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Practice and Exploration of Integrating Ordinary Differential Equations into Course Ideology and Politics

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Abstract: Currently, ordinary differential equation courses in various universities in China generally emphasize the teaching of mathematical fundamentals, while neglecting the infiltration and application of ideological and political elements. With the active development of ideological and political education in university courses, universities should deeply explore the ideological and political elements contained in different types of courses, and the same applies to ordinary and differentiated courses. Based on this, this article discusses the importance of integrating ideological and political education into ordinary differential equation courses, and proposes two practical methods for developing courses: mathematical thinking and practical life integration, in order to provide reference and assistance for integrating ideological and political education into ordinary differential equation courses.

Keywords: Ordinary differential courses; Course ideology and politics; Integration measures

Introduction

The course of ordinary differential equations belongs to the core professional courses of mathematics and applied mathematics in universities, laying the foundation for subsequent courses and playing an important role in cultivating students' professional abilities. Many teachers believe that the focus of this course is on objective laws, and the theory is universal, belonging to knowledge that transcends ideology, so they believe that it is not suitable for conducting ideological and political education in the course. But in fact, mathematics embodies universal objective laws, which contain many philosophical thoughts and have a positive impact on guiding students to view the world correctly. Therefore, how to deeply develop the ideological and political elements contained in ordinary differential courses has become a hot topic of concern and discussion for many frontline teachers.

1. The Importance of Integrating Ordinary Differential Equations into Curriculum Ideology and Politics

1.1 The special status of the course

The course of ordinary differential equations is a continuation of advanced algebra and mathematical analysis, and is also a fundamental course required for three majors in mathematics. Moreover, the knowledge learned in the course of ordinary differential equations provides ideas and methods for dealing with problems in various courses such as mathematical modeling and control theory foundations. It can be seen that for the study of mathematics courses, the course of ordinary differential equations plays an important role as a bridge between the past and the future. The course of ordinary differential equations is a commonly used mathematical language to describe different disciplines such as engineering technology and natural sciences. It has also been widely used in different disciplines such as chemistry, aerospace technology, and biology. The above application background provides diverse materials for the development of ideological and political education in the course.

1.2 The need to build students' ideals and beliefs

The course on ordinary differential equations is usually conducted in the second academic year. Students have gone through a year of college life and have gradually matured psychologically, becoming healthier and more confident. However, due to various factors, some students often experience issues such as a lack of social responsibility and academic ethics, or develop pessimistic and depressed emotions. In response to the above issues, relying solely on traditional ideological and political theory courses cannot effectively solve them, nor can it fully connect their emotional value demands. Especially for students in their second year of university, the ideological and political theory courses have generally been completed. Therefore, teachers in various majors should fully utilize the educational role of professional courses, reasonably introduce ideological and political elements into course teaching activities, achieve subtle education for students, help students establish correct worldviews, outlooks on life, and values, and have a positive impact on students' personality development.

1.3 Specific needs for educational reform

In May 2020, the Guiding Outline for Ideological and Political Construction of Courses in Colleges and Universities issued by the Ministry of Education clearly put forward the ideological and political construction of courses as the overall goal, comprehensively deployed the key work related to ideological and political construction of courses in colleges and universities, and believed that colleges and universities should always adhere to the spirit of Xi Jinping's speech in China's education conference, promote ideological and political construction in colleges and universities in an all-round way, so as to effectively complete the task of building morality and cultivating people. Therefore, universities should further promote the implementation of ideological and political education in courses, comprehensively promote the construction of ideological and political education in subject majors, fully develop deeper ideological and political elements in different types of courses, fully reflect the value of moral education in each course, and effectively improve the overall quality of talent cultivation. Therefore, universities need to continuously cultivate the awareness and ability of ordinary differential equation course teachers to carry out course ideological and political construction, and indeed fully integrate ideological and political elements into course teaching activities.

2. Practice and Exploration of Integrating Ordinary Differential Equations into Course Ideology and Politics

2.1 Mathematical ideas for developing theoretical knowledge

During the process of teaching elementary solutions to first-order differential equations, teachers explain to students the common ideas of variable transformation, highlighting the mathematical thinking mode of variable transformation. This way of thinking is widely used in solving many problems of ordinary differential equations, such as Euler's equation, Bernoulli's equation, and so on; In the process of explaining the causes of integration, it is recommended to try using heuristic teaching methods, pre design problems, guide students to continuously think and research by posing questions, gradually discover problems in the learning process, and use the knowledge learned to solve them. Learn how to transform unfamiliar problems into known problems in a way of thinking. In the process of explaining the uniqueness theorem, carefully analyze the method of establishing a sequence of gradually approaching functions, so that students can understand the connotation of the method of gradually approaching, learn how to handle problems through the thinking mode of limits, and then master the general rules of dialectical thinking that trigger qualitative changes on both sides. They realize that the process of fearlessly overcoming difficulties, forging ahead, and achieving personal goals is the same, and always observe the important belief of "never forgetting the original intention and keeping the mission in mind". When explaining the constant coefficient homogeneous linear differential equation, guide students to use the properties of elementary functions and combine the knowledge point that first-order constant coefficient homogeneous linear differential equations have solutions, gradually understand that the solution of the equation may be in the form of an exponential function, help students master the process of transforming the undetermined exponential function into a more easily solvable algebraic equation, and develop mathematical thinking to transform the unknown into the known.

2.2 United Living Practice

Many students believe that there is no close connection between ideological and political elements, ordinary differential equation courses, and personal life, and their practicality is not strong. Therefore, in the process of course explanation, teachers should try to introduce life display elements into teaching, and guide students to grasp the perspective of development through mathematical modeling.

Taking the explanation of variable separation equation knowledge points as an example, teachers can introduce the specific application value of the equation to students. For example, this equation can be used for art authenticity verification, carbon-14 production age, etc., in order to stimulate students' learning enthusiasm. During the learning process, teachers can try to introduce relevant knowledge points such as infectious disease models and Lorenz equations to improve students' ability to flexibly apply these knowledge points and make them aware that the course is widely used in daily life. Taking the introduction of infectious disease model as an example, we can explain to students the beginning and end of the COVID-19 in Wuhan and the risk control measures. Through the unremitting efforts of medical staff, the cooperation of the people and the timely prevention and control measures of the government, we have effectively controlled the further development of COVID-19, so as to strengthen the national self-confidence of college students. In explaining the process of reducing the price of high-order equations, the question of how to calculate the second cosmic element can be introduced in the classroom, in order to introduce the development of China's aerospace industry in recent years, including Chang'e-5 and Tianwen-1, so that students can deeply feel the prosperity of their country and make contributing to the country their personal goal.

3. Conclusion

Ordinary differential equations, as the foundation of many mathematical courses, are of crucial importance and their role in fostering moral character cannot be ignored. Therefore, as a subject teacher, one should fully understand the importance of curriculum ideological and

political construction. By developing mathematical ideas based on theoretical knowledge and combining them with practical life, effective measures should be taken to infuse ideological and political elements into curriculum teaching, fully tap into the educational value of ideological and political elements, cultivate students' correct values, outlook on life, and worldview, and fully play the role of curriculum ideological and political education in cultivating morality and nurturing people.

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