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The Ways to Create Problem Situations in Physics Teaching of High School

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ABSTRACT

In middle school physics teaching, the design of appropriate problem situations is very important. It can stimulate students' interest in the content of this lesson, enhance students' motivation for learning, and promote the learning efficiency of students' independent cooperative inquiry.

1.Problems in the Creation of Current Physics Teaching Situation

Physics is a relatively abstract subject for middle school students. Many students are afraid of difficulties in physics learning. In physics teaching, teachers must devote more effort to design every aspect of the classroom and stimulate students' interest in learning. Enhance learning motivation and3 make complex, abstract, and boring physics learning simple, contextual and interesting. In the course introduction and other links, teachers need to design problem situations.

But at the moment, many teachers still directly throw out the content of the explanation, throwing the highly abstract concepts, axioms and laws directly to the students, so that the students cannot apply it after receiving the recruitment, and there is a physics-specific "understanding, but "Can't do a problem" situation.

There are also teachers who randomly design question situations, which complicate and obscure the relatively clear questions themselves, and have no accurate answers to answer; or digress from the question and do not properly control the variables; or the enlightenment is not in place, causing a lesson to be listened to , The students do not know what to say. I have to say that such teachers account for a certain percentage of physics classes in middle schools.

2.Ways to Create Physics Problem Situation

2.1 The Experimental Method Creates Problem Situations

Physics is an experiment-based discipline. Therefore, students are often attracted when creating problem situa-

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tions with experiments.

For example, when studying the section of "Galileo Free Fall Motion", students could not imagine that while releasing feathers and iron balls from a static state in a Newton bottle in a vacuum, they would fall at the same time. So, the teacher can demonstrate the experiment of the Newton bottle during the first class, and ask the students why the feathers in the Newton bottle can fall at the same time as the iron ball, but in real life, the feathers fall slowly, while the iron ball falls faster. In order to stimulate students' interest, construct the big problems of the whole class, and let students continue the following courses with the mood to solve the problems.

2.2 Physics History Law Creates Problem Situations

Behind every major discovery in physics, there are one or many great scientists. Teachers use the method of creating problem situations in the history of physics to construct an academic atmosphere when studying a certain problem, so as to stimulate students' interest in physics.

For example: when teaching "Faraday's Law of Electromagnetic Induction", the exploration history of magnetism generation is a very long process. At first, Ampere placed a magnet next to a wire with useful electrical appliances and waited for the time; later, Coraton placed the sensitive ammeter and the bar magnet coil in two rooms, running around and missing the opportunity; until Faraday invented it It was only with the first generator that the problem of magnetic generation in the history of science was solved. The whole presentation process can be combined with slides and pictures, so that students can deeply feel the hardships of scientific inquiry and the great interest in it.

2.3 Deriving the Method of Proof to Create A Problem Situation

Mathematics is an important tool of physics, so the method of mathematical derivation and verification is also a very important method of physics. In this process, even if students are unable to deduce successfully, they will learn to master the derivation methods through cooperation and exploration in later stages.

For example: when teaching "Relationship between Displacement and Time of Uniformly Variable Linear Motion", since students have learned the relationship between the speed and time of uniformly variable linear motion in the first two chapters, and have already been exposed to the image method, they can be asked at the beginning of the class Derive the relationship between displacement and time in linear motion with uniform speed.

2.4 The Method of Creating Problem Situations in Connection with Reality

The physics taught by teachers and learned by students is often abstract and concise physics after physics modeling. But in real life, physical phenomena and later applications often need to consider more factors. Many students feel that they know it when they listen to physics in class, but they will not be able to do problems afterwards, let alone apply what they have learned. The reason is that I have not experienced the inquiry process of physical modeling. Therefore, in physics classes, students can be appropriately allowed to solve practical problems independently.

For example, when teachers explain the concept of "acceleration", students often feel that it is more abstract. In fact, the creation of every physical quantity has its specific meaning. Therefore, when explaining this concept, a problem scenario can be constructed: ordinary small cars and passenger trains can reach a speed of 90 km/h. However, the time it takes for them to reach this speed after starting is different. For example, a car reaches a speed of 90km/h in 20 s, and it takes about 500 s for a train to reach this speed. Who is "increasing" faster? How much does their speed increase in an average of 1 second?

Through the setting of actual problem situations, students can imagine that a physical quantity is needed to describe the speed of change. Thus, there is a certain understanding of acceleration.

3. Principles to Be Followed in the Creation of Physical Problem Situations

The above-mentioned methods for creating several problem situations can be applied in actual teaching. You can use one of them, or you can use several of them in combination. But if you want to create a better problem situation in the physics teaching process, you need to follow the following principles:

3.1 The Purpose Needs to Be Clear

When designing the situation of physics teaching problems, it should be based on the content of the new knowledge points learned, and it should not be too difficult or partial, otherwise the students will not be able to show the ideal state.

3.2 The Process Should Be Intuitive and Visual

When designing a problem situation, more perceptual

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materials should be invested in the entire design process, and some pictures, videos, prints, etc. should be put in appropriately.

3.3 Highlight the Principle of Contradiction

In the study of physics, students are affected by the sub-concepts of daily life, and they often have some one-sided or even wrong ideas. Therefore, in the process of physics learning, these unspoken concepts need to be lured out and then eliminated in one fell swoop. Therefore, when designing a problem situation, you might as well highlight the contradiction.

3.4 The Principle of Classroom Efficiency

Individual physics teachers have extremely low ability to master the classroom. The entire class is not complete, and the proportion of the design problem situation is too large, resulting in low efficiency of one class and little content for students. This situation is more common among young teachers. Therefore, for this part of teachers, it is necessary to strengthen professional training and consolidate basic skills. Let yourself be able to excellently complete the design of a lesson problem and the links of explanation and practice.

4. Conclusion

The construction of the problem context plays an important role in both the simple teaching process and the question-based teaching of inquiry topics and sub-questions. It conforms to the "teacher-student dialogue" and "student-student dialogue" in the new curriculum reform concept, and also shows the spirit of "independent and cooperative inquiry". Based on the construction of better problem situations, the students' interest in physics learning can be stimulated, and the motivation of physics learning can be enhanced. It can effectively promote the transformation of students' learning styles and cultivate students' innovative ability, and it also reflects the teaching philosophy of teachers' new curriculum reform.

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