

Strategies for cultivating students' creative thinking ability in College Physics Education

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Abstract: with the development of social economy, the demand for talents' ability in various fields has changed greatly, and innovative talents have become the main type of talents needed in various fields of society. The transformation of social talent demand has posed new challenges to China's higher education. How to cultivate students' creative thinking has become a major research topic in Colleges and universities. In the previous college physics education, teachers mostly focused on the teaching of professional knowledge and problem-solving skills, while ignoring the development of students' creative thinking, which made it difficult to effectively improve students' comprehensive ability and quality, which ran counter to the development trend of higher education reform and talent demand in the new era. Therefore, it is necessary for college physics teachers to pay attention to the cultivation of students' creative thinking ability in teaching, comprehensively cultivate students' ability and quality, and promote the reform of college physics teaching. Based on the reality of college physics education, this paper expounds the characteristics of creative thinking in physics education, and puts forward the Cultivation Strategies of students' creative thinking, in order to provide reference for teachers.

Key words: College Physics; Education; Creative thinking ability; strategy

At this stage, the global economy and science and technology are developing rapidly. In such an environment, the country can not get a place in the international environment without the support of creative talents. As a professional and logical science and engineering discipline, college physics has high requirements for students' creative thinking ability. In this regard, whether at the macro or micro level, it is urgent to strengthen the cultivation of College Students' creative thinking ability. Therefore, in college physics education, how to cultivate students' creative thinking ability has become the top priority for teachers to study.

1. Characteristics of creative thinking in Physics Education

1.1 Critical and imaginative

Creative thinking refers to the innovative ideas, methods and theories that produce their own unique on things, which are mainly used in the analysis and exploration of things. By looking at the original things in a diversified and multi-dimensional way, judging the integrity and authenticity of the original resource information content, and analyzing it in depth, in order to explore the new information hidden under the surface, new ideas, methods and theories may emerge as the times require. Imagination and creative thinking interact and complement each other. On the one hand, creative new thinking can be developed in unlimited imagination. On the other hand, creative thinking also relies on scientific imagination. From this point of view, creative thinking is critical and imaginative.

1.2 Seeking difference and originality

The core characteristics of creative thinking are seeking for the opposite sex and originality. Fundamentally, creative thinking can provide unique, innovative and valuable thinking results. Therefore, the generation of creative thinking needs to break through the traditional thinking mode and habitual solving methods, break the restrictions and shackles of authority, experience and tradition, and adopt new thinking of seeking differences and originality to solve problems in the research of new ideas and methods, so as to draw creative thinking achievements and conclusions.

1.3 Flexibility and jumping

On the parallel track of abstract thinking and image thinking, it follows the basic laws of abstract thinking and image thinking under certain conditions, and at the same time, it is manifested as non logical thinking, that is, creative thinking. This form of thinking has the characteristics of flexibility and jumping, which are dialectical unity and complementary. Non logical thinking is mainly manifested in the form of intuitive thinking, and creative thinking is the combination of logical thinking and non logical thinking to some extent. Generally speaking, non logical thinking often appears at the interruption of logical thinking, which is the concentrated expression and jumping expression of logical thinking.

1.4 Depth and agility

Creative thinking has profound characteristics, that is, in the process of thinking, it can help students deepen their cognitive depth and explore the truth, which requires students to explore and think deeply about problems, grasp the essence of problems and the laws of things, and finally be able to predict the development process of things. The agility characteristic of creative thinking refers to the reflection speed of the thinking process. In the process of analyzing, processing and solving problems, students need to keep objective and rational in an urgent state, and then make a correct judgment on the problem, and finally come to the conclusion that it is absolutely accurate. However, the agility characteristic is characterized by criticalProfundity and flexibility are the basis and premise.

2. Strategies for cultivating students' creative thinking ability in College Physics Education

2.1 Optimizing teaching content and stimulating students' creative enthusiasm

Based on the traditional teaching mode, due to the limitations of traditional teaching thinking, college physics teachers are used to

taking the traditional physics knowledge as the main line in the teaching process. Compared with the physical content such as heat and light, the content is more abstract and complex, and lack of contact with each other before, which makes the teaching classroom atmosphere dull and boring, and it is difficult to mobilize students' subjective initiative. Finally, it can not cultivate students' creative thinking. Based on this, when implementing college physics teaching, teachers should carry out teaching activities according to students' interests, development needs and learning status, constantly adjust and improve the teaching content, and integrate the latest research theory and practice results into the teaching content, so that students can acquire cutting-edge knowledge on the basis of traditional theoretical knowledge, Deepen the relationship between tradition and frontier, and help them deepen their cognition and understanding of what they have learned. Through the optimization of a series of teaching contents, students' creative thinking ability can be effectively improved and their innovative ability can be cultivated. It should be noted that when choosing teaching content, teachers need to fully consider the differences between students of different majors, so as to select case content with strong professionalism and relevance to carry out teaching activities. Only in this way can students' innovative consciousness be effectively improved and their creative thinking be exercised.

2.2 Innovating teaching mode and improving students' thinking ability

Limited by the traditional teaching thinking, in the past college physics teaching, teachers mainly used didactic or cramming teaching. However, under this teaching mode, students are often in a state of passive acceptance of knowledge. Boring teaching content tends to lead to a dull classroom atmosphere, which is difficult to mobilize students' autonomy and enthusiasm. Finally, it can not effectively improve students' creative thinking ability. In order to effectively cultivate students' creative thinking in the physics classroom, teachers can integrate the teaching content with the actual problems encountered in life, so that students can actively think and explore, improve their problem-solving ability and autonomous learning ability, and effectively exercise their innovation ability and creative thinking. Based on this, when guiding students to carry out physics course learning, teachers can innovate the teaching mode by introducing advanced technology and the latest education concept, stimulate students' thirst for knowledge and curiosity, and enable them to immerse themselves in physics course learning. At the same time, teachers should guide and instruct students to explore different solutions in the process of inquiry, and finally effectively stimulate their creative thinking ability.

2.3 Improve the assessment mechanism and achieve innovative thinking results

College physics teachers need to be fully aware of the important role of constructing and improving the assessment mechanism in the whole course teaching, which can not only provide a reference for teachers to adjust the teaching plan, but also provide a clear direction for students to make up for their skills shortcomings, so as to improve the teaching quality of the whole course. Based on this, teachers need to incorporate creative thinking ability into the student assessment system, and improve the assessment mechanism on this basis. While paying attention to students' problem-solving skills, they should also fully assess their comprehensive quality and innovation ability, avoid them from investing time and energy in mechanical memory, and focus on improving their creative thinking ability. In the process of teaching evaluation, teachers need to set students' creative thinking as the main assessment index, flexibly carry out classroom examinations, and comprehensively evaluate students according to their classroom performance, experimental level and homework content, so as to improve students' comprehensive learning ability in physics and stimulate their creative thinking ability at the same time.

2.4 Impart physics ideas and stimulate students' interest in learning

In order to achieve the teaching goal of stimulating students' innovative thinking and improving their innovative ability, teachers can try to integrate physics thinking into the whole teaching process, guide students to fully understand the charm of physics, and stimulate their interest and motivation in physics learning. In the actual teaching process, teachers need to explore appropriate opportunities to teach students physics ideas, provide ideological guidance for them to acquire basic knowledge and exercise practical skills, and lay the foundation for them to form creative thinking. First of all, teachers should guide students to observe the surrounding environment with the help of physical thoughts, and solve practical problems with the help of physical knowledge. For example, after explaining the connotation of the concept of "particle" to students, teachers need to set the following questions for students according to the actual situation: "please think about whether there is particle in real life? If there is no particle, why explore particle?" Under the guidance of questions, it is of positive significance to guide students to carry out independent exploration of relevant knowledge and physical thoughts, which is of positive significance for the cultivation of their creative thinking. For example, the proposal of particles includes the discovery and application of calculus, and also reflects the close relationship between mathematics and physics. In this process, teachers can introduce the physical ideas of "grasping the main contradiction first and ignoring the secondary contradiction" and "from simple to cumbersome". Through the penetration of these physical ideas, students' interest in learning can be stimulated, Lay the foundation for the cultivation of students' creative thinking ability.

2.5 Strengthen experimental innovation and increase design physics experiments

For physics, experiment is a very important part of physics learning and scientific research. All the great achievements of physics research are inseparable from the exploration of physics experiments. As a practical subject, physics is created in practice and further practiced in creation. In this regard, college physics teachers can cultivate students' creative thinking ability in the process of guiding students to carry out practical operation through physics experiments. In the actual classroom teaching, teachers can guide students to carry out physical experiments through the process of "asking questions - assuming conjectures - making experimental plans - collecting data to carry out experimental exploration - demonstrating experimental results - summarizing experimental conclusions", so that students can realize the effective cultivation of creative thinking in practice. Design experiments play an important role in the cultivation of College Students' creative thinking. For college physics teachers, we should increase the proportion of design physics experiments in the overall

experimental teaching to better cultivate students' creative thinking ability. For example, in the teaching of photoelectric effect experiment, this experiment is a very important experiment in the study of college physics, and it is also a major difficulty for students to carry out physical experiments. It is difficult for most students to carry out experiments only by relying on the tips in the textbook, which is related to the lack of sensitivity of laboratory electroscope. When the ultraviolet light irradiates the zinc plate, the phenomenon of electron escape will occur. In this way, the zinc plate with positive charge will form a power plant to prevent the continuous escape of electrons, so as to achieve a dynamic balance. However, the potential of the general zinc plate will have a limit value. When this limit value is reached, the foil tension of the electroscope will be insufficient, and then the experiment will fail. Based on the failure principle of this experiment, teachers can guide students to redesign the experiment in the form of group cooperation, combined with their own physics knowledge and experience, so as to set up a design experiment in the classroom, and carry out experimental research and demonstration by redesigning the experimental scheme. For example, some students carry out the experiment by first negatively charging the zinc plate; Some students add a charged parallel plate capacitor around the zinc plate... Through such a design experiment, students' creative consciousness can be effectively stimulated, and then the effective development of students' creative thinking can be realized.

3. Conclusion

To sum up, it is necessary and feasible to cultivate students' creative thinking ability in college physics education. In the actual teaching, college physics teachers can continuously optimize the teaching quality and effectiveness of the course, strengthen the cultivation of students' creative thinking ability, cultivate comprehensive and creative talents for the society, and help the further development of China's economy and science and technology from the perspectives of optimizing teaching content, innovating teaching mode, improving the assessment mechanism, teaching physics ideas, and strengthening experimental innovation.

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