The Construction and Thinking of the Integrated Teaching Mode of College Physics Theory and Experiment Course

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Abstract: The theory and experiment of university physics is the foundation of natural science and modern engineering technology, which plays an irreplaceable role in cultivating the scientific quality and innovation ability of university students. A comprehensive teaching model of university physics theory and experiment is established. The optimization of curriculum system, the integration and renewal of educational content, the reform of guidance methods and methods, and the reform of curriculum evaluation and evaluation standards have become the focus. It carries on the practical research to the university physics and the experimental education, explores it, implements it. The practice of the comprehensive teaching method that the theory and experiment education of university physics complement each other.

1. Introduction

College physics is the foundation of natural science and modern engineering technology. Physical experiment is an important practical course for students to carry out basic training of scientific experiment[1]. College Physics and experimental teaching directly affect the quality of talent training. However, for a long time, there have been some problems in these two courses, such as the existing curriculum system and education content system, a single education mode and the theory and experiment of the coexistence state of each other[2]. In order to meet the demand of social development for the quality of talents, the theory and experiment teaching mode fails to completely eliminate the knowledge transfer in the teaching practice of the theory and experiment course of college physics. To meet the needs of the society, the modern education concept reflects the basic function of university physics and the experiment of talent training. The enthusiasm and stimulation of students stimulate CSI, the theoretical and experimental research of university physics. In the unified education mode, further improving the quality of university physics education is of great practical importance.

2. Thoughts on the Construction of the Integrated Teaching Mode of College Physics Theory and Experiment

It is suggested that we should combine the theory of physics and experiment teaching in our university, absorb the experience of physics and experiment teaching at home and abroad, and construct a comprehensive teaching mode of physics theory and experiment in University [3]. Depending on the optimization and systematic reform of the teaching mode, content, teaching method and evaluation method, the new education system "comprehensive and multi-faceted teaching" reflects the theoretical teaching and experimental courses, cultivates students' scientific exploration, improves students' interest and enthusiasm in learning, develops their thinking, cultivates innovation awareness and creativity, and realizes the coexistence and phase of university physics and experimental education Mutual unification.

3. The Research and Practice of the Integrated Teaching Mode of the Theory and Experiment of College Physics

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3.1. Determine the Outstanding Characteristics and Principles to be Followed in the Construction of Integrated Teaching Mode

Obviously, the comprehensive teaching mode of theory and experiment in college physics means "comprehensive and multi-faceted teaching characteristics"[4]. Theoretical education is the main one, while theoretical teaching and experimental guidance are both. Basic training and comprehensive training are combined in the experiment. At the same time, the verification, application training and innovation training of both will help. Theoretical education system, students have a strong foundation, in order to determine the content of education, in order to optimize the use of education mode. At the same time, according to the characteristics of students of different majors, the diversification of educational organizations, and the comprehensive knowledge characteristics of the expansion outside books, extensive training has been formed. Follow the principle of teaching quality first, pay attention to the cultivation of innovation consciousness and spirit, and follow the principle of optimizing resource allocation.

3.2. Specific Methods for Research and Practice of Integrated Teaching Mode

According to the physical diagrams issued by the provincial teaching and Instruction Committee of the Ministry of culture, the contents of college physical education are classified. The first level is the basic knowledge of physics issued by the Education Operation Committee of the Ministry of education, which mainly includes the basic concepts, basic laws and their applications. It is a university that provides students with a basic platform for the minimum physical requirements of science and engineering for all majors[5]. The second level is about the frontier of physical science and the development of technology application. This part of the content can be displayed in the classroom in the form of "knowledge window" or "research question", or discussed as a small paper in the form of homework or students, and summarized in the discussion class. This level is to cultivate students' creativity. The first level is the application of physical knowledge in professional fields. The content of this level is only related to relevant specialties, and other specialties can be omitted or simply mentioned.

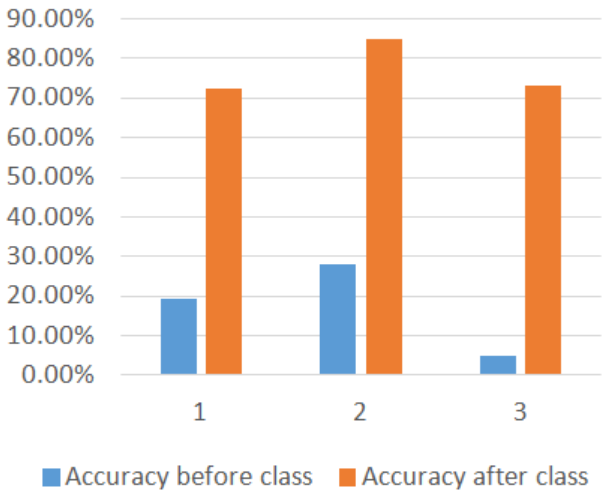

Figure 1 Comparison of accuracy before and after discussion

Completed the level of experimental curriculum system. This system breaks the traditional independent experimental curriculum system for each rule. A new three-level physics curriculum system is established, which is accompanied by a higher level of curriculum. (engineering application) has formed a new three-level circulation system from low level to high level, from basic to the most advanced, from receiving knowledge to cultivating comprehensive ability and gradually improving the comprehensive ability. All levels of experiments include mechanics, Tamils, electromagnetism, optics and modern physics experiments[6]. It means different levels of experimental skills and scientific thinking. On the first level, students can be familiar with the

measurement of basic physical quantities and the use of conventional experimental equipment. It is a common experiment, suitable for the research and basic training of science and engineering students. The second stage is based on the comprehensive physical experiment[7]. In the same experiment, it involves many knowledge fields and applies many methods and techniques synthetically. This level of experiment is mainly to integrate the results of basic experimental learning stage. Please broaden students' horizons and ideas, and use experimental methods and techniques to improve students' comprehensive ability. Eye level is the application of physics experiment principle in professional field. It is designed for research and experiment, aiming at the basis of engineering technology application. Under the guidance of students and teachers, choose the subject and research direction, complete the experimental plan, analyze the experimental results, and finally write the research report. This stage of education focuses on the cultivation of students' comprehensive innovation quality[8]. For example, according to the content of photoelectric effect test, coupled with the content of optical fiber transmission technology and the determination of solar cell characteristics, we can deepen the understanding of modern science and technology. Educational content, in a variety of fields, professional fields and levels of stratification to meet the needs of students elasticity.

We are to make full use of modern information technology resources, video demonstration, Cai open network resources and traditional blackboard and chalk route teaching, creative methods, introduction of problem stories, group discussion, and efforts to achieve the highest educational results. Pay attention to the extracurricular guidance of students. There are various forms of extracurricular learning[9]. There are regular assignments, course essays and online discussions, as well as ppt presentations. The survey shows that this kind of guidance model is helpful to students' autonomous learning and personalized development. In the experiment teaching, different experiment teaching methods are used in different experiment levels. At the level of basic experiment, the heuristic method and teaching method are used. At the level of comprehensive test, discussion and suggestions are given. At the experimental level, the inquiry based teaching method is used. The new development of physics, such as chaos, nuclear magnetic resonance, simulation robot, black hole dark matter, material science and application of modern high-tech such as new materials, laser and technology. In order to teach students, demonstration experiment video, please tell me. It emphasizes the connection between theory and practice and reflects the comprehensive teaching method thoroughly.

Through the comprehensive teaching mode, the course evaluation method is being improved. The traditional physics examination method has two parts, the final written examination and homework. After the exploration, we have formed the final written examination, mid-term distribution, internal and external topic discussion, small papers and PPT speech course total score. The last academic year is 50% of the total academic year, and the general academic year is 50% of the total academic year. Please pay attention to the comprehensive training guide for small papers and speeches. These two parts account for a large proportion. Small paper is an important method to reflect the ability of students to explore and solve individual problems. We arrange it according to "physics and my major" and "physics in life", such as the students on the topic of essays. In a certain period of time, teachers let students read some relevant articles, broaden their horizons, expand their knowledge, and examine new laws and phenomena. It is completely focused on the evaluation of the process. there are four parts about the research methods of college physics examination. Please ask students to do more experiments and do more hands. Students can also choose the experimental time, rather than the necessary time for class. Take the weighted average of the best experimental items. The final examination will take place in any of the following. The other is that there is no basis. The teacher held several experimental design questions. The students refer to the experimental design and complete them. Finally, the ability of students is evaluated based on the ability of students to complete the experiment, the experiment report and defense. In addition, according to the students' comprehensive design and research experiments, as well as the innovative consciousness and ability confirmed in these experiments, students' performance can be comprehensively evaluated. This kind of evaluation method has greatly promoted the students who

actively participate in the experiment class.

4. Conclusion

From 2013 to 2015, the senior students of engineering major tried the comprehensive teaching mode of university physics theory and experiment. Education has changed the traditional independent curriculum system of traditional university physics and traditional physics experiment. This reflects the level of curriculum system, and establishes a new integrated physics curriculum system which is independent, unified and mutually supportive. This kind of teaching mode promotes the enthusiasm, initiative and creation of students. The comprehensive education model is a comprehensive attempt of education and learning. The two rounds of education test the possibility of realizing the comprehensive education mode. Under the guidance of the new theoretical and experimental curriculum system and educational content system, the construction of the adaptive comprehensive teaching mode, according to the teaching syllabus, has prepared a set of textbooks for the integration of college physics and experimental education for two years. The implementation of the reform and performance integrated college physics education mode has greatly improved the students' physical theory, experimental skills, innovative consciousness, scientific research ability and engineering application ability. The students participated in the national electronic design competition, the free proportion automobile knowledge competition and the college students' physics innovation competition. Achieve excellent results. The implementation of the comprehensive teaching mode has a significant impact on the cultivation of students' comprehensive innovation quality.

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