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## Reengineering Computing Pedagogy: Digital Transformation in Tertiary Education

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KEYWORDS	ABSTRACT
Information Background, College Computers, Teaching Mode.	Amidst ongoing socioeconomic development, interest assessment technologies and information technologies have become increasingly integrated into daily life, exerting a notable influence on computer software instruction in higher education. This study implements a multi-task-driven pedagogical approach, dividing participants into experimental and control groups to comparatively analyze students' knowledge acquisition, skill proficiency, and competency levels. Empirical results demonstrate superior mastery among experimental group students, confirming the efficacy of task-driven methodology in enhancing knowledge point assimilation. Quantitative analysis reveals: written examination scores of 76.873 (experimental) versus 73.086 (control), alongside assignment scores of 78.238 versus 62.832 respectively. These findings indicate that while the multi-task-driven approach yields statistically insignificant differences in theoretical knowledge acquisition ( $p > 0.05$ ), it produces marked improvements in practical application outcomes ( $p < 0.01$ ), thereby underscoring a significant performance dichotomy between conceptual understanding and operational competency development.

### 1. Introduction :

In the current era of rapid iteration of information technology, various cutting-edge technologies are accelerating innovation and deeply reshaping the social life form<sup>[1-2]</sup>. This trend has injected vitality into higher education, but also brought unprecedented challenges<sup>[3]</sup>. Although advanced information technology has added innovative opportunities to teaching scenarios, the traditional computer teaching model is difficult to break through due to inertia, and the integration of courses with modern teaching needs has lagged significantly, forcing the reform of computer

courses in colleges and universities to be imperative<sup>[4]</sup>.

Previous research has already laid both theoretical and practical foundations for teaching reform. For example, Shankararaman and colleagues drew on constructivist learning theory and the need to build students' information literacy. By looking at the reality of public computer courses in Chinese universities, they demonstrated how a "task-driven and group learning" approach can be effectively implemented and why it works in practice.<sup>[5]</sup>; Chuang et al. pointed out that although the computer teaching model is an emerging field and

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is in the exploratory stage, there is still a broad space for optimization in improving teaching effectiveness, which urgently needs in-depth research by educators<sup>[6]</sup>. As a core course for cultivating students' basic electronic technology capabilities, university computer courses, although not a major, occupy an important position in the knowledge system<sup>[7-8]</sup>. However, through teaching practice and experience summary, it is found that the inherent disadvantages of the traditional teaching model are becoming increasingly prominent<sup>[9]</sup>.

Based on this, this paper takes the computer teaching model in colleges and universities as the research object, combines cutting-edge scientific and technological achievements, systematically analyzes the limitations of traditional teaching methods, and proposes targeted optimization paths and reform strategies, aiming to promote the modernization of computer teaching<sup>[10]</sup>.

## **2. Research on Computer Teaching Models in Colleges and Universities in the Context of Digitalization**

### **2.1 Status of Computer Education Reform in Higher Education in the Context of Informatization**

Problems of traditional teaching of computer from largely limits the institutions of higher learning in computer teaching and students' computer level ascension, although most of the students has a strong ability of computer self-study, but should be for all the student to carry on the system of colleges and universities, the comprehensive teaching, otherwise it will make the traditional computer course is difficult to play a role, even have a

negative effect of teaching.

#### **(1) The textbooks are relatively backward, and there are no corresponding practical cases to help-**

In the context of information development, although the computer technology is changing with each passing day, there are still many problems in the computer teaching courses in colleges and universities. For example, the teaching content is rigid and unitary, and the content in the book cannot present many cases teaching. So, students in the classroom cannot focus on learning, over time to learn to produce fidgeting quickly put. It is difficult for students to make good use of the knowledge they have learned, and their learning goals are not clear. They only learn the rigid knowledge from books, and they cannot mobilize their interest and initiative in learning. Many universities' teaching results are not optimistic and cannot achieve the corresponding goals.

#### **(2) Placing too much emphasis on theory and too little on practice-**

At present, computer teachers do not pay enough attention to computer courses, and the school's class schedule is also very small, and the teaching is often attached importance to theory rather than practical operation, so it is difficult to improve students' technology. For computer teaching, we must pay attention to let the student in field and increase a certain course of time, only time is up, can make learning not only in the "paper", more practical technology to teach students, let students could use the computer and their professional class, the combination of better learning. In addition, in recent years, China is also vigorously promoting

the new curriculum reform, computer practice teaching is more and more attention, because if only rely on theory is difficult to cultivate high-quality computer talents and ensure that all students timely adapt to the changes of the new era, comprehensive development.

### **(3) Teaching is not innovative enough to attract students-**

Looking at how computer teaching is currently carried out in colleges and universities, it's clear that there isn't enough focus on innovation. As a result, the teaching methods are often outdated and one-dimensional. This not only fails to spark students' interest but can even lead to feelings of boredom and disengagement.

## **2.2 Direction of Computer Education Reform in Colleges and Universities under the Informatization Background**

It is an urgent problem to carry out computer teaching reform and improve the traditional teaching methods, and it is also an inevitable requirement to adapt to the development of The Times under the information background. The author thinks that Chinese universities should carry out computer teaching reform from the following directions

### **(1) The high-quality application of information-based teaching means-**

Successfully completed the first step of computer teaching reform is to use the informationization teaching technology and equipment, because the computer professional is a little a lot, especially it can connect with information technology, information technology development is based on the computer, so the school can vigorously

promoting informationization teaching mode in teaching and auxiliary equipment based on the information environment.

### **(2) The scientific transformation of teachers' teaching concept**

The traditional teaching concept obviously cannot be compared with the modern information technology, so the teaching of computer in colleges and universities must be reformed as soon as possible to follow the footsteps of the information age. At the same time, it should be noted that the quality of students is also very important to their learning career. We should not only pay attention to knowledge teaching, but also pay attention to the practical ability and quality of students.

### **(3) Scientific construction of curriculum system**

Building a well-structured curriculum is the foundation of meaningful teaching reform. The traditional system, however, is too limited—placing most of its emphasis on delivering theoretical knowledge while neglecting the development of students' practical skills and overall abilities. Addressing these shortcomings and creating a more balanced, scientific curriculum has become an urgent task. In this new system, the ultimate goal is to nurture students' well-rounded qualities and prepare them for real-world challenges.

## **2.3 Strategies for Enhancing Computer Teaching in Universities in the Digital Era**

### **(1) Determine the objectives of computer teaching in colleges and universities-**

In the context of information technology, the improvement of teaching mode in colleges and universities needs to pay attention to the following

problems:

1) It is necessary to do a good job in the basic teaching of computer knowledge, because the work of basic teaching is particularly important. At the same time, it is very critical in the learning career of students, because the practice can only be carried out based on a solid theoretical foundation.

2) To enhance the level of students' computer application practice, so as to lay a foundation for future practical teaching.

**(2) To develop a sound computer teaching system-** In the teaching of computer, whether the system is good or not is very important, which contributes to the combination of theory and practice. So, to carry out the computer teaching reform, we must first carry out the reform of the computer system, improve. A set of scientific and efficient system of computer teaching, to reform the computer better, so the school more effort and give enough support to yourself and let the teachers and students are actively into the innovation of the computer teaching, and organization of teachers training for many times, let the students and teachers can be very good for teaching.

**(3) The update of computer teaching faculty-** At present, in the computer teaching in colleges and universities, although the old teachers have made great contributions to computer teaching, but in the context of the rapid development of information, the old teachers themselves have mastered the knowledge points and the use of teaching methods have been inconsistent with the current requirements of computer teaching in colleges and universities. In computer teaching, universities shouldn't rely solely on senior faculty. It's equally

important to bring in fresh talent and strengthen teacher training. Doing so will build a stronger teaching team and provide solid support for the continued development of computer education in higher education.

### **3. Research on Computer Teaching Models in Colleges and Universities in the Context of Informatization**

#### **3.1 Experimental Subjects**

This paper chooses Class A and Class B of two local universities as the research objects, and divides them into experimental class and control class. Both of these two classes have taken relevant exams when they were enrolled, and their results are similar. Moreover, their majors are both computer science. Through the analysis of various data of the final exam scores of last semesters, the two classes have similar basic computer knowledge, and the grades of the scores are also quite similar.

#### **3.2 Application of Task-Driven Teaching Mode**

In the learning process of students, through interviews with students and re-learning of literature materials, the experiment decided to adopt the multi-task-driven teaching mode according to the characteristics of students' different levels and different abilities to accept knowledge, which should not only consider the overall characteristics of students' learning, but also consider the individual differences of students. Multi-tasking mainly refers to the occurrence of multi-layer tasks in a teaching activity, forming the situation of successive and progressive levels. In the preparation stage, through the investigation of students' information technology level and the

collection of relevant data, the students' information technology ability is analyzed and evaluated. Then, according to the teaching materials and students' level, the key points and difficulties of teaching are predicted. Then, teachers' study and discuss carefully to form the teaching design. In the end, teachers design multi-layered tasks according to the teaching components and create their own task situations.

#### 4. Exploration and Discussion of Computer Teaching Mode in Colleges and Universities under the Background of Informationization

(1) Let's look at the following after a semester of learning, the two classes of PowerPoint learning effect assessment. The semester examination is divided into two parts: written examination and work evaluation. The proportion is 60% for written examination and 40% for works. The written test adopts the closed-book test, and the assessment content is theoretical knowledge content. Since the same teacher teaches, the review content is exactly the same. The assessment form of the work is to show and report the work and evaluate the students' performance. In a word, evaluation should not only evaluate students' knowledge and skills, but also their abilities. The test results are shown in Figure 1 and Table 1:

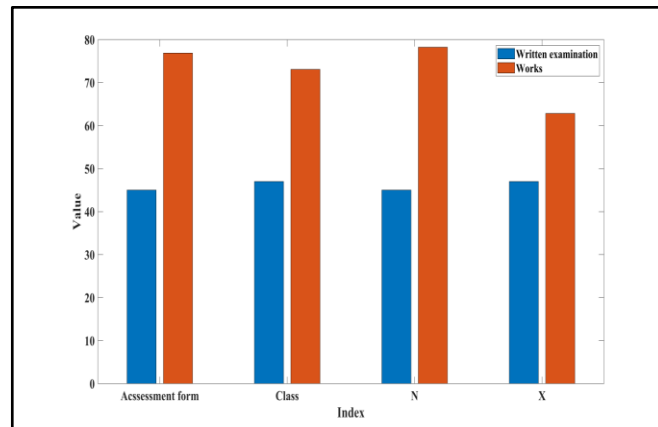


Figure 1. Comparison of exam results

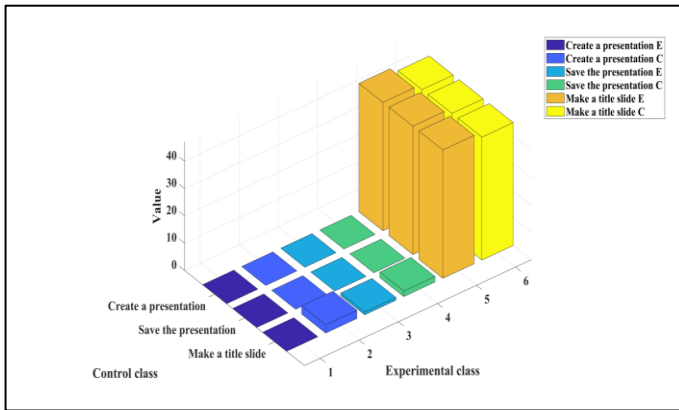
(2) Students make full use of what they have learned and use the Internet to collect materials (including text, pictures, sound, etc.) to make presentations from various angles. Through personal self-evaluation and mutual evaluation by groups, students further strengthen the mastery of each operation skill of PowerPoint software. First we make presentations given by behind the evaluation gauge table to obtain the following data, we can see from the table and experimental classes of three knowledge master degree reached 100%, 100%, 97.9%, and the control class two knowledge master degree reached 100%, 100%, 88.9%, the rest of the knowledge mastering degree: experimental classes > control class. Therefore, the use of "task-driven" teaching method can effectively improve students' mastery of various knowledge points. Specific data are shown in Table 2 and Figure 2.

Table 1. Comparison of exam results

Assessment form	class	N	X
Written examination	Experimental class	45	76.873
	Control class	47	73.086
Works	Experimental class	45	78.238
	Control class	47	62.823

Table 2. Evaluation form for making presentation

Knowledge points	Will not operate		Basic operation		Number of skilled operators		Proficiency	
	Experimental class	Control class	Experimental class	Control class	Experimental class	Control class	Experimental class	Control class
Create a presentation	0	0	0	0	47	45	100%	100%
Save the presentation	0	0	0	0	47	45	100%	100%
Make a title slide	0	3	1	2	47	45	97.9%	88.9%



**Figure 2.** Evaluation form for making presentation

## 5. Conclusion

This study looks at the challenges of teaching basic computer courses in colleges and universities and proposes a more flexible teaching model that adapts to both the school's environment and students' needs. To test the approach, students were split into an experimental group and a control group. The results showed clear differences: the experimental group scored an average of 76.87 on written exams compared to 73.09 in the control group, and 78.24 on homework compared to 62.83 in the control group. Beyond the numbers, the study also discusses practical ways to improve computer teaching, with the goal of offering useful guidance for future reforms in higher education.

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