Teaching Design of Fundamentals of College Computer Course Based on Mind Map with 3w2h

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Abstract. The knowledge of fundamentals of college computer is wide and fragmentary. How to make students understand and master numerous and complicated knowledge is the key problem in teaching. Mind map is a powerful tool to solve this problem. For this reason, according to the law of knowledge learning and the characteristics of course, the paper gives the teaching design idea of mind map with 3w2h, discusses the corresponding teaching design from four aspects, and makes a comparative experiment on two teaching classes. The results show that the mind map with 3w2h can better guide students to learn, understand, remember and apply, be conducive to guiding students' passive learning to active learning, improve students' interest and efficiency in learning, form the habit of inquiry learning, and then achieve good teaching effect.

Keywords: fundamentals of college computer; 3w2h; mind map; teaching design

1 Introduction

As a general course for college students, Fundamentals of College Computer plays an important role in the training of professional talents [1]. The course mainly emphasizes the use of common system software and application software, while taking into account the frontier knowledge in the field of computer application. Through the study of this course, students can master the basic knowledge of computer software and hardware, cultivate students' computer application ability in this major and related fields, cultivate students' ability to analyze and solve problems with computer, and improve students' computer culture quality.

It can be seen that Fundamentals of College Computer has the characteristics of wide range of knowledge and fragmented knowledge points, which makes it difficult for students to learn, understand, remember and apply. Mind map [2,3] has the characteristics of divergence, association, and organization. It can visualize miscellaneous knowledge well. By using the skill of paying equal attention to graphics and text, it can show the relationship between different levels of topics with the hierarchical graph of mutual subordination and correlation, and establish memory links between theme keywords and images, colors, etc. Therefore, many colleges and universities apply mind map to course teaching [4] based on the advantage that mind map can help students understand and remember. Yan Dan [5] pointed out that according to mind map, students integrate knowledge points again and construct key knowledge structure points under the guidance of teachers, which not only promotes the realization of teachers' teaching objectives, but also effectively improves students' learning efficiency and self-learning ability. Liang Xiaoou [6] studied the effective application of mind

map in the learning of network knowledge, visualized the thinking process in the form of knowledge network, deepened the impression and had a more systematic and comprehensive understanding of network knowledge. In view of the characteristics of Fundamentals of College Computer involving a wide range of contents and limited class hours, starting from mind map, Zhang Qiongmin [7] explored how to build an efficient classroom to improve the teaching quality of the course, and pointed out that mind map can help students complete the integration of scattered knowledge points, clarify the context of knowledge, and improve learning efficiency.

To sum up, mind map can effectively improve the teaching effect of teachers and the learning efficiency of students. However, in these teaching research and teaching reform, most of them are mind map based on knowledge points. Although they can clearly map out the outline of knowledge, the knowledge is still fragmentary. Aiming at the problem that knowledge is fragmentary and hard to remember, this paper puts forward the teaching design based on mind map with 3w2h according to the regular pattern of knowledge learning and the characteristics of the course Fundamentals of College Computer.

2 Teaching desingn idea of mind map with 3w2h

Firstly, knowledge points are summarized and refined according to knowledge units; secondly, refined knowledge points are classified and made mind map with 3w2h; finally, the teaching design is carried out according to the mind map with 3w2h, which is shown in Figure 1.
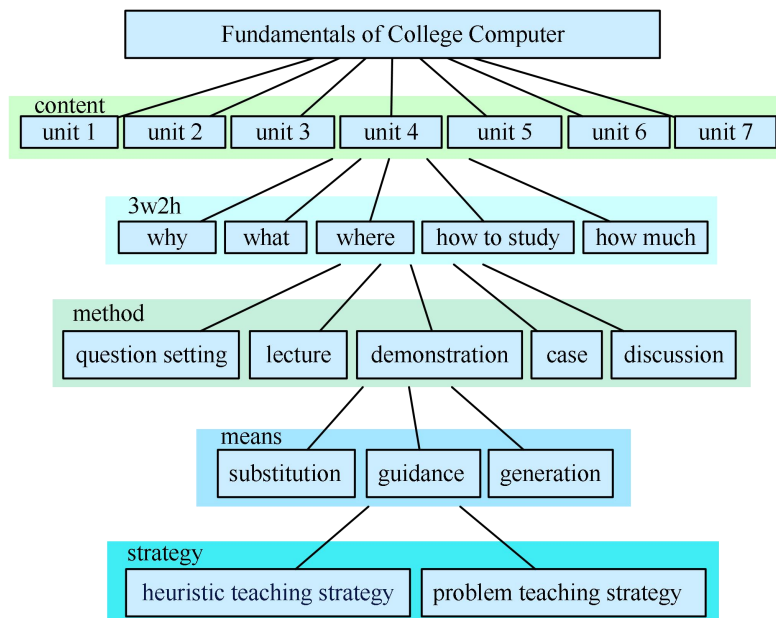

Fig. 1. Teaching design of mind map with 3w2h

3 Discussion on teaching desingn of mind map with 3w2h

The paper studies the teaching design of mind map with 3w2h from four aspects: teaching content, teaching method, teaching means and teaching strategy.

3.1 Teaching content design

For the design of teaching content, it needs to make clear why to learn this knowledge, what to learn specifically, where to apply this knowledge, how to learn these knowledge efficiently, how much to learn these knowledge, which is called as 3w2h mode. According to mind map with 3w2h, the fragmentary knowledge can be shown systematically. Taking the database unit as an example, the teaching content design of mind map with 3w2h is shown in Figure 2.
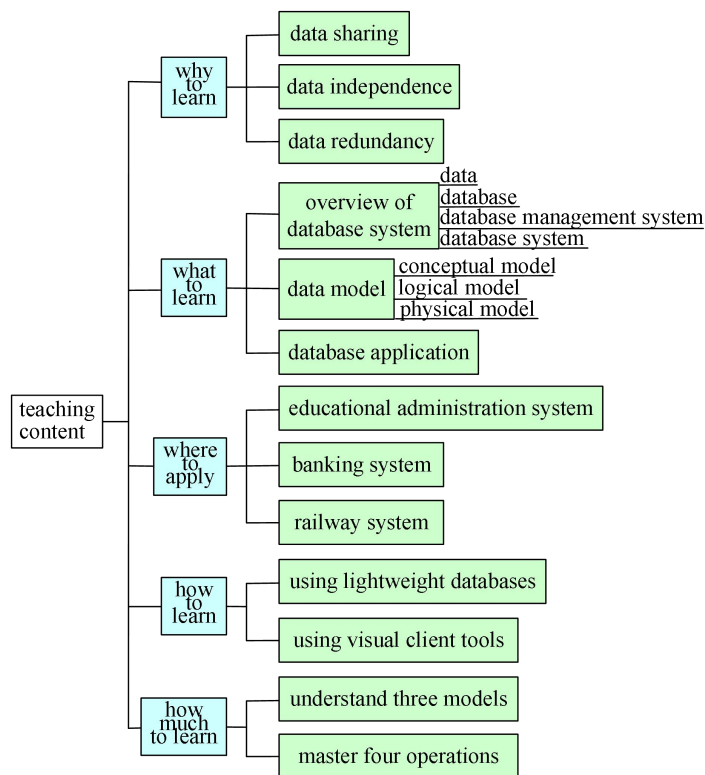

Fig. 2. Teaching content design of mind map with 3w2h

3.2 Teaching method design

According to the mind map with 3w2h, the teaching methods of question setting, lecture, demonstration, case and discussion are comprehensively used. It uses question setting, case and discussion method to explain why to learn this knowledge, uses question setting, lecture, demonstration and case method to explain what knowledge to learn, uses question setting, lecture and case method to explain where to apply this knowledge, and uses question setting,

lecture and demonstration method to explain how to learn this knowledge efficiently, uses question setting, lecture and discussion method to explain how much to learn these knowledge. The teaching method design of mind map with 3w2h is shown in Figure 3.
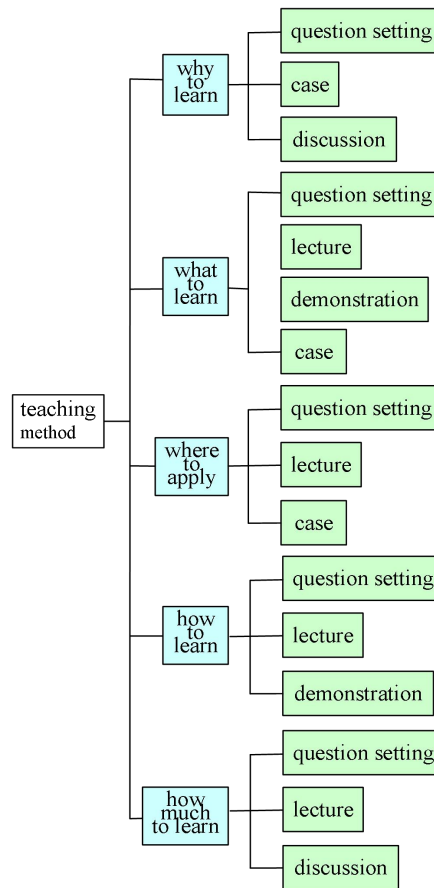

Fig. 3. Teaching method design of mind map with 3w2h

3.3 Design of teaching means

A variety of teaching methods are applied comprehensively, such as substitution, guidance, generation. In the initial stage, the substitution teaching method is used to organize the teaching content, and the knowledge is taught to students in the form of mind map with 3w2h. In this stage, teachers are the subject, and students have no initiative. In the middle stage, the guiding teaching method is used to urge students to make the mind map according to 3w2h mode, so as to understand the outline of knowledge during preview. In this stage, both teachers and students are the subject. In the final stage, the generative teaching method is used to encourage students to make mind map with 3w2h independently, so as to organize, understand, strengthen and transfer the learning content. In this stage, students are the subject and have the initiative.

3.4 Teaching strategy design

The heuristic teaching strategy and problem teaching strategy are used to teach knowledge according to the mind map with 3w2h. The former is adopted to make students always take the initiative in the learning process. Through the process of induction, explanation, and application, students can actively discover and explore, and then find out the solution to the problem. The latter takes problem as the clue, and promotes the development of students' creative thinking through the process of question setting, exploration, solution, discussion and resolution.

4 Analysis of teaching effect

In order to compare the teaching effect, a comparative experiment was carried out between two classes. For class A, teachers teach knowledge according to mind map with 3w2h, and students study and review according to the same mode. However, class B does not use mind map with 3w2h. Two weeks after the end of the course, the seven units involved in the course were tested. Figure 4 shows the comparison of the lowest score, the highest score and the average score between class A and class B. If the percentage of the number of students in a certain score interval to the total number is defined as the ratio, the ratio comparison of class A and class B in different score interval is shown in Figure 5.
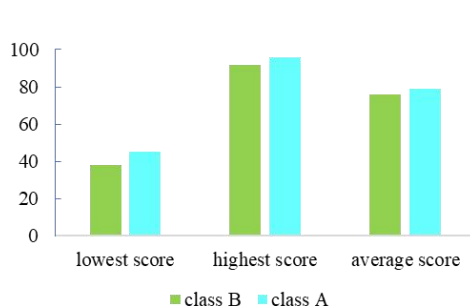
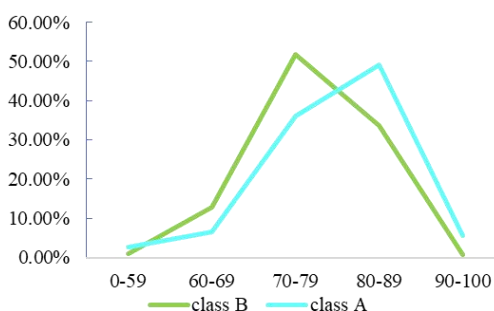**Fig. 4.** Comparison of test results   **Fig. 5.** Ratio comparison in each score interval

As can be seen from Figure 4, class A has improved in terms of the lowest score, the highest score, and the average score. As can be seen from Figure 5, in different score interval, the ratio of class A is 2.69%, 6.57%, 35.97%, 49.10%, and 5.67%, and that of class B is 0.90%, 12.82%, 51.79%, 33.72%, and 0.77% respectively. In the good and excellent range, class A is significantly higher than class B, which improves by 15.38% and 4.90% respectively. These results show that students' mastery of knowledge in class A is better than that of class B. Therefore, teaching design of Fundamentals of College Computer based on mind map with 3w2h achieves good teaching results.

In addition, the course group investigated students in class A, and asked them about the advantages and disadvantages of using mind map with 3w2h to implement teaching. All students think that mind map with 3w2h can help them study and review very well. A

classmate once said: "the mode mind map with 3w2h gives us a basis for our study and a compendium for our review." It can be seen that students are extremely in favor of mind map with 3w2h. Using the mode mind map with 3w2h can help students understand and memorize the knowledge points of the course to a great extent, and then improve the ability of students to solve practical problems by computer.

5 Conclusion

This paper discusses the application of mind map in the course teaching of Fundamentals of College Computer. The mode mind map with 3w2h can help teachers design teaching, which can visualize many and miscellaneous knowledge according to the regular pattern of knowledge learning. The mode is not only conducive to teachers' refining and displaying of curriculum knowledge, but also conducive to students' learning, understanding, memory and review of knowledge points. To a large extent, the teaching research and reform can guide students' passive learning to active learning [8], improve students' interest and efficiency in learning, improve students' ability to use computer to solve practical problems, make them develop good information literacy and computational thinking [9,10], so as to achieve better teaching effect.

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