Creation and Realization of "Problem-Discovery" Classroom Teaching Scenarios

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Abstract: Aiming at stimulating students' intelligent activities in classroom teaching and raising the thinking level and innovation ability through the exploration of knowledge, this paper puts forward the "Problem-Discovery Teaching Methodology", which is explored from four aspects: well-prepared lessons, checking on both keys, attracting students' attention and enlightening teaching.

1. Introduction

As Russian educator Duboliubov said: "If you chew scientific materials so carefully that students don't have to chew any more, just swallow what you say. In this way, students can only be trained into apes who understand knowledge, not people who can think.". Therefore, it is necessary to break the traditional teaching mode of pure teaching and explore a scientific and reasonable teaching mode.

As far as classroom teaching is concerned, how to stimulate students' intelligent activities and arouse them to improve their thinking level and innovative ability by exploring knowledge? Educator Tao Xingzhi once said that "innovation begins with problems". Innovation always arises when one deals with different dilemmas or problems. It is inseparable from problem solving. Problems should be the beginning of innovative education. The problem should be the main body running through the innovation teaching process, and the problem should become the destination of innovative education activities. Therefore, in classroom teaching, we should pay attention to setting up the teaching scenarios of "Problem-Discovery", let students learn knowledge through a series of problem solving, transform "static" knowledge into "dynamic" problem exploration. Let them use their brains, mouths and hands in the exploration of problems, so as to make them develop.

2. Basic Views

2.1. Careful Lesson Preparation is the Premise of Creating a Good Classroom Problem Situation

The process of lesson preparation is the process of processing and refining the content to be taught by teacher according to the requirements of syllabus and characteristics of the teaching content. It is a higher-level thinking process that teachers carry out on the basis of existing knowledge and are suitable for students to accept. Therefore, the quality of lesson preparation directly affects the classroom effect. To design classroom teaching well, we should not only have a deep knowledge foundation, but also grasp students' psychological characteristics, inspire students' positive thinking, and cultivate their ability to explore and solve problems, so as to improve students' quality. Therefore, in the process of lesson preparation, students can learn knowledge by solving a series of problems by creating the "Problem-Discovery" teaching scenarios. Focus on the following issues:

a. What is the connection and difference between this chapter and other chapters, and why this chapter should be introduced;

b. According to the content of this chapter, how to optimize the teaching content, how to set

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questions, how to ask questions and how to allocate time reasonably;

c. What are focus and difficulties of this chapter, and what mistakes students may make in studying;

d. Whether the choice of exercises is moderately difficult and whether there are multiple solutions to the problems.

In the lesson preparation, we start with imparting knowledge to maximize the enthusiasm of students to explore problems and cultivate creativity. This requires teachers to prepare not only teaching materials, but also students, teaching methods, and teaching language when preparing lessons. The accuracy, vividness, visualization, inspiration and infectivity of teaching language will stimulate students' strong interest in learning and make them learn actively.

2.2. Paying Attention to "Checking on Both Keys" in Classroom Teaching is an Effective Means to Mobilize Students to Actively Explore Problems

The both keys mentioned here refer to "entry" and "completion". The so-called entry is to explain to students why the chapter is being introduced and the necessity to introduce it. This part of the textbook usually takes up little space, sometimes just a few lines, and is often overlooked, but its role in the teaching process should not be underestimated. On the one hand, it plays a connecting role in the content, which can guide students to recall the content of the last class and help them understand the content of this class; on the other hand, the teacher's colorful explanations can stimulate students' interest in exploring problems and acquiring knowledge, so as to provide a good foundation for future lessons. Therefore, "entry" also includes telling students the main contents, key points and difficulties to be learnt in this class during each course. This makes students clear the main task of this class and listen to the class with problems, which will produce the internal learning motivation to achieve the purpose to some extent. In addition, with the progress of classroom teaching, the solution of problems and the mastery of teaching content, students have a sense of achievement in acquiring knowledge and have more interests and enthusiasm in learning.

"Completion" means that after the basic content of this course is taught, in order to check the learning effect, consolidate knowledge, and guide students to summarize the learning content themselves, we can let students complement each other's answers to questions, inspire students' positive thinking from point to area, and then correct their vague understanding. This not only enhances students' understanding of what they have learned, but also improves their thinking level.

2.3. Attracting Students' Attention is a Must to Guide Them to Explore Problem

From the perspective of psychology, attention is featured with four aspects: breadth, stability, distribution and transfer.

Firstly, the breadth of attention is related to the characteristics of perceptual objects. People's breadth of attention is greater for objects that are concentrated and ordered; for those that are uniform in size; and for those that are the same color. In this way, teacher must pay attention to the layout of blackboard writing and the unity of fonts in classes. In order to attract students' attention, eye-catching colors or larger fonts may be available. Secondly, the breadth is also related to the subject's knowledge and experience. If the objects of attention are presented with shapes or words that are familiar to the students, then the range of attention they can grasp will be wider. Therefore, teacher should express those abstract and difficult concepts to students in an easy-to-understand way so that they have a complete and clear understanding of the content of each class.

The stability of attention is the duration that attention can be kept on a specific object or within a certain range of activities. To maintain the stability of students' attention, in addition to students having a good mental state and positive thinking, teacher should pay attention to the diversification of classroom content, comprehensive application of explanations, discussions, questions, self-study, etc., combined with teaching methods such as models, slides, videos and multimedia courseware, so as to make the teaching content lively and vivid. It should also allow students to combine mental activity with practical manipulation. Manipulation can play a role in organizing and controlling attention. Presentation model, experimental classes, etc. can focus students' attention and help them overcome distractions.

The allocation of attention is conditional. Strictly speaking, you cannot multitask. Only when you are quite proficient in one activity and have reached the degree of automation can you focus on another activity. For teachers, they should be very familiar with the teaching contents and then they can pay attention to the students' listening situation in class and the degree of knowledge mastery, so as to grasp the rhythm and focus of lectures; For students, they take notes while listening. At this moment, teachers should ask students to focus on listening as much as possible, and give them appropriate buffer time to take notes on substantive problems based on understanding.

The speed and difficulty of attention transfer are related to the object of new attention. The more the object meets people's needs and interests, the easier it is to transfer attention. When it comes to the turning point of problems, teachers should start with analyzing phenomena or practical engineering problems, or explain that this problem is related to students' future needs and tasks, so as to stimulate their interest in exploring problems and make their attention shift and concentrate quickly.

2.4. Heuristic and Learning Guide Teaching is a Means to Guide Students to Actively Explore Problems

Even students of the same level and major have great differences in their abilities. To fully mobilize the enthusiasm of students at all levels in exploring problems, we should try to let as many students of different degrees enter the class, and then in the challenging problem situation carefully created by teachers, the heuristic teaching of interaction and communication is adopted to deepen students' thinking process, capture students' attention, activate the classroom atmosphere, and give full play to the enthusiasm of students' thinking, thus greatly improving teaching effect.

The "initiation" of heuristic teaching refers to the leading role, and "development" refers to students' subjective initiative. To carry out heuristic teaching well, teachers must first thoroughly understand the contents of teaching materials, and then carefully create a teaching scenario of "Problem-Discovery" to explore and think together with students. According to the contents and characteristics of the hydraulic technology and mechanical design foundation courses, during heuristic teaching, we generally use the question-and-answer method of creating questions and finding answers, that is, teachers ask students to answer or teachers ask and answer themselves. These questions are not arbitrary, but carefully created in the lesson preparation. Specific teaching process creation, such as when to set up a question, set what questions, how long the gap is left after the question is asked, whether the student answers or the teacher answers themselves, and estimation of various answers that students may have, should be in the principle of inspiring students to think actively and arousing students' enthusiasm for learning to the maximum extent, and should be designed according to the content of teaching materials and students' conditions. Thirdly, teachers' questions should be enlightening. Use transitional language such as "Now let's learn chapter X and section X" or "Let's talk about problems" as less as possible. For the less difficult and easy-to-read chapters in the textbook, the learning-guided teaching is adopted, that is, teachers give some thinking questions, students learn and explore by themselves first, and then teachers answer the different questions of students individually and answer the common questions intensively; Elaboration, after the self-study, is organized to reveal the essence of problems. This teaching method gives prominence to the key points, presenting good effect in teaching and students' self-study ability.

3. Conclusion

The above shows some of our views and practices in creating a "Problem-Discovery" teaching scenario to improve students' innovative ability. Through the summary and comparative analysis of teaching practice in recent years, we have achieved good teaching results, including cultivation of students' divergent thinking, relaxed and flexible interaction between teachers and students, and vivid classroom teaching which is conducive to the memory of knowledge points.

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