Exploration and Practice of Teaching Reform in Advanced Mathematics Course

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Abstract: The advanced mathematics course has gradually become the basic course of colleges and universities, but its inherent nature of the slow upgrade speed and monotonous contents causes that the reform process of the advanced mathematics course is slow and students' learning enthusiasm is low. Based on the author's study and practical experience, this work first analyzed the existing problems in the advanced mathematics course, and then put forward some suggestions on the reform of advanced mathematics teaching method, such as clarifying the course orientation to realize the transformation of course function, making full use of multimedia tools to increase the presentation form of the classroom, constructing a discussion classroom to activate classroom atmosphere and adopting the classroom teaching method of the transposition simulation to enhance the subject status of students. This work is conductive to the teaching reform and practice of advanced mathematics course.

1. Introduction

Advanced mathematics has penetrated into various fields, such as natural science, economy, finance and society, and has a profound influence on economic and social activities. The view and thinking mode of mathematics are increasingly important in the development of modern science and technology and higher education [1]. Since there are problems of advanced education in the new situation, especially the basic education in the undergraduate teaching, how to reform the advanced mathematics course to meet the needs of the present high-speed development of science and technology and economic development and to cultivate inter-disciplinary talents needed by the present society is one of the subjects that teachers in colleges and universities have to study [2].

2. Main Problems Existing in the Present Advanced Mathematics Teaching

2.1 Lack of Clear Course Orientation.

At present, advanced mathematics is orientated as a public basic course in many colleges and universities. However, some corresponding colleges pay more attention to the training of professional level and skills, but set fewer class hours to the basic courses of advanced mathematics. Therefore, the teaching arrangement and planning of advanced mathematics are relatively compact. Many advanced mathematics teachers can only arrange the teaching process according to the main and secondary relations of the teaching content, and there is no apparent correlation between advanced mathematics teaching and students' major. Therefore, students are confused when studying advanced mathematics and lack sense of direction, which affects their learning effect of advanced mathematics.

2.2 Single Teaching Method of Advanced Mathematics.

Bounded by the traditional teaching methods of advanced mathematics, many advanced mathematics teachers still adopt the single teaching mode of "students listening and teachers speaking" in the classroom. Teachers show the knowledge structure to students through blackboard combing in every class [3]. This teaching method pays more attention to the indoctrination of knowledge than to understanding and creation. At the end of the advanced mathematics course,

students will selectively complete their homework according to the homework tasks assigned by teachers. Students lack effective communication and interaction with teachers in class, leading to a boring classroom atmosphere, and it reduces students' enthusiasm in learning advanced mathematics.

2.3 Monotonous Teaching Contents of Advanced Mathematics.

In the current curriculum design of colleges and universities, the advanced mathematics course is regarded as a relatively difficult subject by college students. Many students are afraid of learning advanced mathematics and have a certain sense of fear. In addition, advanced mathematics teachers do not fully take into account the actual situation of students and teach too many formulas and axiomatic derivation [14]. Although the essential purpose of teacher is to help students master the knowledge and methods of advanced mathematics. However, the monotonous teaching contents make students cause rebellious psychology, thus affecting the enthusiasm of the majority of college students to learn advanced mathematics.

3. Suggestions on the Reform of Teaching Methods in Advanced Mathematics Course

Fundamentally speaking, the potential of students is very different. However, advanced mathematics teaching is different from the water production line in the workshop. Teachers should try their best to grasp students' personality as accurately as possible, so as to lead students to develop in the direction that they are good at. It is widely acknowledged that tradition emphasizes unity, so it ignores the quality of seeking difference, causing that students' potential can not be brought into full play. In the past traditional teaching, the used teaching materials, syllabuses, requirements and plans are almost the same. All of these will virtually limit the initiative of teachers, and at the same time, the personality of students will also be suppressed, so that the teaching quality of advanced mathematics cannot be improved [5]. Einstein once said, "interest is the best teacher." For students, if they are not interested in learning, it is actually a kind of boring burden for them. The part that they are not interested in actually lacks wisdom and inspiration. It is difficult for single traditional teaching method to let students in the main position produce interests in the teaching process of advanced mathematics. In the process of teaching, if teachers adopt some novel methods to assist teaching, they can not only make students interested, but also improve the quality of teaching. Using modern information technology to apply all kinds of novel dynamic demonstration functions in mathematics teaching, using the blackboard to explain the thought, displaying content during the break, and using the three-dimensional teaching means of website-aided learning can fully mobilize students' interest in learning.

3.1 Clarifying Course Orientation and Realizing the Transformation of Course Function.

Advanced mathematics is a public basic course in colleges and universities. Majority of students have to take this course, particularly, most colleges and universities are regraded as local and applied schools. However, the author observes that in the actual teaching, many colleges and universities pay more attention to the cultivation of students' professional skills and professional level. Although they arrange class hours of advanced mathematics, the class hours are relatively few, and the teaching planning and teaching arrangement are compact. In addition, the advanced mathematics learning is not closely related to students' major, and many students do not even know why they have to study advanced mathematics [6]. The author believes that colleges and universities should clarify the orientation of advanced mathematics course, combine the course teaching of advanced mathematics with the professional needs of different professional students, formulate the corresponding teaching goal, break the subject line, explore deeply the integration and application characteristics of the advanced mathematics course with different majors and different disciplines, and realize the functional transformation of advanced mathematics course. For example, when giving lectures to students majored in accounting, advanced mathematics teachers can combine the professional characteristics of accounting and the professional ability requirements of students based on the knowledge points of the advanced mathematics course. If this major focuses

on the students' analysis ability, the basic ability and comprehensive ability to solve actual problems, teachers can develop the specific teaching plan and carry out the targeted teaching practice. The inaccurate course orientation of advanced mathematics course brings certain difficulty to the effective development of teaching.

3.2 Making Full use of Multimedia Tools and Increasing the form of Classroom Presentation.

At present, digital teaching resources and multimedia teaching equipment are widely popularized, which provides great convenience for the classroom teaching of advanced mathematics teachers. Many knowledge and concepts in advanced mathematics course are abstract and difficult for students to understand and master. With the help of these teaching auxiliary resources and teaching aids, teachers can innovate the teaching mode, enrich the classroom teaching content, visualize the abstract advanced mathematics knowledge to attract the attention of students, reduce students' learning difficulty, deepen students' understanding and application of knowledge, and create an active classroom atmosphere [7-8]. Therefore, it is necessary to make full use of multimedia tools to increase the form of curriculum presentation. Teachers can combine multimedia with blackboard teaching, use the blackboard to list outline as well as important and difficult knowledge, and display the abstract reasoning and evolution process knowledge with multimedia, such as axiom and formula, so as to assist each other in completing classroom teaching.

3.3 Constructing a Discussed Classroom and Creating an Active Classroom Atmosphere.

Teachers can ask deep and heuristic questions to let students research and discuss with each other actively, then students make presentations in the classroom to report their results that maybe are not mature, and finally teachers summarize to make improvement. For example, teachers can first guide students to think, such as giving a simple formula to inspire students to think about which formula can be derived from this formula [9]. This process should be from simple to difficult, and make students study important and difficult points. At the same time, teachers can give students some easy exercises in the class to consolidate the mathematics knowledge. Then, with the help of multimedia teaching equipment, teachers can demonstrate the law of the derivative formula, so that students can view the local linearization of the derivative curve. It can help students understand the questions put forward by teachers quickly, and help them find out the correct and wrong points in their thinking process, so as to improve the classroom teaching efficiency and the teaching quality, improve the initiative of students' learning and increase the output of advanced mathematics course.

3.4 Adopting the Classroom Teaching Method of Transposition Simulation and Enhancing the Subject Status of Students in Classroom.

Teachers can let students hold classroom discussions and make them speak independently, while teachers step back from the stage to the backstage, and only correct and supplement the problems in students' discussions to help them sum up and improve. Students can make a leap in aspects of applying mathematics instead of studying mathematics, learning actively instead of learning passively, and innovating spirit instead of practicing through discussing and practicing with problems [10]. For teachers, it will promote teachers from imparting knowledge to teaching skills, educational concept and thought to teaching level and ability and teaching mathematics to comprehend mathematics. However, this kind of teaching mode will cause some problems in the implementation. For example, some students can not actively participate in the discussion, the discussion process is easy to cause chaos, and it is easy to cause the unpredictable interference factors, which requires teachers to have excellent professional knowledge and control ability, and use the teaching method with intelligence and flexibility.

4. Summary

There exists some problems in the development of advanced mathematics course teaching at the present stage. In order to solve these problems, it is necessary to upgrade the teaching concept, reform the teaching content, improve the quality of teachers and reform the teaching activity mode,

which is in fact a complex system engineering. Although the reform is feasible, more efforts must be made to make a breakthrough in this system engineering. In the future teaching, teachers should continue to explore and practice, constantly try to reform the model and methods, improve students' interest in learning advanced mathematics, and give students the way to explore knowledge to create favorable conditions for students to study and work in the future and make the teaching reform of advanced mathematics continue to achieve better results.

References

[1] Pu Bingyuan, Shi Lili, Huang Xiaoping, Wang Changhui. Reform and practice of higher Mathematics Curriculum in higher Vocational Colleges[J]. Chinese Vocational and Technical Education, 2019(08):12 - 16.

[2] Zhu Wanzhen. The Innovation of Advanced Mathematics Curriculum System for the Training of the Excellence Engineer [J]. Chinese University Teaching, 2018 (04):55 - 57.

[3] Kang Shunguang, Jia Jia. Research on the Reform of Mathematics Curriculum Teaching Mode in Colleges and Universities on Minority Areas - A Case study of Tarim University [J]. Journal of Mathematics Education, 2016, 25 (03): 81 - 84.

[4] Jiang Chao. Research on the Reform of Higher Mathematics Curriculum System of Economics and Management in Higher Vocational Education [J]. Education and Vocation, 2013 (33): 128 - 129.

[5] Wu Jianchun. The Idea of the Reform of Higher Mathematics Curriculum in Computer Specialty - Taking Inner Mongolia Normal University as an Example[J]. Journal of Inner Mongolia Normal University (Education Science Edition), 2013,26 (09):86 - 89.

[6] Yin Jiangyan. Reform and Practice of Higher Applied Mathematics Teaching[J]. Education and Vocation, 2013 (18): 117 - 118.

[7] Yu Chaoyang. Research on the Reform of Hierarchical Teaching in Higher Mathematics[J]. China Adult Education, 2013 (08): 124 - 125.

[8] Su Zhebin. Teaching Reform and Practice of Higher Mathematics Course in Application-oriented Colleges and Universities[J]. Educational Exploration, 2013 (01): 42 - 43.

[9] Zhang Hongli. Curriculum Reform of Mathematics in Higher Vocational Education based on Professional Ability[J]. Education and Vocation, 2011 (30): 129 - 130.

[10] Li Huaping, Hu Xianfu. The Construction of Higher Mathematics Curriculum System in Higher Vocational Education Based on Credit System[J]. Vocational & Technical Education Forum, 2011 (20): 37 - 38 and 41.