

To Explore the “Problem-centered” Teaching Strategy of High School Physics Concept——Take the Law of Gravitation as an Example

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Abstract: In the process of high school physics teaching, in order to better improve the teaching effect, teachers should use problems as guidance in teaching, so as to encourage students to better improve their ability to grasp knowledge and strengthen their physical thinking under the drive of problems. At this time, high school physics teachers should set up courses according to students' conditions, take problems as the center, drive students to think about problems, analyze problems, explore problems, and then solve problems, and finally achieve the effect of improving their comprehensive literacy of physics in the whole process of solving problems. Based on this, based on the knowledge of “law of gravitation”, this paper explores the “problem-centered” teaching strategy of high school physics concept for reference.

Keywords: Problem; High school education; Physics teaching

Introduction:

The application of problem-centered physics concept teaching can effectively cultivate students' thinking ability and inquiry ability, and carry out divergent thinking with problem as the focus, and gradually gain knowledge along the direction of the problem. In this process, teachers should optimize the design according to the needs of students, guide students to explore knowledge, so as to strengthen their thinking ability and improve their own concept understanding ability in the process of exploration.

1. The significance of “problem-centered” physics concept teaching in high school

1.1 Stimulate students' enthusiasm for learning

High school physics involves a wide range of knowledge and concepts, so students need not only to perform calculations, but also to have a very high physical operation ability in the process of learning^[1]. However, due to the differences in students' learning, it is difficult for some students to effectively understand the concept of logistics, and then it is difficult to effectively use knowledge to solve problems. Therefore, in the view of high school physics teachers, the problem-centered teaching method can attract students' energy to knowledge exploration with questions, thus arousing their enthusiasm for learning, adding fun and vitality to the classroom, effectively avoiding the shortcomings of traditional physics classrooms, and improving the efficiency of teaching.

1.2 Inspire students' physical thinking

In high school physics teaching, the burst and application of thinking is an indispensable condition. Some students' thinking is out of step with the teaching progress, so they still need to be developed. At the same time, because their thinking fails to spread, they will think that knowledge learning is more difficult. High school physics teachers must realize that it is of great significance to train students' physical thinking ability in teaching. Taking problems as the center of high school physics teaching can enable students to develop their physical thinking in thinking and exploration, and gradually achieve the ideal thinking education goal under the guidance of problems^[2].

2. “Problem-centered” physics concept teaching strategy in high school

2.1 Create problem situation in combination with actual life

The raising of problems requires teachers to find problems in teaching. In the class of high school physics teachers, teachers should set problem scenarios according to the relevant concepts of the Law of Gravitation, so that students can find problems in the situations, and then guide them into the physical concepts step by step under the guidance of the problems. The connection between the real world and physical knowledge is relatively close, and many physical concepts are derived from life. Therefore, teachers should encourage students to observe their own lives, dig out some physical problems in their lives, and encourage them to scientifically summarize their physical knowledge, thus encouraging them to form exploration consciousness^[3].

For example, when teaching the concept of the Law of Gravitation in high school physics, teachers can first understand students' interests and then frame questions based on this characteristic. For example, “We already know that because of the gravitational relationship between the sun and the moon, it is impossible for the moon to leave the sun, but have you ever thought of the existence of a variety of things on the Earth, what kind of forces will cause it to not leave the ground?” “My Love from the Star” is very popular, teachers can combine knowledge with this TV series in teaching, set questions, guide students to explore knowledge, and stimulate students' enthusiasm for physics exploration. For example: “How did the main character of the play arrive on Earth from another planet?” “Can't we take him back to his original planet?” Such questions can make students think about physical problems and gradually feel the distance between the concept of gravity and our lives, which will make the atmosphere of the class lively.

2.2 Ask questions bravely to improve students' awareness of problems

The problem-centered teaching in high school physics class should arouse students' desire to explore new knowledge through problems and encourage them to absorb relevant physics knowledge in the analysis and solution of problems. In the actual education process, teachers not only ask questions, but also guide students to take the initiative to ask questions, so that they can better participate in the thinking and exploration of problems and improve the learning effect of students^[4]. In high school physics class, teachers should pay attention to the cultivation of students' awareness of problems. If students only follow the teachers' thinking to study and explore knowledge during the process of learning, it will affect their learning enthusiasm in the long run. Therefore, in order to effectively avoid this problem, teachers should base on the principle of taking problems as the basis in teaching, cultivate students' awareness of problems around problems, promote their thinking ability to be improved, and then take the initiative to participate in the discussion of problems guided by teachers, and gradually look for problems and explore solutions to problems. In this process, Students' various learning skills will be improved.

For example, when teaching the concept of the Law of Gravitation in high school physics, teachers can demonstrate that the earth revolves around the sun and the moon revolves around the Earth through multimedia courseware, and students can ask questions through the teacher's demonstration images, such as, “How do the eight planets go around the sun?” “What forces sustain the moon in its circle around the earth?” On this basis, through the analysis of the problems given, the conclusion is drawn. The teacher can set some questions according to the requirements of the course, such as: “Is there a force between any two objects that is similar to the rotation of the moon around the Earth?” In class, teachers can ask students to review what they have learned in the course, and ask questions, and then answer their questions, so as to deepen their understanding of the concept of the Law of Gravity. In this way, students can not only strengthen their awareness of problems, but also deepen their cognition of physics knowledge while discovering, analyzing and solving problems, so as to improve their overall quality.

2.3 Optimization problem design and consolidation of conceptual exercises

Exercise is a very key link in high school physics. Under the guidance of exercise, students can better understand and grasp the basic concepts of physics. Therefore, according to the content and purpose of the course, teachers should guide students to correctly grasp the key points, emphases and difficulties of concept teaching, lay a solid physical foundation for students through the training of “double bases”, design expansive and comprehensive problems, so that they can be effectively used in practice, so as to consolidate and improve knowledge.

For example, when teaching the concept of “Law of Gravitation” in high school physics, students gradually understand that the concept of gravitation reflects the innovative ideas of scientists, and through the simple treatment of physical problems, the ideal physical model is constructed, so that students can better grasp its essence in the process of solving problems. For example, two stars that are very close together are called “binary” stars, and they each orbit around the core so that they are not attracted to each other by gravity. Given the weights of the two stars are M_1 and M_2 , and the distance is L , find the position of the rotation center and the rotation period. In order to enable students to solve problems correctly, they need to know the law of gravity, and be able to skillfully

use quantitative operations, strengthen rational thinking, and find a solution. The study of concepts focuses on the application, in which the meaning of concepts is deeply understood. At the same time, teachers should carefully design exercises to inspire students to think, so that students can master the basic knowledge of physics and train their problem-solving ability.

Closing remarks

All in all, because the learning level and knowledge reserve of high school students are different, teachers should adapt to their actual situation and set them as difficult questions, and cooperate with the problem scenarios of exercises, so that they can continue to divergent thinking and cultivate students' ability to solve problems by using physics methods. On this basis, through the appropriate modification of the representative exercises and the setting of multiple difficulty problems, students can get an all-round development in the process of solving problems. At the same time, teachers can also find appropriate questioning scenes for students, which can not only promote the development of students' thinking, but also better expand the depth of students' thinking through questioning, discussion and other ways, which can show teachers' education strategy and wisdom. In this process, teachers should design questions based on students' actual needs, and stimulate students' interest in learning through the guidance of questions. Only in this way can students better grasp the application mode and connotation of concepts and lay a foundation for the improvement of their core literacy in physics.

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