

Innovative Teaching of Applied Higher Mathematics Curriculum Based on Mathematical Modeling Drive

Wenting Ma*

Nanchang Institute of Science and Technology, Nanchang, China

18929355@qq.com

*corresponding author

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Abstract: With the development of large-scale scientific computing and large-scale engineering applications, more and more scientific fields need to support a large number of theories and applications more urgently than ever before. How to better integrate modular thinking into higher mathematics teaching is a major focus of current research in higher mathematics teaching. The traditional higher mathematics curriculum has certain deficiencies in teaching content, teaching methods, teaching methods, etc., resulting in the course failing to enable students to improve their logical thinking ability. Based on this, this paper proposes research on innovative teaching of applied undergraduate advanced mathematics courses based on mathematical modeling. This paper analyzes the current status of applied undergraduates in higher mathematics courses, and uses literature review, questionnaire and expert interview methods to study innovative teaching of applied undergraduate advanced mathematics courses based on mathematical modeling. The results show that The most important thing for advanced mathematical teaching driven by mathematical modeling in applied undergraduate colleges is to incorporate mathematical modeling ideas and content, update teaching concepts, redefine teaching priorities, reform teaching models and evaluation methods, highlight professional characteristics, and establish layering Progressive teaching mode and tutoring mechanism and make full use of modern information technology to enrich teaching methods.

1. Introduction

Mathematical modeling is a scientific and technological activity that uses mathematical knowledge and computer technology to solve practical problems. At present, there are still many problems on the development of mathematical modeling. It is a research hotspot how to integrate modeling ideas into the teaching of high numbers. Although the traditional higher mathematics curriculum has maintained the logical tightness and systematic integrity of mathematics in the teaching content, it has the defects of emphasis on theoretical knowledge, ability and application, arithmetic skills, and mathematical concepts. In terms of teaching methods, they only focus on deduction and induction, do not pay attention to unity and individuality, cannot adapt to the requirements of different specialties and different levels of training, and still use instilled teaching methods. Students are passive receivers of teaching activities and cannot participate in teaching activities. The above disadvantages have led to the failure of higher mathematics teaching, unable to improve students' logical thinking ability, and unable to make full use of the curriculum foundation and platform.

With the continuous deepening of the connotation construction of application-oriented undergraduate colleges, as an important course to cultivate application-oriented talents, how to closely integrate with the professional courses learned by students is becoming increasingly important [1]. To this end, it is necessary to strengthen the reform of higher mathematics teaching in applied undergraduate colleges, follow the principle of "development as the goal, practice as the purpose, and necessary and sufficient degree", and establish the basic concept of professional

service of higher mathematics courses. Actively promote the reform of higher mathematics teaching, integrate the beauty of mathematics into teaching, focus on the cultivation of emotional quotient, enhance students' interest in learning, and tap the effect and value of higher mathematics teaching. It is of great significance to train students' comprehensive quality, innovation ability and improve teaching quality. Innovative teaching of applied higher mathematics courses based on mathematical modeling is of great significance [2].

This article combines research with the training objectives of applied talents in universities, the goal positioning of higher mathematics courses in the curriculum system, teaching content and teaching methods, integration with professional courses, training of applied mathematics ability, etc., and the common development and personality of students. Problems such as training are analyzed, and countermeasures are proposed.

2. Proposed Method

2.1 Status Quo of Higher Mathematics Courses in Applied Undergraduates

(1) The role of higher mathematics courses in applied undergraduate education

Advanced Mathematics is the basic course of the undergraduate course, not only providing solutions to students' mathematical knowledge and learning tracking courses, mathematical creativity, and practical problems. By studying advanced mathematics courses, students have mastered the ability to apply, to innovate, to analyze and solve problems, to unite and collaborate, and to have good learning methods so as to comprehensively improve students' overall quality. Therefore, the quality of higher mathematics courses directly affects the quality of subsequent courses. To train high-quality talents and give full play to the role of basic mathematics courses in undergraduate education, we must comprehensively and systematically reform the educational content of higher mathematics courses.

(2) Analysis of Current Situation of Higher Mathematics Teaching

1) The educational process is limited to traditional theoretical knowledge education, and does not extend the application process; teachers simply adopt the form of theoretical education, ignoring the possibility of higher mathematics applications [3-4]. Advanced mathematics is a basic course in learning. With the development of the Applied Science curriculum, the applicability of this curriculum should also increase. In the case of applied universities, the goal of education is to cultivate applied talents. The goal is to reform and rationally set the curriculum, with a focus on improving the quality and ability of students.

2) The main teaching content of advanced mathematics courses includes calculus, infinite series, analytic geometry, etc. Due to teaching reform and the occupation of other professional courses, the number of hours of advanced mathematics courses has been greatly reduced, so that teachers only have limited class hours. Complete teaching tasks, barely rush to finish teaching progress [5]. The teaching process of this pair will make students have a certain degree of difficulty in the process of learning and understanding knowledge, and the homework and exercises arranged after class will also be greatly restricted.

3) From the perspective of the curriculum system, the system and integrity of the curriculum has been emphasized too much. There are more continuous variables and insufficient discrete variables; pay attention to the training of arithmetic skills, ignore mathematical concepts, and guide mathematical thinking methods; develop sufficient ability to apply mathematical knowledge to solve students' consciousness and practical problems. Practice guidance links lack a guidance plan; there is a lack of guidance requirements and a single guidance model.

(3) Problems Facing the Teaching Reform of Higher Mathematics

The problems faced by the reform of higher mathematics teaching are: First, there is a contradiction between less mathematics in teaching hours and large amount of teaching tasks. At present, colleges and universities have reduced the number of hours of advanced mathematics courses, but the content of advanced mathematics courses is large, and the impact is that teachers can not complete the teaching content under the condition that the current number of hours is not

available, often until the end of the semester. Teaching is complete [6]. The second is that most students are not clear about the purpose of studying advanced mathematics. Most students' purpose for studying advanced mathematics is only to complete an examination subject. There are also some students who want to study advanced mathematics because they need postgraduate exams. [7]. Third, the students' mathematical foundations are uneven. In the teaching process, teachers can feel that some students are interested in the study of advanced mathematics, and the ability to receive new knowledge is also better. However, some students will learn I find it relatively difficult, which causes the students in this part to be less interested in studying advanced mathematics courses [8].

2.2 Teaching Requirements for Advanced Mathematics Courses in Applied Undergraduate Colleges

With the deepening of the construction of the meaning of the University of Applied Sciences, as an important course of applied talent training, the method of tightly combining with the professional courses learned by students is becoming more and more important [9]. To this end, we must strengthen the reform of higher mathematics education in applied universities, and establish the basic concepts of higher mathematics courses as professional services in accordance with the principle of "development as a goal, the practice of a goal, and a degree are necessary and sufficient". Actively promote the reform of higher mathematics education, integrate the beauty of educational mathematics, focus on the cultivation of emotional indexes, increase students' interest in learning, and make full use of the effect and value of higher mathematics education [10-11].

(1) Talent training requirements for application-oriented colleges

Schools and universities aiming at applications, based on the "13th 5-year plan" of national education, focusing on the training of high-quality applied technical personnel for regional economic development, the contribution of regional economic development, and the professional development of learners, Focus on social evaluation. . Artist training is centered on training goals, the overall design is student-centered, and the starting point is the combination of school and business cooperation and work and learning. The combination of "teaching, learning, execution", work-learning alternation, and post-practicum internship is the forefront of all industries that must meet job needs, build a talent training model that closely integrates engineering and learning, and cultivate high-quality proficiency. Expert [12-13].

(2) Higher Mathematics Curriculum Requirements for Applied Undergraduate Colleges

Mathematics is language, mathematics is tool, mathematics is foundation, mathematics is science, mathematics is technology, and mathematics is culture. Advanced Mathematics is an important open basic course for all colleges and universities. It is a necessary basic course for science and engineering majors of applied colleges and universities. It plays an important role in training students' comprehensive quality, logical thinking ability, innovation and creative ability[14-15].

3. Experiments

(1) First confirm that the research object of this article is applied undergraduate advanced mathematics course teaching. Using literature review method, through the collection, collation, and analysis of literature data, to understand the current development status of advanced mathematics teaching, and master the drive based on mathematical modeling. The situations and problems in the application of advanced undergraduate mathematics education, clarify the research context in this field, and then form their own research findings. This will lay a solid theoretical foundation for this research and organize the results.

(2) Use the questionnaire survey method to conduct a questionnaire survey on students and teachers of applied undergraduate colleges, to understand the current status of students in applied colleges and students' views, and to ask teachers about the current teaching methods of higher mathematics. Reform proposals, and through expert interviews, express opinions on innovative teaching research of applied undergraduate advanced mathematics courses based on mathematical modeling.

A total of 1,500 questionnaires were distributed in this questionnaire, and 1,400 valid

questionnaires were recovered. The effective rate of the questionnaire was 93.3%.

4. Discussion

4.1 Analysis of Problems Existing in Teaching of Applied Higher Mathematics Based on Mathematical Modeling

Questionnaires are issued to teachers and students who have problems with the application-based undergraduate advanced mathematics courses driven by mathematical modeling, and the results are sorted into categories. The results are shown in Table 1.

Table 1. Analysis of problems in Application-oriented Undergraduate Higher Mathematics Teaching Based on mathematical modeling drive and suggestions for solutions

Existing problems	Solutions
Students' mathematical foundation is relatively weak	Grasp the characteristics of students and teach them according to their aptitude
Poor adaptability of teaching materials	Multi means integration, building teaching platform
The flexibility of teachers' teaching methods is not enough	Strengthen ability training and pay attention to the combination of learning and using
Higher mathematics teaching content and professional content are not closely linked	Meet the professional needs and realize the integration of disciplines

As can be seen from Table 1, from the perspective of students and teachers, there are still problems in the teaching of applied undergraduate advanced mathematics based on mathematical modeling. Some teachers have given suggestions on solving these problems. Model-driven application-oriented undergraduate advanced mathematics courses have good reference values when they have problems, and also provide ideas for the reform of higher mathematics education.

4.2 Analysis of Higher Mathematics Teaching Reform in Applied Undergraduate Colleges Based on Mathematical Modeling

The expert interview method was used to ask experts about the reform methods of advanced mathematics teaching in applied undergraduates based on mathematical modeling, and the results were collated and analyzed. The results are shown in Figure 1.

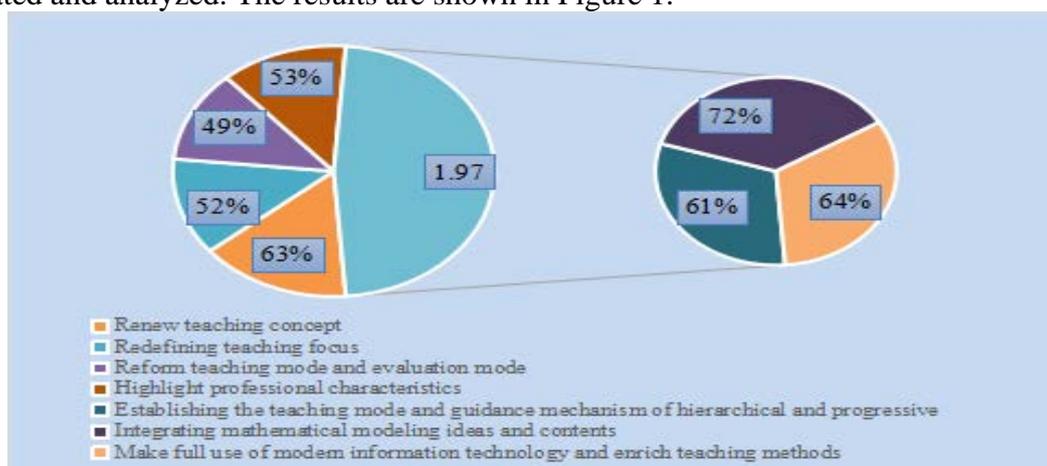


Figure 1. Analysis of higher mathematics teaching reform in Application-oriented Undergraduate Colleges driven by mathematical modeling

It can be seen from Figure 1 that there is a lot to be done in the reform of advanced mathematics teaching in applied undergraduate colleges based on mathematical modeling. The most important thing is to incorporate mathematical modeling ideas and content. In addition, we need to update teaching concepts Re-determine teaching priorities, reform teaching models and evaluation methods, highlight professional characteristics, establish layered and progressive teaching models and

tutoring mechanisms, and make full use of modern information technology to enrich teaching methods.

5. Conclusions

This paper has carried out research on innovative teaching of applied undergraduate advanced mathematics courses based on mathematical modeling. The research in this paper shows that the higher mathematics curriculum is difficult to learn due to the system, theory, and abstract characteristics. It is necessary to change the traditional education concepts and methods in the actual education process according to the actual situation of students. More colorful and fun math lessons. According to different educational content and specialty characteristics, combining advanced mathematics and follow-up majors, improve the quality of mathematics education. The development of higher education is applicable to the educational reform research and practice rules of higher mathematics courses, which can promote educational reform, improve educational quality, and promote scientific research.

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