The Innovation and Practice of College Physics Course Teaching Mode in the History of Physics

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Abstract: Based on the analysis of the university physics course and the traditional teaching mode, this paper put forward a kind of innovation of the history of physics teaching mode by the modern fruits of teaching research and innovation and has carried on the practice. This paper expounds the teaching objectives, the activity steps and the problems that should be paid attention in the teaching.

1. Analysis of the Current Situation

The traditional teaching mode of physics course in university science and engineering university is mainly taught by teachers, and the students are the audience and audience in the class. The common problem in the teaching is that students go to college from high school, and they can't adapt to the large amount of information and the fast velocity of study; The learning situation is not timely and effective feedbacked; Learning difficulties cannot be solved in time and so on. With the accumulation of these problems, the students with poor self-learning ability[1] and low level of cognition will increase their psychological pressure and cause a vicious circle, which will eventually lead them to lose confidence and give up their studying.

For this reason, there are many teachers to carry out the research of teaching mode in order to provide a platform for solving these problems. With the popularization and application of the multimedia technology, more or less having to improve the university physics teaching situation. And many teacher have carrying out the research for highlighting the teaching model of students main body status and initiative. But these research is mainly carried of the goal of the education on the knowledge and skills, is little care of the process and method, the two-dimensional goal of emotional attitude and values is less. However the two-dimensional target is the mainly problems existing in the college physics teaching in current. The current research was only done to the traditional model on a improvement of ways and means, but it is not suited to the innovative society demand for talent cultivation[2].

2. The Theoretical Foundation of the Research on Teaching Mode Innovation

The teaching mode refers to the "step-by-step procedures that guiding specific learning outcomes". It points to a certain teaching objectives and follows a certain teaching procedures, which can encourage students to actively studying. Its effectiveness depends on three conditions: a:the foundation of scientific teaching theory, can reflecting the research results of thinking, the research fruits of learning and behavior; b: Teachers instruct students to carry out a kind of activities according to a certain sequence; c: Students are actively participants in learning activities. Mary Alice gunter selection of 8 kinds of basic teaching mode is: direct teaching mode, concept mode, development mode, group identification method mode, explores mode, class discussion mode, cooperative learning mode, explore the emotional and solve conflicts mode.

The goals of the first three modes are correspond to the the knowledge acquisition and skill acquisition; Understanding and applying concepts; Classification and comprehensive information, these goals are belong to the goals of knowledge and skill. The 4th, 5th and 6 kinds of targets are aimed at stimulating creativity; problem solving and exploration; cultivate insight and promote

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critical thinking, it is belong to the goal of process and method to raise questions. The latter two aims at developing cooperative learning attitude and enhancing cognitive development; to helping the students to connect their learning with their emotional attitudes; learning to deal with ambivalent situations and so on which are belong to the emotional attitudes and values goals.

Because of the stage of foundation education, the knowledge and skills target can be paid enough attention, and the assessment level is also high, with relatively mature experience. However, the evaluation of process and method, emotional attitude and values is not enough, which leads to unbalanced development of the students, insufficient learning ability and low metacognitive level. Therefore, the teaching of colleges and universities should improve the understanding of the two-dimensional goals of process and method, emotional attitude and values in order to meet the requirements of innovative society for talent cultivation.

3. Research on Innovative Teaching Mode of University Physics Courses

The teaching of college physics course is based on the physics of middle school, many students have had the skills of the corresponding physics knowledge and skills. After mastering a certain knowledge of higher mathematics, should make the students more actively involved in the teaching process, in order to making them becoming the main body of the teaching process and developing their initiative in the cognition of the physical world. Further study the knowledge of physics, master the methods and ideas of physics, enrich their emotional world and improve their value judgment in the process of the physics teaching, so that the students have a certain innovation spirit and innovation ability and so on.

Bagunter point out that it is necessary for the combination of the eight basic teaching modes and the renewal and creation in order to achieve such a goal[3-4]. Because of the innovation education contains emotion education, free education, image education and value education and so on, the history of physics has a unique educational function, which contains the development of physics theory and thought, contains the thought quality and scientific spirit of the physicists. It can achieve the organic combination of the natural science and the humanities, and achieve the realization of the three-dimensional goal better, so that students can have certain innovative spirit and innovative ability.

The author have made some innovation practice in the process of college physics course teaching, based on the history of physics, combine the teaching modes of explore the mode, classroom discussion mode, cooperative learning mode, explore the emotional and solve the contradiction mode, put forward the teaching mode innovation based on the history of physics of university physics. The target of the model is: to improve the students' scientific and humanistic accomplishment; to improve students' autonomous learning and the ability to explore physical problems; cultivate the students' innovative spirit. So that they dare to face difficulties and challenges and to form the correct emotion attitude and values.

4. Teaching Practice Cases -- Constant in Vacuum, Analysis of the Magnetic Field in the Vacuum

4.1. Teaching contents

We plan to use two lessons to teach the knowledge in the first four sections of this chapter. The specific content is: magnetic field (magnetic phenomenon, magnetic induction intensity, gauss theorem); Biot - savart's law; the application of Biot - savart's law; ampere loop theorem.

4.2. Design and analysis of the teaching process.

(1) We show the early research of magnetic phenomenon, the interaction between the magnetic and electric, introduces oster and ampere's life and their contributions for establishing the current and magnetic theory, and introduces several related important experiment by using of the multimedia in order to make the students to comprehend the scientific spirit of the physicist of oster and ampere, (tenacity, witty, be good at to accept new things and so on.), the humanities spirit

(philosophy of heritage, cultural heritage and so on.) and the change of scientific research methods and ideas

(2) We must to guide the students to independent construction of the knowledge system, guide students to independent construction of knowledge system of the magnetic induction intensity, gauss theorem, Biot - sand laval's law[5-6], and the ampere loop theorem of knowledge on the basis of physics history.

The key is to understand the physical concepts and laws of physics, to understand the nature of the steady magnetic field. It is suggested that students use the comparison method to connect the magnetic field to the electric field. It is promise that the students make their own self-determined learning methods, self-selected learning materials, self-paced learning procedures, self-adjusting metacognitive level and allowing students to learn have multiple levels of goals. The students may have some difficulties in the process, for example: the students could not use their own language accurately represent the concepts and rules, such as: the establishment of the concept of magnetic induction intensity needs to have a lorentz force and torque concept on the basis of that current-carrying coil; Biot - savart's law is the law of the combination of experiment and mathematics, and the concept of current element can cause cognitive impairment, self-learning speed is slow and vector integration is difficult and so on. These difficulties often vary from person to person, requiring teachers to diagnose and help them in time or guide them to overcome difficulties and improve their self-learning ability.

4.3. Group discussion, exchange and inspiration

We continue to solve the problem of learning disabilities through mutual learning. At the same time, we discuss the emotional attitudes and values in the process of studying. For example: anxiety, anxiety, dissatisfaction, fear and other emotions in the learning, how to regulate and control oneself, how to deal with success and failure, what does oster and amperes experience suggest and so on. By combining these problems with the study of magnetic phenomena[7], students' emotional attitudes and values are further reflected so that teachers can make diagnosis and guide them.

5. Several Issues Should be Noted in Practice.

First, encourage the teacher in high school to enhance communion and communication

Anything is mutual, either apparent knowledge or recessive knowledge, either coding knowledge or don't code knowledge, the intellective mutuality is universal and orthodox. Owing to the knowledge is a mankind's summary of social fulfillment over a long period of time, so knowledge is not only the intellective creator but also to effect the other action main body, the knowledge have strong exterior character, intellective schematism, complexity and evolvement character, so the knowledge represent intellective imperfection and asymmetry among different individual. So any knowledge will form intellective connection and mutual complementarity through intellective pervasion and overflow[8]. Obviously, knowledge represent the intellective connection, exterior character, overflow and mutual complementarity etc. Not only the teacher's teaching ability represent the intellective impart ability that the teacher's professional knowledge and correlative knowledge, but also represent the combine ability between the professional knowledge and practice ability. Intellective configuration exist difference between different subject and different speciality. The young teacher in high school should actively keep to communicate with the young teachers in different professional knowledge and speciality, carry out intellective across subject and professional share and pervasion. But because of the knowledge type, knowledge proprietor and ability will influence intellective share and pervasion, so the management in high school should institute system that can encourage young teacher in high school to enhance communion, through intellective share and pervasion to offset and enrich teaching practice knowledge and improve the teacher's teaching ability in high school.

Secondly, one of the foundations of this model is that teachers should change their teaching ideas and focus on the development of all students. Taking students as the main body and attaching importance to the interaction between teachers and students; strengthen the concept of horizontal

connection between disciplines.

Thirdly, teachers are required to prepare carefully before class, treat students' questions correctly in class, and conduct effective regulation and guidance due to the open state of teaching content in the process of self-construction, there is a lot of knowledge about other subjects.

Fourthly, this model is applicable to some contents of university physics courses, which should have rich historical materials and have a good educational function.

Fifth, the activity of this mode is not invariable, and the activities of teachers and students should meet the needs of learning. The realization of teaching goal requires a planned and methodical arrangement.

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