

Innovative Research on Curriculum Reform under the Background of "Four New" Discipline Construction—Taking the course of Advanced Mathematics as an example

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ABSTRACT

The four new construction proposed by the Ministry of Education and other relevant departments is an important measure to realize the connotative development of higher education under the background of big data. The fourth new construction includes "new engineering science", "new agricultural science science", "new medical science" and "new liberal arts science". "New engineering" is not only aimed at the in-depth development of a series of new majors, such as robotics, artificial intelligence and cloud computing, but also includes the traditional related majors to adapt to the development of The Times. In view of the "new agricultural science" is to cultivate applied and compound new agricultural and forestry talents, which is the development needs of The Times, now there are many large agricultural warehouses using cloud computing, Internet of things, artificial intelligence and other new technologies to provide a powerful catalyst for the development of agriculture. "New Medical Science" also develops new majors such as intelligent medicine in combination with the pace of big data development, and cultivates new talents with higher medical skills. "New liberal arts" means integrating new technology into the teaching of traditional liberal arts. "Four new" discipline construction under the background of higher education many disciplines are faced with reform and innovation, higher mathematics is one of the required courses of engineering and science major, there are a lot of professional are new engineering related under the construction of the engineering and science, so the higher mathematics is also to keep pace with the construction of four new construction innovation reform research. This paper will study the curriculum reform and innovation of higher mathematics under the background of "four new" discipline construction from four aspects: the reform of teaching mode, the innovation and reorganization of teaching content, the reform of assessment mode and the feasible teaching mode.

KEYWORDS

higher mathematics teaching mode; four new construction; assessment method

1 Introduction

Under the background of the four new construction, the innovation and reform of disciplines is also imperative. It is not advisable to only learn their own disciplines under the trend of big data development. The integration and innovation between disciplines are in line with the development of The Times. Teachers engaged in higher education should also conform to the development of The Times, and create the intersection and integration between the courses they teach and other disciplines. After learning a course, students can not only master the required knowledge, but also learn more knowledge to open their horizons, and understand the cutting-edge knowledge of subject development and the integrated development of interdisciplinary subjects. Higher mathematics should also focus on the reform of teaching content, mode and other aspects, On the one hand, the teaching content integrates computer programming to solve the relevant knowledge of high numbers, Let the students see the new methods to solve the problem of high numbers under the four new background; Secondly, add the ideological and political elements that integrate with the knowledge points, The combination of teaching knowledge points with the achievements of national scientific and technological progress and research and development, Let the students improve their national self-confidence; Teaching knowledge points combined with the current film and television works to stimulate students' interest in learning; Teaching knowledge and integrating literature combines science and arts, So that students can also improve their literary literacy while learning science, Teach knowledge points and stimulate students' sense of national honor through the story explanation of mathematicians; Finally, through the study of a course, I can truly become a new era of talent under the background of the "four new" disciplines, This is also the ultimate goal of the innovation and reform of this course.

2 The reform of the teaching mode

In view of the teaching of higher mathematics, we re-grasp the knowledge points of higher mathematics, combine with the teaching objectives, re-examine the teaching pain points, and adopt the mixed online and offline teaching mode to teach students in accordance with their aptitude. Online around the difficulties of high numbers, let the students learn the higher mathematics function, limit and continuous, unary function differentiation, unary function integral learning, vector algebra and spatial analytic geometry, multivariate function calculus, ordinary differential equation and infinite

series these chapters. Online, repeated explanation of knowledge points for students with weak foundation, and push relevant advanced knowledge and cutting-edge knowledge to good students, so that they can actively explore and broaden their horizons. Push different learning materials to students of different levels to achieve the purpose of multi-pronged teaching in accordance with their aptitude. Under the four new background, we should actively explore and analyze the effective ways to combine the content of higher mathematics taught by students with their professional knowledge, and select more cases to use in the teaching of higher mathematics, so that the online and offline teaching mode can be further applied. To improve the efficiency of students' learning, for the traditional final examination model, with card grading, student mutual evaluation, teacher proposition, student proposition, platform discussion and standard report.

3 Innovation of teaching methods and content

At the present stage, most of the knowledge points covered by the textbooks used in colleges and universities are basically the same and very comprehensive, and the only deficiency is the lack of professional differentiation. Because higher mathematics is a necessary course for many majors such as engineering and science, but in most of the higher mathematics books, the knowledge content consistent with each major is very little. In the past teaching, teachers did not deeply analyze the contents of the real application of higher mathematics in various majors, which made the lack of pertinence and effectiveness in teaching. This situation will lead to many students do not pay attention to and lack of interest in higher mathematics, and then affect the application of mathematical ability in this major. In view of this situation, more teaching cases, cutting-edge knowledge and teaching introduction should be taught to strengthen students' cognition of the role of higher mathematics. For example, construct the medical teaching case database for the definition of infectious diseases, and the case base of environmental majors affected by air pollution, etc., and explain the case databases for different majors.

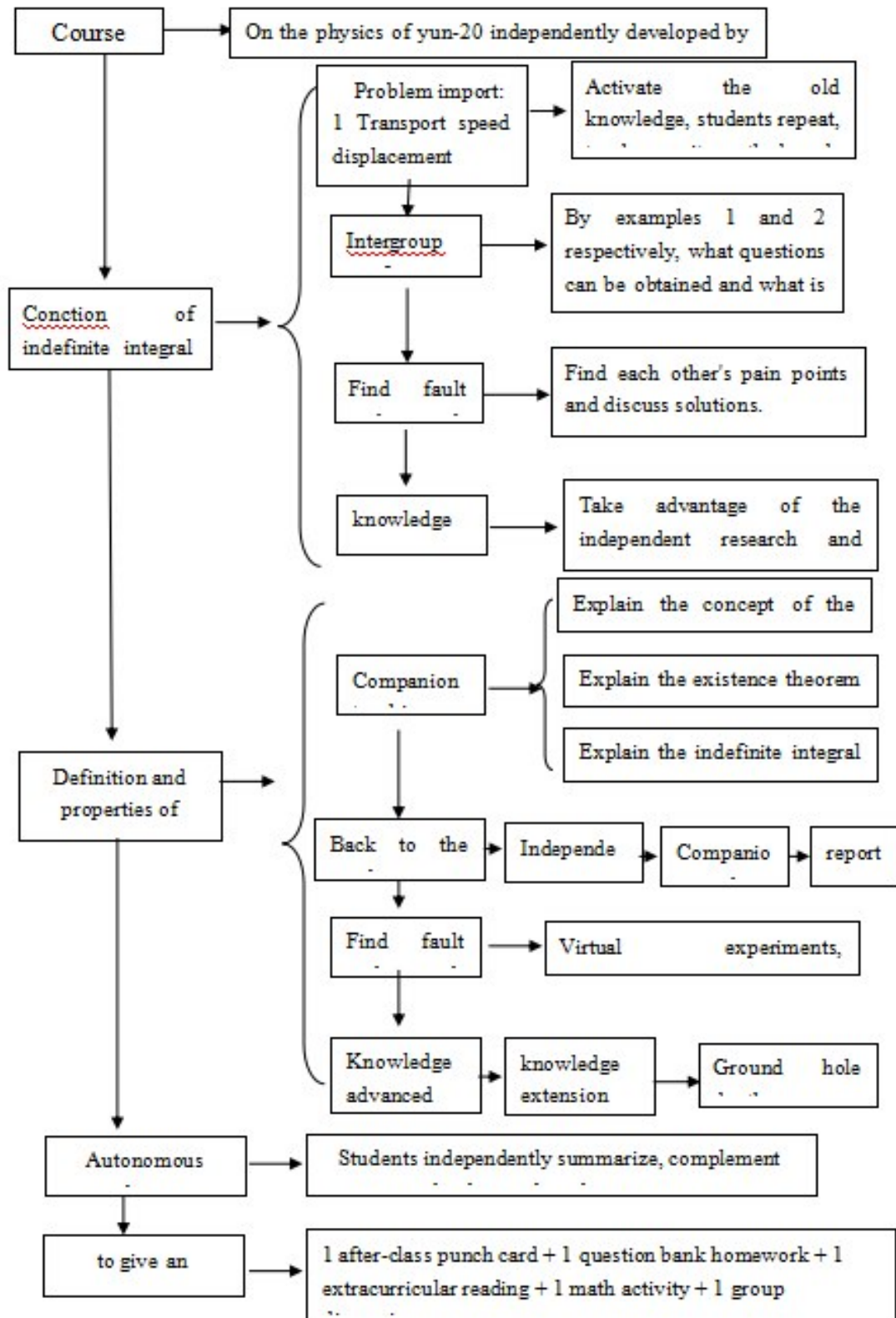
The practical application of higher mathematical knowledge as an important goal, construction and mathematical modeling ideas and mathematical culture integration of teaching content, to learn is a very important purpose, for some is not easy to understand the key knowledge can rely on mathematical modeling case as a carrier to guide students to participate in the process of modeling, experience the practical application effect of theory. Using mathematical modeling on the one hand, taking the case as the carrier can improve the application of the knowledge. On the other hand, it can reduce the boredom of learning high numbers produced by the high theory and strong logic of advanced mathematics, and reduce the negative impact to a certain extent.

Advanced mathematics is an abstract and complex subject. If you want to learn this course well, we must mobilize students' initiative and improve students' participation. In the process of teaching, grasp the three important stages before class and after class. Before class, the teacher pushes the task on the learning pass, mainly in the form of some simple knowledge in the form of video, small test and small reading before class to pave the way for the key and difficult points of explanation in class. These parts also have a result as a part of the process assessment, one is to urge students to consciously complete the study, the other is to make the assessment of ordinary results diversified.

It combines "BOPPPS + PAD" mode with curriculum introduction, student teaching, group confrontation, virtual experiment, knowledge expansion and self-summary. In the course introduction process, Introduce new courses with teaching cases in line with the major or videos and stories that attract students; In the peer teaching link, students first think independently, and answer independently, Then organize the student peer teaching, Through learning, the correct rate of the answer has been significantly improved; In the inter-group confrontation session, the whole class is divided into 3-4 groups to design related topics, Some topics have different minor questions, Some questions can have different solutions for different groups of students, The group average score for this section as everyone's score, Improve the ability to cooperate and unite with everyone; In the virtual experiment, the computer programming method is mainly used to make students realize the new method of advanced mathematics knowledge points, And exercise the students' mathematical modeling ability and the ability to solve practical application problems; In the link of knowledge development, we mainly focuses on the preface dynamics and the achievements related to knowledge points and culture, science and technology and history, Cultivate students' feelings of family and country and mission responsibility. In the process of independent induction, students will summarize the knowledge points of this class and submit them after class as part of their usual results.

Through the concept of indefinite integral, we systematically show you how to carry out the teaching design. Indefinite integral is one of the core concepts of calculus. It is not only mathematical knowledge, but also embodies a mathematical idea, which is mutually inverse operation with derivative and differentiation. Indefinite integral is an important tool to determine the integral value, and also plays an important role in studying geometry and inequality. It is widely used in physics, economics and other fields, and is an essential tool to carry out scientific research. First of all, before class, let us review the guidance problem learned before, combining a case of physics and the case of geometric

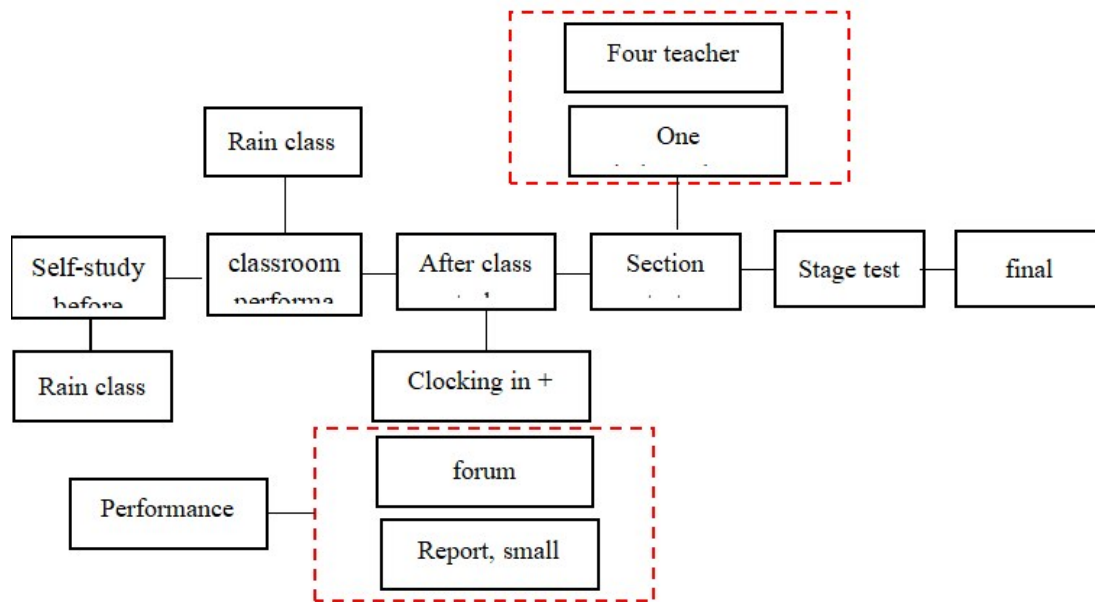
application. Check the origin of the indefinite fraction, let the students have a big box understanding of the indefinite integral. The specific ideas in the class are shown in the figure below.



4 The reform of the assessment method

The assessment method is divided into process assessment and final examination; its proportion is 10% for self-study before class + 10% + individual task in class 15% + 5% for group task + 10% + 50% for final examination; the following

figure shows the modules included in the score evaluation.



5 Generalizable teaching model

First, the content arrangement designed before, during and after class are replicable; second, the six links designed by "BOPPPS + PAD" mode can improve students' interest in learning and participation. This mode is also suitable for other mathematics courses such as linear algebra and probability theory. Finally, the virtual laboratory also has a great promotion value in other courses.

6 Summary

Under the development of big data era under the background of "four new" discipline construction, develop the teaching mode of online and offline complementarity for advanced mathematics; arrange the three modules of before, during and after class, make good use of the six links; grasp the integration of course politics, subject frontier and knowledge. I believe that through the study of a course, I can truly become the new era of talents under the background of "four new" disciplines.

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