

Analysis on the Problem of Computer Teaching Reform Based on Optimized Strategy Decision-making Model

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Abstract.

Many colleges and universities have taken place large changes in the configuration of computer education resources and education environment. This paper expounds the current status and cognition of computer teaching in colleges and universities. And on the basis of this, this paper analyzes the problems one by one which exist in the colleges and universities' computer teaching. At the same time, by applying mathematical modeling thought, this paper constructs the mathematical model and proposes optimization strategy decision for colleges and universities' computer teaching reform. To some extent, it also provides reform basis and time path for colleges and universities' computer teaching.

Introduction

Many colleges and universities' students will more or less have a psychological inversion in learning, especially the generation after 90s. It requires that computer teachers should teach students according to their different learning characteristics and find out the study way and teaching method which are suitable for students who have different characteristics[1-3]. Moreover, only by inspiring the students' interests for learning the computer can they achieve the best effect of teaching and learning. As a result, in order to actively cope with the situation demands of social development, China's colleges and universities should continuously reform and optimize the computer teaching and improve the actual learning efficiency and quality of computer[4].

The present situation and cognitive of colleges and universities' computer teaching.

At present, large changes have taken place in the computer teaching of China's colleges and universities, especially in the teaching resources and students' learning space. The education resources continuously increase, which have been put into the colleges and universities[5]. Thus, the computer-related learning environment has also changed. Along with China's accelerated development of economy in recent years, the education ministry of every local government increases the investments to the education teaching for each region[6,7]. Network Center, information experiment center and computer classrooms are gradually becoming the basis related teaching places of colleges and universities. And colleges and universities' related computer resources are really used by the majority students. Specific is shown in the following figure.

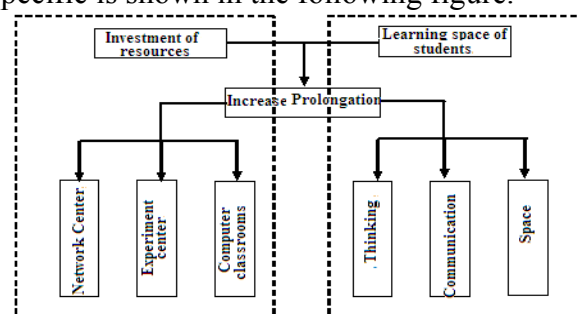


Fig 1. The transformation of colleges and universities' computer teaching

As shown in Figure 1, the spectacular rise of the computer network technology in China has bigly changed the colleges and universities' students in their learning space and learning. In previous teaching process, the teacher teaches oral interpretation and explains content, and students are passive to take notes and absorb knowledge. There are little actual interaction process. However, online teaching and online courses have increased the intensity of mutual cooperation and communication between students. Because different teachers and students will consider and analyze the same question from different angles, they will have different understandings so that there are differences in the actual answers[8]. Through the interaction and communication between students and teachers, the way of thinking and learning thinking can be expanded so as to learn more knowledge.

Computer teaching problems of colleges and universities

There are Problems in Colleges and Universities' Computer Foundation Teaching Content. China's colleges and universities have invested a lot of financial and material resources and manpower into computer-related teaching. Thus, in the related teaching of computer, China has obtained big improvement in the construction of its hardware and software[9]. However, to some extent, with the rapid development of computer education, the problems which exist in the computer teaching of colleges and universities are more outstanding. There are four common problems on the basic teaching content. Specific is as shown in the Figure below.

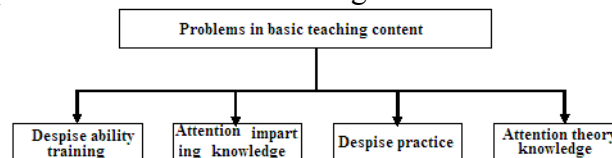


Fig 2. There are problems in the basic computer teaching contents of the current colleges and universities

As shown in Figure 2, at present, there are a lot of computer teaching courses as well as its basic teaching contents which exist the situation that “despise the ability training, pay attention to imparting knowledge, despise the practice and pay attention to theoretical knowledge”. Computer updates and reforms its teaching content very slowly so that a lot of computer teaching knowledge has been unable to adapt to the actual development and demand of students' employment. As a result, students have produced the resistance of leaning computer. This situation is very unfavourable for students to learn computer knowledge. Moreover, it also leads to a certain pressure on the teaching level and quality of colleges and universities.

Analysis on the Pressing Task at Issue of Colleges and Universities' Computer Teaching. From the problems which exist in the basic teaching content and teaching, it is obtained that the distribution of colleges and universities' actual teachers is uneven and they do not pay much attention to the popularization of computer. In recent years, colleges and universities are constantly improving their strength of teachers, but they do not pay more attention to the relevant computer teaching and do not popularize it. The teaching levels of many related colleges and universities are different from each other. Many teachers lack practical teaching experience and do not have good methods and skills, which have an impact on the teaching effect and level. Assume that variables $Y_i (i = 1, 2, \dots, n)$ of computer teaching faculty obey the computer teaching practice which considers $\beta_1 + \beta_2 X_{2i}$ as mean and σ^2 is the normal distribution of variance, therefore, density function of colleges and universities' computer teaching integration advantages $Y_i (i = 1, 2, \dots, n)$ is[10] :

$$f(Y_i) = \frac{1}{\sqrt{2\pi}\sigma} \exp\left\{-\frac{[Y_i - (\beta_1 + \beta_2 X_{2i})]^2}{2\sigma^2}\right\} \quad (1)$$

In formula (1), in the process of computer teaching, research-related teaching and application-related teaching are carried out to better cultivate students' research ability and application ability. It can be deduced that $Y_i, Y_j (i \neq j, i, j = 1, 2, \dots, n)$ are not related. And for normal distribution, this

means independent. Because work time of school and the environment of treatment as well as computer related applications have some differences, a lot of colleges and universities' computer teachers outflow, which further aggravates the pressure of constructing the colleges and universities' computer teachers team. Thus, the overall teaching level and teaching ability also subsequently fall. By formula (1), it is obtained that the joint probability distribution of random variable $Y_i (i = 1, 2, \dots, n)$, namely, density function of n-dimensional random vector (Y_1, Y_2, \dots, Y_n) is as follows:

$$f(Y_1, Y_2, \dots, Y_n) = (2\pi\sigma^2)^{-\frac{n}{2}} \exp\left\{-\frac{1}{2\sigma^2} \sum_{i=1}^n [Y_i - (\beta_1 + \beta_2 X_{2i})]^2\right\} \quad (2)$$

By formula (2), if the value of explanatory variable $X_{2i} (i = 1, 2, \dots, n)$ is given (it is still expressed as X_{2i}) and the experimental value and observed value of random variable Y is $Y_i (i = 1, 2, \dots, n)$. That's to say, in formula(2), teachers will impart related development projects with practical application and creativity on students. Meanwhile, students should fully utilize Internet, library and other related resources in time and ensure their own actual computer time. So $Y_i (i = 1, 2, \dots, n)$ can be considered as the sample values under the condition that the value of variable $X_{2i} (i = 1, 2, \dots, n)$ is given. Thus, (Y_1, Y_2, \dots, Y_n) is a point on the n dimensional space. In the process of practice, if they only know the theory knowledge, facing with relatively simple relevant procedure design, they will also be unable to deal with it. It is very difficult to teach students the related ideas of procedure design only by taking advantage of theoretical knowledge. So from formula (2), it is obtained that the likelihood function of a random variable Y is [11]:

$$L(\beta_1, \beta_2; \sigma^2) = (2\pi\sigma^2)^{-\frac{n}{2}} \exp\left\{-\frac{1}{2\sigma^2} \sum_{i=1}^n [Y_i - (\beta_1 + \beta_2 X_{2i})]^2\right\} \quad (3)$$

By formula (3), it is obtained that the pressing tasks at issue of colleges and universities' computer teaching include two aspects: the problems of computer's practice link and issues related to teachers' quality. The main reason is that many teachers themselves are also lacking in practical ability and their teaching contents are only theoretical knowledge. As a result, it has big differences with practical computing skills and application practice.

Optimized strategy decision-making model of colleges and universities' computer teaching reform

Computer teaching reform of colleges and universities should make it clear that computer teaching should pay more attention to the cultivation of practical ability. Although the theory is regarded as an very important basic computer education, practice is the fundamental of learning computer [3].

Along with the continuous improvement of computer technology, related courses of computer are also putting forward higher requests on actual teaching. In addition, they also require higher quality and more advanced teaching equipment. Only by this way, can they ensure the modernized development of the computer teaching. In the process of computer teaching reform, this paper assumes that based on the problems in the teaching practice and teachers' quality samples $Y = (Y_1, Y_2, \dots, Y_n)$, the logarithm likelihood function of random variable Y is $l = \ln L(\theta; Y)$. Namely, the relevant teaching plan and teaching program should be unceasingly modified and improved. At the same time, the reservation, update and unified compilation of computer teaching materials should be adjusted in time according to the actual demand. In the process of teaching, the contents of courses should be timely modified and designed. So the first-order derivative of unknown parameter θ is called as the effective score of θ based on the samples. The score of θ is:

$$U(\theta; Y) = \frac{\partial l}{\partial \theta} = \frac{1}{L(\theta; Y)} \frac{\partial L(\theta; Y)}{\partial \theta} \quad (4)$$

As shown in formula (4), according to the effective score situation of practical teaching, this paper can effectively organize the teaching content from the related forms of many aspects by the use of multimedia technology and computer technology. Sequentially, a variety of ways can be used to guide students to have a high efficiency and high quality in the study of computer technology and increase the student's teaching way, and then change the past inflexible computer teaching mode for students [8].

Because the mathematical expectation of score is zero, the mathematical expectations of the variance and score's square are equal. Namely, the following two formula are established.

$$E[U(\theta; Y)] = \int_{\Omega} \frac{1}{L(\theta; Y)} \frac{\partial L(\theta; Y)}{\partial \theta} L(\theta; Y) dY = \frac{\partial \int_{\Omega} L(\theta; Y) dY}{\partial \theta} = 0 \quad (5)$$

Formula (5) shows that in the process of teaching computer, the colleges and universities' teachers should also strengthen their own computer knowledge. According to the problems that they have in the computer related knowledge structure, they should replenish and learn the new knowledge. Only by related channels to learn and understand the new technology of computer can they better adapt to requirements that colleges and universities have on computer teachers' professional strength. Meanwhile, teachers also need to have the ability of computer operation practice. Assume that the correlation coefficient of $\ddot{\theta}$ and θ 's score is ρ , so:

$$\rho^2 = \frac{[\text{cov}(\ddot{\theta}, U)]^2}{\text{var}(\ddot{\theta}) \text{var}(U)} = \frac{1}{\text{var}(\ddot{\theta}) \text{var}(U)} \quad (6)$$

Because the optimized strategy decision correlation coefficient of colleges and universities' computer teaching reform is always between -1 and 1, teachers can stimulate students' ability to explore knowledge and improve learning ability by related Internet from the side. For example, teachers can help them to effectively use the network education on the basis of network information technology foundation. Investigation shows that Internet is primarily used by students to play games, visit the forum, send microblogging, see Post Bar and other recreational activities. The specific results of investigating the main activities of college students' surfing Internet are as shown in Table 1.

Tab 1. Statistical table of college students' major activities on the Internet

Project	Boys		Girls	
	Number of people	Proportion	Number of people	Proportion
Comments on web news	165	16.5%	56	56.0%
BBS	231	23.1%	327	32.7%
Aggregating news RSS	212	21.2%	167	16.7%
Community BBS	161	16.1%	201	20.1%
QQ/QQ group	901	90.1%	899	89.9%
MSN	106	10.6%	201	20.1%
BLOG	57	57.0%	306	30.6%
Micro-blog	581	58.1%	634	63.4%

As shown in Table 1, the biggest advantage of network education is that it is very popular in the teachers and students, and it can stimulate students' interest in learning, which are the congenital advantages that other teaching ways and methods can not match. Students can select their favorite course pattern and content by relevant network education course. The student and the teacher can also communicate with each other in time through the BBS、QQ and so on. At the same time, teachers can also explore the new learning strategies and teaching methods with the relevant auxiliary of network, such as project-based learning, individualized learning, exploratory learning, etc. That is to say $-1 \leq \rho \leq 1$, so $\rho^2 \leq 1$.

Therefore: $\frac{1}{\text{var}(\ddot{\theta}) \text{var}(U)} \leq 1$;

Namely:

$$\frac{1}{\text{var}(U)} \leq \text{var}(\ddot{\theta}) \quad \text{var}(\ddot{\theta}) \geq \frac{1}{\text{var}(U)} = \frac{1}{I(\theta)} \quad (7)$$

$\xrightarrow{\text{var}[U(\theta; Y)] = E[U(\theta; Y)]^2}$

The reason why formula (6) is set up is that the integral about sample points of joint density function in the sample space is constant1. Through the establishment of the campus local area network (LAN),

the computers of students and teachers can be connected so that when teachers impart related knowledge on students, they can freely control the students' computers, and switch the display of screen through the "radio" and other similar forms, which is benefit for students to timely finish the operations that teachers teach in the computer. When teachers explain the theoretical knowledge, they also can demonstrate in practice. Thus, students can practice in theory and learn from practice and then further improve the learning quality of student.

Conclusion

This paper analyzed related problems which existed in the process of colleges and universities' computer teaching, such as the single education mode, backward teaching content, generally poor teachers' quality and backward teaching hardware and software. By applying mathematical modeling thought and considering the basic problems of computer teaching, teaching problems of computer teaching and pressing tasks at issue of colleges and universities' computer teaching, this paper put forward the methods and measures which could improve computer teaching problems and constructed a model for the reform of computer teaching. At the same time, much attention should be paid to strengthening the improvement of computer-related teaching facilities and strengthening the construction of teaching staff. In addition, the practice of computer teaching should also be valued to emphasize the prominence of practice in the whole process of computer teaching.

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