the autonomous status of students, suppresses students' enthusiasm for learning, and prevents students from radiating creative thinking. The understanding of physics knowledge is relatively abstract, requiring students to have a clear and logical thinking ability when thinking about problems. If only theoretical knowledge is established, students cannot deeply understand some abstract physical motion mechanisms, and practical teaching aims to break the shortcomings of traditional teaching. Students create a good physics learning environment and guide them to explore physical phenomena through practice.

3.2 Experimental Method

This paper randomly selects four ordinary classes in a university to test the physics practice teaching effect calculated by the organization and end users. The average scores of the last semester physics final exams of these four classes are collected. Class A and Class B are used as experimental classes. C Class and Class D are control classes. The experimental class adopts the physics practice teaching evaluation system for teaching, and the control class adopts traditional physics classroom teaching methods. The experiment duration is four months, that is, from March to June. A monthly test is conducted at the end of each month. The average grade of each class is used to test the learning effect of the two methods.

4. Practical Application Analysis of Physics Practice Teaching Evaluation System Based on Organization and End-User Calculation

4.1 The Design of a Physics Practice Teaching Evaluation System Based on Organization and End-User Calculations

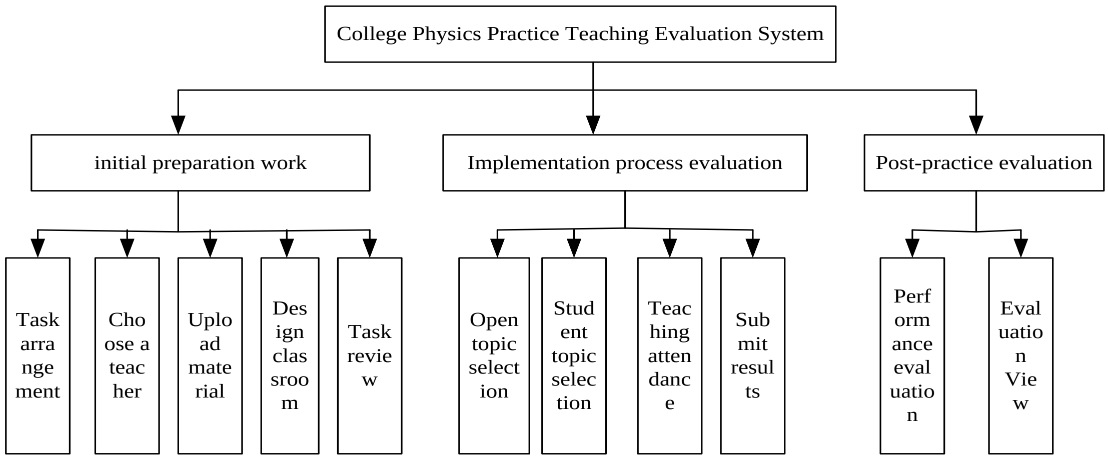

Figure 1: Physics practice teaching evaluation system

As shown in Figure 1, it is a physics practice teaching evaluation system based on organization and end-user computing design. The system includes three modules, namely the preparatory work module, the execution process evaluation and the practice post evaluation. There are five sub-modules under the pre-preparatory work module: the task arrangement sub-module refers to the physics curriculum arrangement; the teacher selection module means that students can learn online through the system and choose physics teachers from their own school or other schools to teach; the upload material module is refers to the teacher uploading relevant physics materials to the system, including courseware, exercises, etc.; the design topic refers to the teacher’s design of the next course content during the course preparation process; the audit task refers to the back-end administrator’s schedule, exams, and competitions for the physics course and other related activities for review. There are four sub-modules under the implementation process evaluation module: the open topic selection module refers to the content that the teacher chooses to explain in the classroom; the student topic selection refers to the selection of several after-class exercises arranged by the teacher to consolidate it, and students are not required to do all of it. Reduce the burden of students' homework; teaching attendance refers to the attendance management of the teacher's class and the student's listening situation; the submission of the achievement module refers to the test of the student's learning results after a stage of teaching. There are two sub-modules under the post-practice evaluation module: the evaluation module refers to the teacher's evaluation of the student's academic performance, for example, the teacher can evaluate the student's recent learning attitude; the evaluation viewing module refers to the evaluation of the student's satisfaction with the teacher's teaching evaluation.

4.2 Application Analysis of Physics Practice Teaching Evaluation System Based on Organization and End-User Calculation

(1) Analysis of teaching effect before experiment

Table 1: The average scores of the final exams last semester

	A	B	C	D
Final exam results last semester	47.6	48.2	47.3	46.8

It can be seen from Table 1 that the average scores of the final exams in the four classes are distributed between 46.5-48.5, indicating that the physics learning conditions of the four classes are similar, and there is no obvious difference in the average class scores, which excludes the unequal scores for the experimental test. The interference factors increase the scientific rationality of the experimental results.

(2) Analysis of teaching effect after experiment

Table 2: Average results of the four monthly exams

	A	B	C	D
March monthly exam	50.3	49.6	46.9	47.4
April monthly exam	53.4	53.8	47.6	48.5
May monthly exam	57.2	58.3	48.1	47.7
June monthly exam	61.5	60.1	47.9	46.6

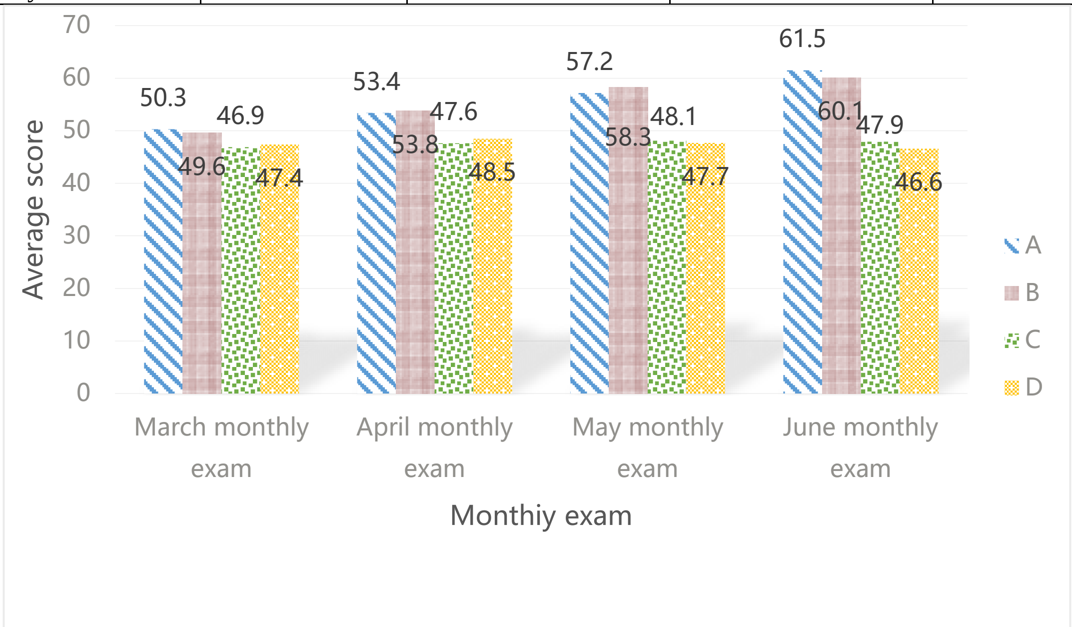

Figure 2: Physics scores under the comparison of two teaching methods

As shown in Table 2 and Figure 2, two methods are used to show the results of four months of teaching. From the figure, it can be clearly seen that the average test scores of the two experimental classes of Class A and Class B are steadily increasing each month. Moreover, the average scores of the two classes improved from failing to passing scores, which was a great breakthrough. Comparing the results of the two control classes, the results of Class C and Class D did not significantly improve, and even Class D showed a phenomenon of regression. This shows that the application of the physics practice teaching evaluation system based on organization and end-user calculations in physics teaching activities can promote the improvement of students' performance. The system can be used in actual physics teaching and can improve students' learning effects.

5. Conclusion

This article finally verifies whether the use of the physics practice teaching evaluation system can help students learn physics. It is found that the evaluation system based on organization and end-user calculation optimization combined with physics practice teaching has a significant effect on improving students' physics performance. It verifies that the system is in teaching the practicality of this aspect solves the problems in physics teaching practice to a certain extent, and points out the direction for the future research of physics teaching mode.

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