

Research on the Comprehensive Reform Goal and Implementation Scheme of Mathematics and Applied Mathematics

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ABSTRACT

As we all know, cultivating talents is one of the important functions of colleges and universities. Only by correctly dealing with the relationship between talents and social needs, as well as the relationship between professional courses and comprehensive reform, can we better promote development. Mathematics and applied mathematics is one of the important majors in Colleges and universities. This discipline plays an important role in promoting the development of mathematics science, and can cultivate high-quality, high-level talents who can serve the needs of economic and social development. Therefore, it is necessary to optimize the comprehensive reform of mathematics and applied mathematics from many aspects and establish the concept of advanced discipline so as to highlight the discipline characteristics and cultivate mathematics educators with teaching expertise, mathematical culture and innovation. In this regard, this paper analyzes the comprehensive reform objectives and specific implementation plans of mathematics and applied mathematics from many aspects, hoping to provide reference for relevant researchers.

Keywords: Mathematics and applied mathematics; comprehensive reform; objectives; implementation plan

1. INTRODUCTION

With the rapid development of economy and society, higher requirements and standards are put forward for talent training in the field of education. Among them, colleges and universities have three social responsibilities: developing science, cultivating professionals and serving the society. One of the important topics that must be looked at directly in development is the unity of specialty setting, comprehensive reform and implementation, social needs and talent training. The most remarkable feature of the future society is internationalization and socialization. Under this background, the major of mathematics and applied mathematics needs to think comprehensively and deeply about how to implement the comprehensive reform, promote the specialty setting to better serve the development of mathematics science, and cultivate high-level and wide caliber talents on this basis. In this way, the discipline development and talent training can be unified [1-2].

2. COMPREHENSIVE REFORM GOAL OF MATHEMATICS AND APPLIED MATHEMATICS

The major is an important carrier of cultivating talents in Colleges and universities, and it is also the carrier of the combination of social needs and colleges and universities. Only by setting up majors and training people can we fully reflect whether higher education meets the needs of society and the degree of adaptation. Generally, the comprehensive reform of majors in Colleges and universities should follow the corresponding principles, clarify the measures, scientific and reasonable feasible schemes and specific implementation strategies. At the same time, the comprehensive professional reform needs to clearly answer the reform purpose, reform objectives and specific operation measures. In view of the comprehensive reform of mathematics and applied mathematics, we need to set goals from the following aspects: establish advanced scientific ideas, complete the discipline system, and create a first-class mathematics and applied mathematics professional platform. Then, based on this professional platform, cultivate

mathematics educators with teaching expertise, humanistic feelings and mathematical culture for the society.

Modern mathematics is not only a technical way and careful thinking method, but also a subject with rich knowledge and skills and continuous and vigorous development. The mathematics and applied mathematics majors set up in Colleges and universities can better inherit and innovate, explore and popularize mathematics knowledge, and further promote the development of mathematics. At the same time, the major analyzes each branch of mathematics based on a relatively unified height, and clearly emphasizes the internal relationship between each branch. Set up main courses closely following the core concepts of mathematics and the latest development trend of mathematics, teaching ideas and methods, so as to form a core curriculum group. The major of mathematics and applied mathematics focuses on cultivating teachers who care for students, love education and mathematics culture, and integrate knowledge, skills and humanistic quality. The indispensable existence of the education system is teachers. Only when they love education from the bottom of their heart can they establish firm faith and admiration, and are willing to contribute to students and education ^[3].

Mathematics and applied mathematics majors cultivate engineering educators with high-level control of the classroom and exquisite teaching art. Teaching is not only an art, but also a scientific project. Teachers play the role of organizer and guide in this process, so they are known as "human soul engineer" by modern people. Therefore, in the comprehensive reform of mathematics and applied mathematics, we should set goals from the aspects of specialty, teachers, curriculum construction, talent training and so on. That is to build a teaching and research team with high teaching and research level and noble teacher ethics, and build a brand specialty of mathematics and applied mathematics. At the same time, the curriculum construction of mathematics and applied mathematics need to be optimized. Also, we should improve the quality of education in many aspects, and provide strong intellectual and cultural support for promoting social sustainable development and civilization progress.

3. IMPLEMENTATION PLAN OF COMPREHENSIVE REFORM OF MATHEMATICS AND APPLIED MATHEMATICS

3.1 Strengthening teachers of mathematics and applied mathematics

At present, the training objectives of teachers are mainly "double qualified". Although the concept of "double qualified" teachers in the field of education is not

unified, the requirements consistent with their own discipline characteristics can be constructed according to the "double qualified" standards and requirements for professional curriculum teachers. The "double qualified" requirements of general mathematics and applied mathematics majors focus on the following aspects: having good abilities and qualities such as teaching and educating people, vocational guidance and professional ethics; Have advanced educational ideas, good mathematical expression ability and solid mathematical knowledge system, and relatively unique classroom teaching ability and teaching skills; Have the ability to use modern educational technology in teaching and mathematical modeling; Have a deep understanding of the position of the courses undertaken in the cultivation of talents in this major. At the same time, we should also have advanced mathematical concepts, systematic mathematical knowledge and scientific teaching methods. The above is undoubtedly the primary problem to solve the construction of teachers majoring in mathematics and applied mathematics.

Generally, the setting of key courses of mathematics and applied mathematics needs to be based on the national teaching team, and give full play to the important role of academic leaders and famous teachers in the construction of courses and majors. At the same time, we will continue to optimize the teaching team, take famous teachers with innovative and strategic thinking ideas as the core, and gather a group of teachers with strong innovation ability, academic and professional advantages to build a teaching team. At the same time, on the basis of the existing teacher team, actively introduce young teachers to inject fresh blood into the curriculum academic inquiry team and improve the teacher force. In this process, we need to strengthen the cultivation of young teachers' teaching ability, and the teaching guidance group of colleges and universities should listen to the teaching of young teachers. Evaluate its teaching advantages and insufficient support, and help young teachers pass the teaching barrier smoothly. At the same time, actively encourage young teachers to study for doctoral degrees in key universities, and constantly improve their professional level, professional quality and academic level.

The school also needs to support the backbone teachers of various series of curriculum groups to participate in domestic and foreign academic conferences, and absorb excellent experience through extensive exchanges with peer scholars and experts. Famous mathematics education experts or scholars at home and abroad can also be regularly invited to colleges and universities to participate in academic exchanges and reports, so as to promote teachers to improve their scientific research level in extensive exchange and learning. As the fresh blood of mathematics and applied mathematics, young teachers should actively invite and encourage this group to participate in the construction

and training of high-quality courses and the compilation of teaching materials, and regularly organize teachers to collectively study and analyze the teaching contents and methods of the courses. Especially for new teachers, they need to actively implement the attendance system and put forward relevant requirements and standards. In addition, we will build a curriculum construction team for geometry, analysis and Algebra with the theme of strengthening the foundation of mathematics and updating the teaching content, as well as a professional practice and innovation teaching team for college students' mathematics competitions, modeling competitions and extracurricular scientific and technological activities^[4-5].

At present, fresh college graduates are the main group of full-time teachers, but they only participate in work after simple pre job training. They lack in-depth understanding and professional practice in this professional field, resulting in the lack of combination of teaching content and practical application field. In the major of mathematics and applied mathematics, we should not only let students master basic mathematical knowledge and skills, but also let students teach correct education and teaching methods, so as to promote students to reasonably apply mathematical ideas to analyze and solve practical problems. Colleges and universities should regularly organize teachers majoring in mathematics and applied mathematics to participate in training, regularly communicate with staff in relevant fields, and broaden teachers' horizons. So as to cultivate better high-quality and high-level mathematics and applied mathematics professionals for the society.

In addition, we need to build a team of teachers with high comprehensive quality and dynamic management. The so-called dynamic management is to implement hierarchical, hierarchical and classified management. The so-called hierarchical management is to further expand the income of teachers between each academic level and professional title level, and stimulate the enthusiasm of teachers to work towards a higher level and level. Dynamic qualification retention assessment can be implemented for the teaching with doctoral degree and senior professional title. In this way, pressure is exerted on teachers to promote them to continue learning, update their knowledge system and maintain a relatively active state of thinking. Hierarchical management defines the responsibilities of educational administration department, personnel management department and professional department, and formulates scientific and reasonable management measures and training plan on this basis. Classified management means that colleges and universities use diversified and flexible employment mechanism according to their own school running experience to put forward different management requirements for different teachers and improve teachers' education level.

3.2 Building the brand specialty of mathematics and applied mathematics

At present, China's higher education has transitioned from the initial development to the connotation with the extension development. Colleges and universities have a sense of urgency due to the increasingly fierce competition of domestic colleges and universities and the frequent international exchanges. In addition to improving the quality of education and teaching, more centers will focus on how to build a brand specialty integrating characteristics and education and teaching quality. The so-called brand specialty is a specialty with clear positioning, advanced education and teaching ideas, innovative talent training mode and distinctive specialty construction. For mathematics and application majors, to implement the goal of comprehensive reform, we should actively build brand majors, so as to better serve basic education. The specific aspects are as follows:

Clarify the direction of discipline construction; Professional development needs the support of secondary discipline construction. Discipline construction should follow the principle of sustainable development, focus on three key directions, such as curriculum and teaching theory, operations research and cybernetics, and basic mathematics, and be equipped with a scientific and reasonable research team. At the same time, scientific and reasonable measures are used in the development and construction of disciplines to ensure the realization of construction objectives. One is the regular communication system. Generally, each discipline has a relatively fixed time for learning and academic exchange. The shortcomings are identified through regular exchange, which is convenient for better optimization and improvement. The second is to adopt the person in charge system, that is, the person in charge formulates relevant plans and plans according to the actual situation of the discipline, which can be implemented only after being approved by the academic working group of the college. Third, each discipline group should formulate scientific and reasonable goals and tasks according to its own actual situation and implement them to each member of the group. Usually, the implementation of tasks is statistically analyzed once every two years. The fourth is to invite experts for academic exchanges. Each semester, two experts closely related to the research direction are invited to the college to carry out academic exchange activities. The fifth is to set up out training system. Regularly organize relevant personnel to go out for training, widely absorb and learn professional knowledge and experience, constantly make up for their own shortcomings and improve their professional level^[6].

Pay close attention to the implementation of students' education and teaching skills. Mathematics and applied mathematics is a professional category of teacher education. For this subject, education and teaching is one of the skills that students must master. Many schools

have taken the cultivation of students' basic teaching skills as the key direction in the course of many years of education, and gradually formed a highly characteristic professional system. For example, establish a correct outlook on education and teaching, and do a good job in classroom teaching, management, education, active participation in textbook analysis and comprehensive teaching skills. Dare to reform and innovate teaching methods and actively communicate with students. According to the students' learning situation, take measures to teach students according to their aptitude, mobilize students' enthusiasm and initiative to participate in classroom learning with the help of problems, and emphasize the process of teachers' presentation and thinking. At the same time, we should also create a teaching mode integrating computer experiment, network learning and classroom teaching. Through the tutor responsibility system, students' basic teaching skills are cultivated. From the beginning of students' enrollment to the end of junior year, there are relatively detailed task training objectives, assessment methods and schedules. Freshmen integrate blackboard writing training into professional teaching, sophomores into classroom teaching training, and juniors into the combination of classroom teaching manners and speaking. Tutors can also recommend books such as famous educator Sukhomlinsky or Tao Xingzhi for students when they first enter the school, so as to promote students to have a clear understanding of their majors and have the courage to shoulder the important task of teaching and educating people and cultivating morality. The most important thing is to actively cooperate with teachers in the training of basic teaching skills ^[7].

Teaching and academic research and its development. Teaching and scientific research are like two wings of a bird. They can't fly smoothly without either side. Throughout the current situation of higher education, it is found that there is a general situation of emphasizing academic research and neglecting teaching research. Only by accurate positioning can colleges and universities flourish. For teaching oriented colleges and universities, we need to focus on teaching, so we need to take corresponding measures to change students' and teachers' wrong cognition of teaching research from ideas. For example, create a good teaching and research atmosphere in the school, or take corresponding measures to improve teachers' understanding of teaching and research. For example, more proportion of teaching research can be set in discipline construction, curriculum construction and team construction, and corresponding reward measures can also be set, such as giving heavy rewards to teachers with remarkable achievements in teaching. And actively advocate the transformation of scientific research results into teaching, so as to lay a solid foundation for improving the level of education and teaching.

3.3 Optimizing the curriculum construction of mathematics and applied mathematics

Specialty construction is the basic component of teaching construction in Colleges and universities. It can be said that its construction level and quality are closely related to the school running level of colleges and universities, highlighting the strength of colleges and universities. Therefore, colleges and universities need to focus on building a meaningful curriculum construction as the core, and effectively implement the professional reform and construction, so as to maximize the professional curriculum reform in line with the actual situation of the profession. Form a relatively perfect mathematics and applied mathematics curriculum system from the essential level to further improve students' practical skills.

On the premise of research and investigation, colleges and universities need to scientifically and reasonably analyze the current situation of mathematics and applied mathematics, such as outdated teaching concepts, lack of reasonable teaching methods, significant differences between students' professional quality and comprehensive level and so on. There are still many problems, such as insufficient attention to basic course teaching, teaching experience to be improved, and difficult graduation and employment of mathematics and applied mathematics. In view of the above problems, we need to actively reform and innovate the teaching of mathematics and applied mathematics. Mathematics major should not only meet the needs of economic, social, scientific and technological development, but also transition from the initial elite education to mass education.

Among them, teachers are changing their teaching ideas, such as changing from traditional closed and indoctrination teaching to integrated and open teaching model. Gradually transition from professional education to quality education; From conventional and standardized personnel training to selective and personalized personnel training; Shift from knowledge to ability; From the previous concept of focusing on scale and quality to focusing on structural coordination and benefit coordinated development. At the same time, it is also necessary to respond to the student-oriented education concept put forward by modern education and promote the rapid realization of the goal of professional construction. The training of general mathematics and applied mathematics majors focuses on meeting the needs of economic and social development, as well as the strong comprehensive ability and high-quality professionals to adapt to modern economic construction. At the same time, it is committed to cultivating advanced mathematics and applied social talents. In recent years, a large number of new mathematical achievements and various forms of interdisciplinary have emerged. For students majoring in mathematics, they should not only

learn and strengthen basic knowledge and skills, but also understand and master basic knowledge of modern mathematics. Therefore, it is necessary to reform the curriculum system ^[8]. The specific methods are as follows:

Optimize the curriculum construction and establish a perfect and new curriculum system; Curriculum is an indispensable part of professional training objectives, which can reasonably implement and decompose the training objectives specified in the teaching plan to a certain extent. The actual teaching quality is closely related to the level of curriculum. Colleges and universities need to build a module + platform curriculum system around the concept of "student-oriented" advocated by modern education, and gradually form a series of optimization modes such as students' independent selection of modules and learning and hierarchical learning. The details are as follows: first, set up professional module courses and carry out different levels of teaching; In view of the need for junior students to cultivate their comprehensive quality, consolidate students' basic mathematical knowledge, pay attention to the advantageous role of basic teaching links, and constantly improve students' computer application level. For senior students, we need to carry out professional diversion and professional selection modules around their characteristics, optimize the module curriculum on this basis, promote the consistency between the module curriculum and professional development, appropriately add new courses in line with the professional development trend and education and teaching objectives, and enrich the teaching content. Second, appropriately reduce the proportion of compulsory courses and enrich the types of elective courses; Colleges and universities should reasonably design elective courses in combination with social development trends, combine the courses with professional courses, increase the number of courses, and enable students to have more course choices. At the same time, it is also necessary to expand the adaptation scope of professional courses, make multi-disciplinary effective integration and poor, implement the concept of teaching students according to their aptitude emphasized by modern education, give full play to the main role and expertise of students, and meet the needs of modern society for high-quality and high-level talents to the greatest extent. Third, integrate the curriculum effectively to make the curriculum system integrated; Colleges and universities should optimize resources in setting up courses to make resources more shared and open. The purpose of integrating courses is to avoid the repetition of knowledge content in different courses and make the courses more coherent and compact. For example, when reflecting the professional curriculum system, colleges and universities can adopt the formation of curriculum groups, that is, the majors are divided into Higher Algebra Curriculum groups, economic mathematics application curriculum groups and

mathematical analysis curriculum groups, so as to establish a relatively complete and systematic curriculum system and ensure the realization of the goal of high-quality talents ^[9].

Constructing high-quality curriculum resources, innovating and reforming teaching contents and methods; Relevant studies have pointed out that high-quality courses play an important role in truly reflecting social needs, promoting discipline development and improving teaching quality. Through in-depth research and analysis, it is known that colleges and universities need to integrate high-quality courses into the curriculum system design, take this as the standard, implement reasonable teaching methods, and further strengthen the reform of teaching methods. In this process, colleges and universities need to standardize the construction of teaching syllabus, design scientific and reasonable auxiliary teaching, establish teaching and research groups, analyze and improve teaching materials, and use modern educational technology to build auxiliary education and teaching system software. Colleges and universities need to reform the multi-level and multi-faceted teaching methods for a wide range of basic and excellent courses, such as using unified standard collective marking and layered teaching to carry out courses such as advanced mathematics and probability statistics, and using multimedia technology teaching methods and experimental teaching methods to carry out calculation methods or mathematical experiments. The above teaching methods are widely welcomed and recognized by teachers and students, and improve the teaching effect. Compared with other majors, mathematics and applied mathematics majors rarely involve practical and experimental needs. However, any theoretical knowledge should assist in practice. Colleges and universities need to carry out exploratory and comprehensive experimental teaching, build mathematics laboratories on this basis, encourage students to participate in it, and unify theoretical knowledge with practice. When explaining mathematical theoretical knowledge, mathematics teachers need to combine their specific sources and actual situation, arrange subject-based and open homework for students, constantly consolidate students' mathematical foundation, and improve their comprehensive level of problem analysis and problem-solving ability. At the same time, colleges and universities also need to build a second classroom and carry out intensive training around students' common problems such as weak modeling ability. It can not only strengthen students' innovative thinking, but also improve the teaching effect and students' knowledge application ability. Colleges and universities can also establish curriculum groups for mathematics and application majors to make mathematics knowledge more systematic and coherent, and further implement the modular curriculum system. Whether building a second classroom or establishing a curriculum group, its main purpose is to enrich teaching

resources, so as to comprehensively and deeply promote teaching reform ^[10].

Improve the long-term mechanism of teaching quality guarantee and management; Colleges and universities need to establish a relatively perfect and long-term teaching management system to ensure the quality of mathematics teaching and promote the smooth development of the comprehensive reform of mathematics and application courses. The implementation of systematic, scientific, archival and information-based teaching management can better implement the talent training mode, so as to achieve the talent training goal in the short term. In this process, colleges and universities need to standardize the teaching order and provide important reference basis for effectively promoting education and teaching management with strict rules, regulations and standards. To improve the standardization of teaching system is to improve the teaching management system and formulate feasible teaching links. In this process, we should also form a perfect teaching supervision system, teaching evaluation system and teaching system decision-making system, so as to achieve the goal of systematic teaching management. In addition, through the electronic management of documents and materials, the collection and sorting of various types of basic teaching archives is more scientific and orderly, so as to ensure the standardization and integrity of teaching materials to the greatest extent.

4. CONCLUSION

In short, the most remarkable feature of the 21st century is the rapid development of information technology, which has a relatively profound impact on China's culture, education, economy and society. In the comprehensive reform, the major of mathematics and applied mathematics should always give full play to the advantages of talents, optimize curriculum construction and innovate education and teaching methods, so as to better explore and study mathematical knowledge, improve students' innovative consciousness, mathematical literacy and innovative consciousness, and lay a solid foundation for the inheritance and development of mathematical culture. Universities and teachers should always be based on students and optimize the curriculum reform of mathematics and applied mathematics from many aspects, so that the reformed curriculum can better serve scientific and technological progress, economic construction and social and economic development.

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