

# *Research on ATEs for Computer Experiment Based on Cloud Platform*

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**Abstract:** Practical teaching plays an irreplaceable role in the cultivating of students' practical ability and innovative ideas. Under the situation of the new education reform, aiming at constantly updating the curriculum content and distinguishing the different teaching contents and task settings for different specialties, this paper studies the construction method and implementation effect of the experimental automation training and examination system based on cloud platform. It includes the construction of cloud platform, the function and flow of the system, the composition of learning resource, the design of question bank, the improvement of teaching process and the optimization of evaluation scheme. Statistical data show that the application of the system in promoting laboratory opening, improving resource utilization, improving learning effect and promoting students' learning enthusiasm and initiative has a significant effect, and it has played a positive role in promoting experimental teaching reform.

## 1. Introduction

Practical teaching plays an irreplaceable role in cultivating students' practical ability and innovative ideas. Experimental course teaching is the basis and important part of practical teaching, and its function and role is no longer just the verification and supplement of theoretical teaching. It should play an important role in consolidating and deepening theoretical understanding, cultivating students to master scientific methods and improving scientific experimental ability in college talent training.

With the rapid development of China's market economy and the renewal of network information technology, the traditional college computer experiment teaching activities can no longer meet the requirements of students' development. Therefore, college computer teachers should take effective measures to reform the computer experiment teaching curriculum and promote the all-round development of students[1-2]. Under the new situation of educational reform, supported by cloud platform technology, we study the construction method and implementation effect of automatic experiment system.

## 2. Scheme of ATES

### 2.1 Main function

Automatic training and examination system (ATES) is a new generation of network examination platform for information technology examination in education and training industry[3-5]. It has the characteristics of accurate identification, convenient implementation, flexible configuration, unique design, safety and reliability, and can also realize the automatic evaluation of complex computer ability. The ATES adopts result recognition technology, process recognition technology, simulation virtual technology and semantic recognition technology to ensure the accuracy, authority and scientific of automatic evaluation. The ATES has an open question bank management system and the most flexible test paper generation system. At the same time, it provides the functions of question bank, test questions and test paper import and export based on XML, and provides question setting tools for operation and programming questions, so as to realize the rapid collection and high sharing of resources. The historical examination result viewing function provided by the ATES can view the examination situation of all students who use the system for examination. With the help of the examination tool, it can restore the online examination situation of candidates, which fully meets the needs of teaching evaluation in Colleges and universities.

The process of ATES management platform is divided into three stages: before examination, during examination and after examination. Preparation before examination includes authority management, question bank management, examinee management, test paper management and parameter management. The examination process includes software upgrade service, selecting examination mode, starting examination service, starting cheating alarm program, monitoring management and closing examination service. After the examination, it includes log management, score management, manual marking, score statistics and examinee examination functions. The examinee's operation process is very simple, which only occurs in the process of examination, mainly including examinee login, examination, test paper recovery and end submission. The management platform process and student operation process of ATES are shown in Figure 1 and Figure 2.

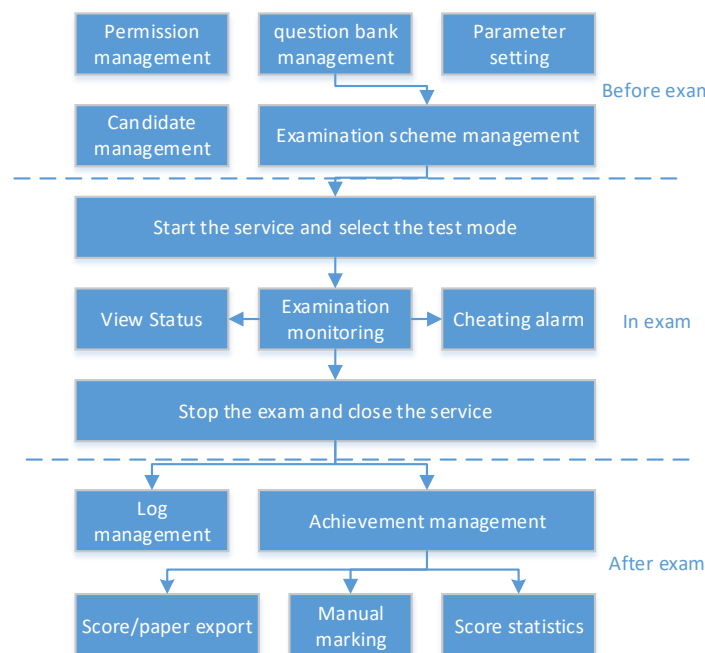


Figure 1: ATES operation flow chart

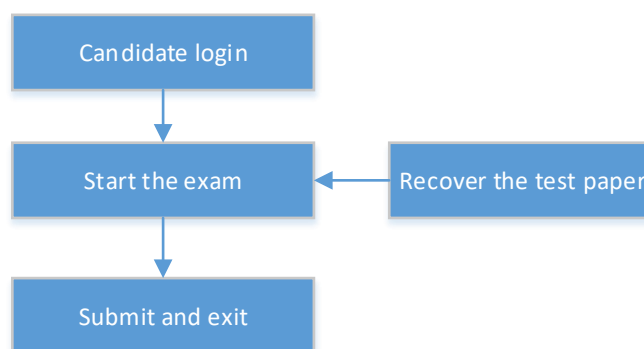


Figure 2. Student operation flow chart

## 2.2 Design of Question Bank

Based on the hardware equipment and software environment, build a dynamic and growing test question bank resources for experimental course teaching and testing that adapt to the content of teaching materials and meet the needs of differentiated teaching. Taking the experiment of university computer programming course as an example, the types of course test questions are divided into verification, design and comprehensive experimental questions. It is necessary to add topics of interest. The construction of question bank should include operation mode, exercise mode and examination mode. The content of the question bank should be divided into units to establish exercise questions, which include unit test and comprehensive test. The experimental report in the form of homework and computer operation cooperate to investigate the students' preview effect after class and learning attitude in class; Unit test scheme and questions cooperate to examine students' learning process and phased learning effect; Comprehensive test plan and questions cooperate to test students' comprehensive application ability; The exercise plan and topics of interest can cooperate to solve the problem of students' individual needs for differentiated learning content. At the same time, topics of interest can serve to stimulate students' interest in learning. The scheme of question bank for the experiment course is shown in Figure 3.

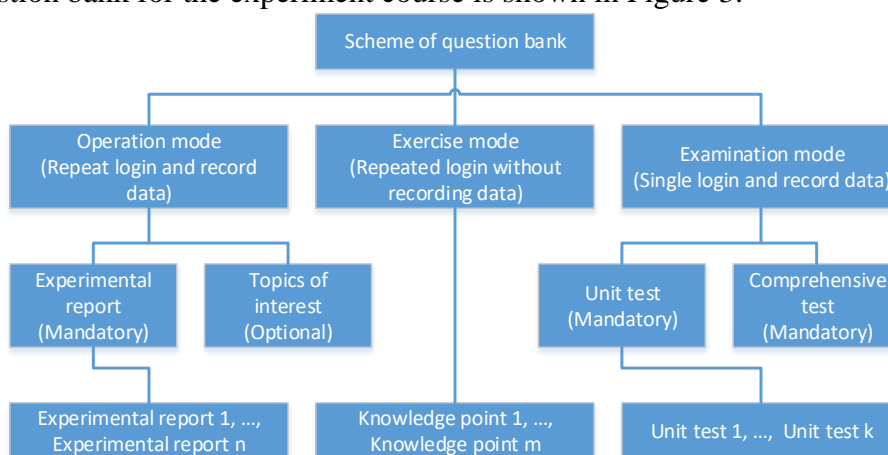


Figure 3: The scheme of question bank for the experiment course

## 2.3 Evaluation

Explore the diversity of assessment methods to promote the development of students. The traditional examination and evaluation design of experimental course teaching tends to pay attention

to the quantity and degree of learners' knowledge. There is also a lack of accuracy and one sidedness in taking a single comprehensive test as the examination basis of students' learning effect[6-7]. The assessment and evaluation of practical courses should not only pay attention to the effect of learning, but also pay attention to the modal motivation and mode process of learning. On the basis of encouraging students to be optimistic, United, cooperative and independent, we strive to improve the objectivity, accuracy and scientificity of curriculum evaluation by paying attention to the comprehensive evaluation of students' learning attitude, learning process and application ability.

### 3. Implementation effect of ATES

The application and implementation of computer experiment ATES based on cloud platform [8-11] has achieved remarkable results in experimental teaching mode, curriculum resource construction and assessment and evaluation mechanism.

Improve the experimental teaching process and optimize the teaching implementation process of college computer basic experimental course. At present, in the teaching process of college computer basic experiment course, students' task is to preview the experimental report, listen to the teacher's explanation in class, debug the program on the computer, and summarize the experimental report; After the transformation, it will be changed into preview of the experimental report, computer debugging program and summary of the experimental report, which can be selected as exercise questions. The process can carry out cooperation between students or under the guidance of teachers, carry out unit self-test, and select comprehensive application questions of interest. The teacher's task is to introduce, explain and demonstrate in class, guide students' experiments, and review the experimental reports after class; It is transformed into individual guidance and help, after-school experimental report review, unit self-test result analysis, and the analysis results are used as feedback to guide students' learning process. Through the improvement of teaching process, the role of students as the center and teachers as guidance and help will be transformed. It also takes the teaching content and teaching process as the center, and adapts to the teaching process. With the help of software system, students have clear class objectives and standardized process, reduce external interference in students' learning process as much as possible, promote cooperation between students and teachers and students, and teachers focus on guiding and helping students. The teaching process should be conducive to stimulating students' learning enthusiasm and initiative, so as to promote students' autonomous learning.

Based on the hardware equipment and software environment, build a dynamic and growing test question bank resources for experimental course teaching and testing that adapt to the content of teaching materials and meet the needs of differentiated teaching. At present, the types of test questions in experimental courses are divided into verification, design and comprehensive experimental questions. On this basis, it is necessary to add interest experimental questions. The construction of test question bank should include operation scheme, exercise scheme, unit self-test and comprehensive test scheme; The content of the test question bank should be divided into units to establish exercise questions, self-test questions and comprehensive test questions. The preview experiment report in the form of homework and computer operation cooperate to investigate the students' preview effect after class and learning attitude in class; Unit self-test scheme and questions cooperate to examine students' learning process and phased learning effect; Comprehensive test plan and questions cooperate to test students' comprehensive application ability. The exercise plan and interest experimental questions can cooperate to solve the problem of students' individual needs for differentiated learning content. At the same time, interest experimental questions can serve to stimulate students' interest in learning.

Explore the diversity of assessment methods to promote the development of students. The traditional examination and evaluation design of experimental course teaching tends to pay attention to the quantity and degree of learners' knowledge. There is also a lack of accuracy and one sidedness in taking a single comprehensive test as the examination basis of students' learning effect. The assessment and evaluation of practical courses should not only pay attention to the effect of learning, but also pay attention to the modal motivation and mode process of learning. On the basis of encouraging students to be optimistic, United, cooperative and independent, we strive to improve the objectivity, accuracy and scientificity of curriculum evaluation by paying attention to the comprehensive evaluation of students' learning attitude, learning process and application ability.

During the implementation of the system, the learning results of the four courses of Programming Experiment I, Programming Experiment II, College Computer Foundation and Database Application Technology were statistically analyzed. The statistical analysis of different courses is carried out according to their grades, and the grades of each subject achieve normal distribution. The distribution of grades is shown in Figure 4.

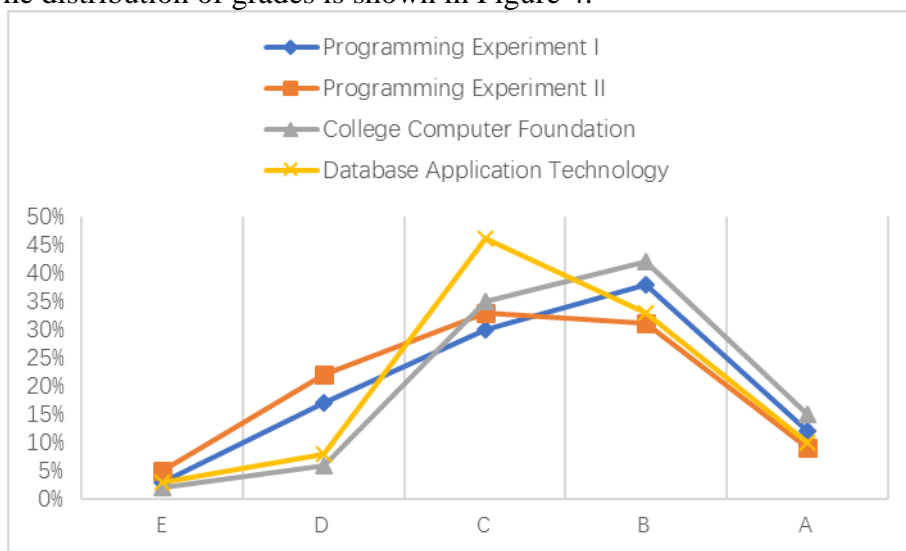


Figure 4: The statistical analysis of different courses

In order to comprehensively analyze the implementation effect of the automatic computer experimental training and examination system based on the cloud platform, we select five dimensions: laboratory opening, laboratory management, resource utilization, learning effect, learning enthusiasm and initiative to make a more comprehensive evaluation of the system compared with the traditional way, as shown in Figure 5. The implementation of automatic computer experimental training and examination system based on cloud platform is superior to the traditional experimental teaching methods in promoting the opening of laboratory, improving resource utilization, improving learning effect and promoting students' learning enthusiasm and initiative, especially in promoting the opening of laboratory and improving students' learning enthusiasm and initiative. In the initial stage of the application of the system, the workload in laboratory management increased significantly. The reason is that the cloud platform architecture is adopted to realize the centralized management and distributed deployment of the system, and the requirements at the technical level are higher than those in the traditional way. In addition, the implementation of ATEs requires the design of supporting training and examination schemes and the construction of rich curriculum resources, which significantly increases the workload in the initial stage. I believe that with the in-depth application of the system, the gradual familiarity with

technology and the gradual enrichment and improvement of resources, the advantages in this aspect will be gradually revealed.

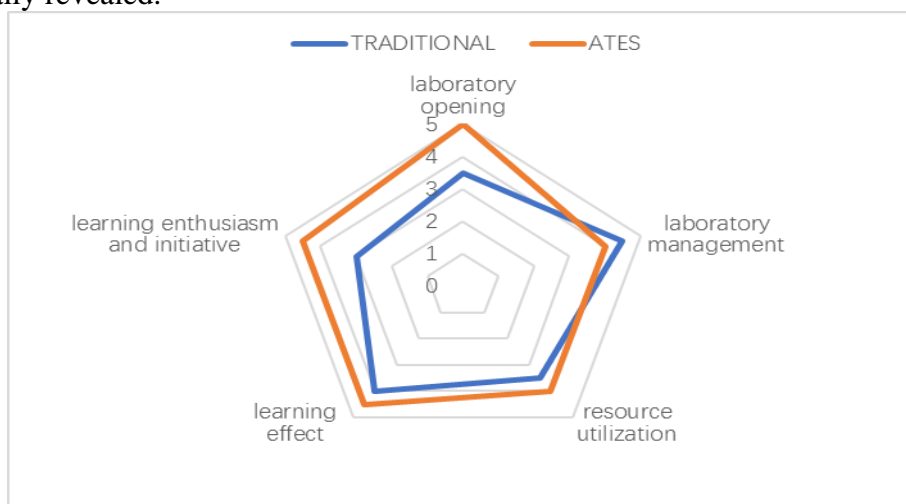


Figure 5: Comparison of comprehensive effects of system implementation

#### 4. Conclusion

The computer experiment ATES based on cloud platform has the characteristics of centralized deployment, small maintenance workload, strong adaptability, low cost, flexible configuration, personalized service and so on. In practice, the system is applied to realize the optimal design of the teaching process and reposition the roles of teachers and students. Promote the transformation of the role of students as the center and teachers as guidance and help, and effectively stimulate students' learning enthusiasm and initiative. The application of the system has played a good supporting role in the comprehensive evaluation of students' learning attitude, learning process and application ability, promoted the optimization and improvement of the examination and evaluation scheme, and effectively improved the objectivity, accuracy and scientificity of the course examination and evaluation. The application of the system has played a positive role in promoting the reform of experimental teaching.

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