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Practical Research on the Ideological and Political Construction of College Physics Experiment Courses in the New Era

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Abstract: With the full implementation of the ideological and political construction of courses in colleges and universities across the country, new educational concepts and forms have continuously emerged, which also pose higher requirements for teaching work in colleges and universities. As a basic course in natural science, the College Physics Experiment is offered to science students across the university, emphasizing cultivating students' practical operation ability and innovative thinking ability. At the same time, it also contains rich "ideological and political" elements. Therefore, physics teachers should attach importance to ideological and political teaching, carry out teaching in combination with the characteristics of the physics experiment course itself, so that students can form correct ideological values while learning knowledge. Based on this, this article conducts research on the practice of the ideological and political construction of college physics experiment courses in the new era for reference.

Keywords: New era; College physics experiment; Ideological and political education in courses

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1. Introduction

The ideological and political work in colleges and universities is the main front for ideological work and an important channel for cultivating outstanding talents. The "Opinions of the Ministry of Education and Other Eight Departments on Accelerating the Construction of the Ideological and Political Work System in Colleges and Universities" clearly states that ideological and moral construction should be emphasized, and several public basic courses that improve students' ideological and moral cultivation should be developed. Following the requirements of the opinions, various colleges and universities have begun to deeply explore new paths for the ideological and political construction of courses, thus comprehensively infiltrating ideological and political education into the entire process of teaching. Science and engineering students will come into contact with various experimental courses during their college years. The College Physics Experiment focuses on cultivating students' scientific awareness and independent thinking ability and contains rich ideological and

political education resources. Therefore, in the teaching of college physics experiment courses, teachers should effectively integrate knowledge education and ideological and political education, enabling students to achieve comprehensive development.

2. Ideological and political elements in college physics experiment teaching courses

For the effective development of the ideological and political construction of courses, it is necessary to deeply explore the ideological and political education elements involved in the courses and further reflect on the functions and values of ideological and political education. Integrating ideological and political elements into all aspects of curriculum teaching helps to better cultivate students' good ideological and moral qualities and form scientific thinking awareness based on knowledge teaching. Ideological and political education in courses is not a simple superposition of "courses" and "ideological and political education." It is a new teaching concept that requires refining and sublimating teaching content and exploring its close connection with curriculum teaching [1].

2.1. Ideological and political elements in the history of physics

The physics discipline contains rich theories and formulas, and its achievements are conclusions drawn through experiments. Therefore, physics is an experimental-based discipline. In the experimental teaching of the physics discipline, teachers should not only focus on transmitting correct knowledge and skills to students but, more importantly, cultivate students' good scientific literacy. However, the scientific spirit does not form automatically in all students during the learning process; it also requires teachers' guidance. Behind every physical achievement lies a wonderful history of physics. If students can understand the development process of physics, they will actively participate in the physical experiment research process, recognize its value during the research, and internalize it into their understanding [2].

For example, in the experiment of measuring the speed of light in optical fibers, the teacher introduces the entire process of human measurement of the speed of light to students, from Galileo's research on the speed of light in the early 16th century, to the rotating plane mirror experiment by the French physicist Foucault in the mid-18th century, and finally to the modern measurement of the speed of light using lasers. By telling students the entire development process of measuring the speed of light, students can deeply understand and feel that science develops progressively while learning knowledge, thus forming a good exploration awareness [3].

2.2. Ideological and political elements in experimental thought methods

Physical experiments involve some research methods and ideas. These ideas and methods are not limited to a single experiment but have guiding significance for all experiments and can profoundly reveal certain problems. During the teaching process, teachers should infiltrate these ideas and methods into teaching, refine and summarize them, so that students can deeply learn and remember them. This also helps to provide more guidance for students' future work. After learning these thought methods, students can apply them to practical life to solve more practical problems [4].

2.3. Ideological and political elements in the relationship between experiments and technical engineering

Technical engineering work involves rich physics knowledge, and the progress and development of physics knowledge also rely on new technological innovation. Therefore, technology is a bridge between physical theory

and experiments. As the recipients of the College Physics Experiment course, science and engineering students are expected by teachers to understand the mutual relationship between the physics discipline and technology through experimental teaching, so that students can apply technology to specific practical activities and form an engineering awareness and craftsmanship spirit. Teachers can combine a certain technology in teaching, deeply explore the ideological and political elements contained in it, which helps students to deeply study cutting-edge science and technology and understand the important value of scientific and technological progress. At the same time, students can also understand the close relationship between science and technology. Science is the foundation of technological development, and technology is an application of scientific development, which they are mutually penetrating [5].

2.4. Ideological and political elements in experimental norms and systems

During experimental teaching, teachers and students need to strictly abide by experimental rules and systems. Therefore, the school stipulates that education related to experimental norms and systems should be carried out to cultivate students' rigorous and serious experimental qualities and realistic ideological attitudes. Students need to strictly follow the specific regulations of experimental operations, observe experimental phenomena, effectively organize data, and write specific experimental reports according to the experimental situation. For data that does not conform to the theory, students should not change it at will but need to seriously think about the reasons and conduct the experiment again. Through forming a rigorous and serious attitude in the experiment can students better uphold good professional ethics in future work. Moreover, students should prioritize safety, strictly abide by experimental requirements, and operate the experiment in a standardized manner. Teachers can combine safety operation procedures with social responsibility education, incorporate corresponding safety accidents into teaching, and warn students through such accidents to help them better complete the experiment [6].

3. Strategies for the ideological and political construction of college physics experiment courses

3.1. Teachers: Strengthen self-learning and innovate teaching concepts

As the leaders of college physics experiment course teaching, only by giving full play to their initiative can teachers better transform teaching concepts and achieve innovation in teaching concepts. On the one hand, the school should strengthen the training of teachers, attach great importance to the ideological and political construction of courses, create a good teacher development environment, and provide more help and support for teachers to make up for the deficiencies of teachers of natural science courses in carrying out ideological and political education, so that teachers are truly capable of carrying out ideological and political education. Through the organization and training of experts, teachers can unify their understanding. The school should pay attention to the construction of the curriculum system, combine ideological and political education courses with natural science courses, and build an integrated education guidance mechanism [7]. On the other hand, teachers should pay attention to their learning, transform educational and teaching concepts, improve their educational ability and level, infiltrate the concept of educating people into teaching design, teaching concepts, and the teaching process, and truly enrich the content of experimental courses. Teachers should also do a good job in teaching innovation, achieve the reform and innovation of teaching concepts, actively transform and adjust educational concepts, deeply study the Party's education policy, adopt diversified teaching concepts and methods in teaching, select appropriate teaching means, so that students can truly form good learning skills and achieve a close connection

between skills and ideological and political education [8].

3.2. Students: Set lofty goals and stimulate inner motivation

In curriculum teaching, teachers need to carry out ideological and political education imperceptibly, pay attention to the construction of students' outlooks on life and values, and require students to better achieve internal development. As the main body of talent cultivation, students are the key to determining whether educational goals can be achieved. At present, many students have unclear learning goals and weak learning autonomy, which greatly affects the effectiveness of classroom teaching and is not conducive to the development of ideological and political teaching in courses. If students' goals are not clear and their learning motivation is insufficient, teachers' ideological and political teaching in courses will hardly achieve good results [9]. As the main body of learning, students should establish their own learning goals, analyze their current advantages and disadvantages, and constantly achieve self-breakthroughs. Only in this way can they form good scientific concepts and innovative thinking while learning knowledge, laying a solid foundation for their future career development [10].

3.3. Teaching content: Reasonably select materials and incorporate value concepts

The College Physics Experiment course is an important general education course for science and engineering students, laying a solid foundation for their subsequent learning and development and containing a rich humanistic spirit. Therefore, teachers should deeply extract the ideological and political elements in teaching and infiltrate these rich and vivid ideological and political elements into knowledge teaching. Through unifying ideas in teaching and research activities, the teaching quality and effect can be further improved, and the curriculum guiding ideology can be effectively linked with curriculum practice activities. First, teachers can incorporate the feelings of family and country. The ancient Chinese summarized a large number of laws in long-term production and life and accumulated rich practical experience, including mechanical principles such as levers and pulleys [11]. In modern times, China's nuclear technology has achieved new breakthroughs. Chinese nuclear physicists have risen to the challenge when the country needed them most and achieved proud results. Teachers can introduce the great achievements of China in the field of physics since ancient times to students, thus broadening their horizons and cultivating their patriotic feelings.

Second, teachers can incorporate the scientific quality of the pursuit spirit. As an important spirit of the physics discipline, the scientific spirit should be infiltrated into teaching content by teachers. This includes telling students the stories of scientists such as Copernicus, Galileo, and Newton, enabling students to deeply learn and understand the spiritual qualities of scientists and form the spirit of daring to question and pursue science. Third, teachers should incorporate a rigorous and serious academic spirit into teaching. As a course with high precision, the College Physics Experiment course requires teachers to guide students to form careful and cautious qualities in the process of experimental operations and data measurement. Teachers can tell students the story of Millikan's experiment. He measured the data of oil droplets for ten years and obtained the elementary charge amount, which also shows his rigorous, serious, and persistent good qualities. Fourth, teachers should attach importance to safety education and infiltrate the concept of safety first into teaching. The College Physics Experiment course requires students to operate instruments. Since the operation specifications and steps of instruments are different, teachers should conduct operation demonstrations and corresponding safety education to cultivate students' spirit of unity and cooperation [12].

3.4. Teaching mode: Extend inside and outside the classroom to achieve three-dimensional learning

Physics experiments are highly operational and contain rich theoretical knowledge. Therefore, teachers should pay attention to the construction of the teaching mode, establish an online + offline teaching concept, determine an experimental teaching idea led by questions and guided by ideological and political education, build an online-offline integrated teaching mode, better achieve the effective combination of pre-class and post-class, and further solve the problems of difficult knowledge points and tight class hours in experimental courses. The online-offline teaching mode helps to realize the connection between curriculum teaching and ideological and political education. It enables students to deeply learn and understand the principles of experiments based on knowledge learning and experiment-doing, stimulates students' exploration awareness, helps to improve teaching effectiveness, create a more active teaching atmosphere, stimulate students' humanistic feelings, improve learning enthusiasm, and give full play to the ideological and political education value contained in the course [13]. Moreover, teachers also need to introduce diversified teaching methods in teaching, carry out problem-based and heuristic teaching, and cultivate students' thinking ability. Teachers should also actively organize various physical activities, guide students to actively carry out extracurricular reading, consult relevant materials, and participate in social practice research to further broaden students' learning horizons and stimulate their awareness of active exploration [14].

3.5. Teaching evaluation: Focus on process evaluation and enrich evaluation methods

Teaching evaluation is an important way to test teaching effectiveness and improve teaching quality. In the ideological and political construction of college physics experiment courses, the application of teaching evaluation helps to understand students' knowledge mastery and further evaluate the development of students' ideological and political qualities. Teaching evaluation should include the integration of ideological and political elements, the improvement of students' ideological and political qualities, the effect of experimental teaching, and teachers' teaching ability. Only by evaluating from multiple aspects can we understand the development of students and the teaching situation of teachers and effectively improve current problems. Teachers should infiltrate "ideological and political education in courses" into the final evaluation. Set some subjective questions in the final exam paper to examine students' gains from a class. For example, please think about your feelings after learning the College Physics course. What are your experiences after learning the spirit of the great-power craftsmanship? By setting such questions, teachers can understand the situation of students during the learning process and the development of ideological and political education in courses [15].

4. Conclusion

In conclusion, ideological and political education in courses, as an educational concept in the new era that focuses on morality and promotes the sustainable development of students, has important value. The college physics discipline is a course offered to science and engineering students in colleges and universities, involving rich ideological and political elements. It is particularly crucial to infiltrate ideological and political elements into the course. Therefore, college teachers should pay attention to their own learning and development, optimize teaching content, innovate teaching modes, and reform teaching evaluations. Only in this way can they better carry out educational work, improve the effectiveness of ideological and political education in courses, enable students to form a scientific exploration awareness, and develop good moral qualities.

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