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Research on Teaching Mode of Programming Course

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Abstract:

With the application and development of information technology, Internet applications have to be popularized in all walks of life. Under the background of "Internet+", the teaching mode of computer programming course is discussed. At present, the teaching mode is diversified. In programming courses, case teaching plays an important role, and the influence of learning mode on teaching quality is particularly important. Here, different students learn programming knowledge at different levels, including beginner, intermediate, and advanced. For beginners, passive learning is an option to teach these students the basics. For intermediate-level students, choosing a semi-active learning mode to get programming knowledge points better. For advanced learners, active learning is necessary to better understand the process of problem-solving, which contributes to the acquisition of relevant complex skills.

Keywords:

Teaching mode
Programming language
Python
C++

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1. Introduction

The teaching mode is an important part of the teaching process [1]. The traditional teaching mode mainly focuses on teaching by teachers and learning by students. The relationship between teachers and students is instilled by one side and accepted by the other, but this will bring about a series of problems, such as whether students can absorb most of the content taught by teachers and whether the knowledge taught by teachers can improve students' cognition and inspire them or encourage students to explore the spirit of learning knowledge. Nowadays, with the development of "Internet +", the traditional teaching mode is no longer suitable for today's teaching, and it is necessary to enhance the learning efficiency of students through the combination of different teaching modes [2]. In computer programming courses, the subjects taught can be divided into three levels: beginner, intermediate, and advanced. For learners at different levels, the corresponding blended teaching mode and different courses should be selected for teaching exploration, to achieve the teaching objectives for various learners [3–4].

2. Design of teaching model

2.1. Preview self-study

Before teaching, students can learn new knowledge

by themselves in different ways. The self-study stage can be either self-study and practice of learning content under the guidance of teachers in the face of designated problems, or individual free learning without teacher guidance and content assignment [5]. Nowadays, with the development of Internet technology, there are many ways to learn, including textbooks, materials consulted by the library, and resources searched on the Internet, including text page content, videos, and so on. This combination of online and offline learning modes enables students to have a better understanding of basic concepts when learning on their own [6]. At the same time, teachers will provide preview questions. Students with learning tasks will have a goal, conscious of learning, and improve the efficiency of learning. The development and application of artificial intelligence can also be used for students to self-study with better guidance, improving the self-study effect [7].

2.2. Mutual discussion

The discussion teaching method is generally regarded as one of the most effective ways to promote students' thinking and understanding. In recent years, it has been the focus and hot spot in the reform of education and teaching [8–9]. For problems that are difficult to understand or representative in class, the knowledge points can be understood and mastered through discussion. The participants in the discussion can be teachers and students, or students can be guided to form small groups to discuss with each other. When orally expressing their views, they will quickly grasp the key points of knowledge in the description process. The other students listening to the discussion by other participants will also gain new knowledge.

2.3. Internal and external exercises

For the knowledge involving calculation or formula derivation, students can strengthen the knowledge points through exercises. The exercises can be completed in the form of homework assigned by the teacher after class, or in the form of a quiz assigned in class. The teacher should correct the exercises in time so that students can timely know whether they master the knowledge points.

2.4. Question and answer

Questioning is an effective way to lead students to think, promote the development of students' thinking, and promote students' thinking innovation [10]. For simple knowledge points or knowledge points that need to be understood by analogy, classroom teaching can be conducted by asking students questions, which can improve students' learning enthusiasm and awareness of active participation, to promote the overall development of the whole learning effect in a good direction.

2.5. Teacher lecturing

In classroom theory teaching, teachers can teach knowledge points that students cannot fully understand through self-study based on students' pre-study and self-study, and make students understand the deep connotation of knowledge more clearly through concepts, principles, derivations, calculations, and so on. In a sense, teachers need to fully prepare lessons before teaching and understand the difficulty of teaching materials. The teachers should be aware of the students' understanding and gradually deepening way of thinking, and choose appropriate teaching methods based on objective factors such as students' adaptability to teaching materials [11–12].

2.6. Summary and analysis

Mind mapping can be used by both teachers and students in all stages of teaching to make the explanation of boring knowledge vivid so that students can better grasp and digest the acquired knowledge, better establish the corresponding knowledge system structure, and learn to use knowledge to solve new problems [13–15]. In the programming course, the teacher can summarize the knowledge points of each chapter and tell them to the students before teaching, so that the students can have a goal in the learning process. After learning, the students can review the knowledge they have learned and summarize the knowledge points of the whole chapter with a mind map, which will make the learning context clear.

2.7. Experimental verification

Some knowledge points are too theoretical so students cannot properly understand. Teachers can verify it through experiments, as experimental teaching is also an important way and method to achieve teaching goals [16]. Theory guides practice, and practice can also strengthen

theoretical cognition. Students need to cooperate, set up a suitable experimental development environment, and conduct practice operations according to the rules of learning, which require a certain amount of time to verify after class.

3. Implementation of teaching model

Different students learn at different levels, including beginner, intermediate, and advanced. For beginners, passive learning is an option to teach these students the basics. For intermediate-level students, choose a semi-active learning mode to get the programming knowledge points better. For advanced learners, adopting an active learning style can lead to a better understanding of problem-solving, which helps to acquire relevant complex skills. By designing graded learning tasks, teachers can help students establish a scientific thinking mode in different learning stages, gradually improve their ability to analyze, reasoning, problem-solving, and innovation, and lay a solid foundation for students' long-term learning and comprehensive quality improvement.

3.1. Teaching mode for beginners

For beginners, they are unfamiliar with the knowledge they have learned and need to learn in a passive way. The learning mode for beginners can be introduced by the teacher, as shown in **Figure 1** below. Based on the teacher's teaching, the teacher's simple questions and the students' answers are further used to strengthen their understanding. Meanwhile, the corresponding simple exercises and experiments are assigned after class to strengthen their mastery of the programming language.

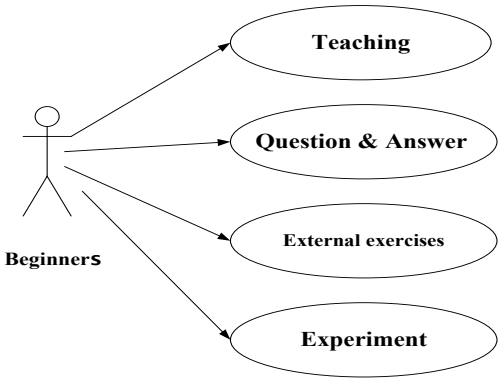

Figure 1. Study mode for beginners

3.2. Teaching mode for intermediate learners

When beginners learn through passive learning mode, they have mastered the basic knowledge of program design. For intermediate learners, the content of the primary learning mode can be made more difficult, and at the same time, students' self-study mode can be added, as shown in **Figure 2** below.

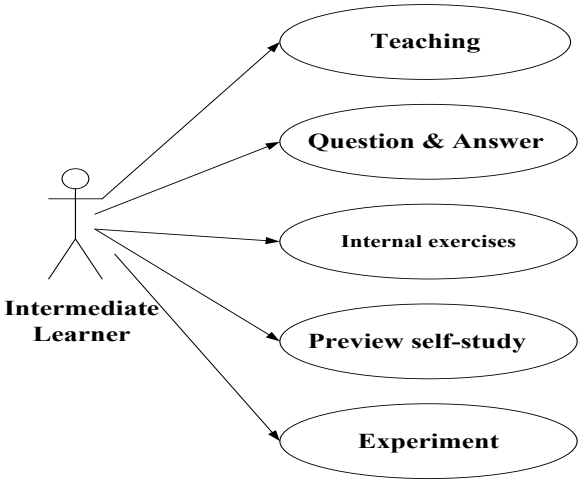

Figure 2. Study mode for intermediate learners

3.3. Teaching mode for advanced learners

After taking programming courses, advanced learners can enrich the teaching content of high-level language programming, such as Python or C/C++ language, by choosing classic algorithm cases, competition projects, and other forms [3]. In terms of teaching mode, in addition to the above teaching mode, they can add mutual discussion and summary analysis. Students can explain their understanding of knowledge through discussion, and use tools such as mind mapping to summarize and analyze, as shown in **Figure 3**.

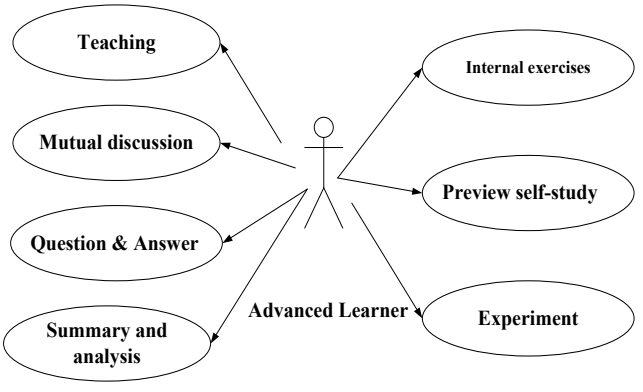

Figure 3. Study mode for advanced learners

4. Summary

This paper summarizes the characteristics of several teaching modes and adopts different teaching modes according to the learning characteristics of different students to improve the teaching quality and teaching effect. In the course of computer programming, students with different foundations are taught according to their aptitude, so that students can better learn follow-up courses.

Disclosure statement

The author declares no conflict of interest.

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