

The Mathematical Modeling and Competition of Comprehensive Colleges and Universities to Cultivate Students' Innovative Ability

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Abstract: The cultivation of innovative education and innovation ability is the requirement of students' high quality training. Combined with the characteristics and professional characteristics of the comprehensive institutions, the mathematical modeling and competition of college students as the starting point, the mathematical modeling ideas and methods of infiltration, into the university mathematics teaching process, from the organization to drive the teaching content, reform traditional teaching Methods and means to build independent learning platform and the establishment of competition incentive mechanism and so on to build a mathematical modeling teaching practice system. Practice shows that the teaching practice system for student awareness innovation, method innovation and other aspects of training to play a positive and effective role, effectively improve the college students innovation and innovation ability training.

Key words: mathematical modeling; modeling competition; comprehensive institutions; innovation ability; problem-driven

Innovation is the soul of a nation's progress, is an inexhaustible motive force for the prosperity of a country. Innovative education and innovation ability training is the eternal theme of teaching and learning. It is the teaching philosophy and the basic task of mathematics teachers to cultivate the high-quality talents with innovative ability, which is the main theme of the current university education, mathematics and mathematics, cultivate students' innovative spirit, innovation consciousness and innovation ability.

Mathematical modeling is a bridge between mathematical rational exploration and practical application, and plays an important role in various fields such as engineering, communication, aerospace, microelectronics, automation and other high-tech fields and econometrics, mathematics Ecology and mathematical geology and other emerging disciplines. It is also an effective way to implement quality education and innovation education for college students to carry out mathematical modeling education. To carry out mathematical modeling teaching and practice of this activity will help college students innovation ability, practical ability and so on the ability to cultivate, thus helps to improve the overall quality of college students. This paper combines the experiences and lessons of the national college students' mathematical modeling competition over the years, takes the mathematical model course as the carrier, takes the mathematical experiment as the practice and takes the mathematical modeling competition as the breakthrough, and studies how to run under the higher education The use of mathematical modeling for college students' mathematical innovation ability is a combination of various basic abilities of mathematics. The topic of mathematical modeling competition is usually the practical application of hot topics such as mathematics, physics and computer, etc. For college students, Learning mathematics maths, linear algebra and probabilistic statistics, but also learning math courses, such as ordinary differential equations and mathematical physics equations, etc. However, the problem of mathematical modeling competition is comprehensive and flexible, and requires the fullness of college students And so on. They all have practical application background, such as the problem of SARS transmission, the evaluation of AIDS therapy and the prediction of curative effect. Therefore, the mathematical modeling contest requires college

students to have the following problems: (1) Strong use of basic knowledge of mathematics, on the The mathematical model can be used to analyze the practical problems of mathematics, physics and computer. , But also can enhance the ability of college students to analyze and solve problems, greatly open up the vision of college students, but also can cultivate the initial scientific research ability of college students. Therefore, in the teaching and training of mathematical modeling competition, mainly through mathematical modeling Basic knowledge analysis, mathematical simulation, mathematical software and computer application technology and other related ways to guide students to use the mathematics, physics and computer-related disciplines, improve thinking and solve practical problems. Mathematical modeling contest questions are often Hot topic or the actual background of the hot issues, so the mathematical modeling competition for college students to provide a knowledge of the use of knowledge to solve the real hot issues of the platform is to improve the students to analyze problems and solve the problem, to cultivate students of mathematical innovative thinking And a good carrier of mathematical innovation.

Mathematical modeling competition involves the application of related disciplines such as mathematics, physics and computer, so students need to learn to use interdisciplinary knowledge to solve practical problems. For example, the problem of SARS is one of the mathematical problems And computer science and other disciplines of a practical problem in college, college students most of the time are used in the exclusive study of professional and basic knowledge Bu, rarely have the opportunity to cooperate with others to complete a task. The modeling process is quite complex , The difficulty of solving practical problems is usually difficult, usually a person is difficult in the mathematical modeling competition time ((3 days) to complete, which requires multiple students to cooperate with each other because the mathematical modeling contest involves mathematics, physics And computer and other related disciplines, so the math modeling contest in a team of three students usually come from different professions, each have their own, three people together to solve the problem of mathematical model (observation, analysis, abstract) - to solve the problem Communication, cooperation, guidance, innovation) one by one summarized (induction, summary, evaluation, improvement). This improved students to participate in the study of the product Hunan University of Science and Technology in the teaching and practice of mathematical modeling training, in accordance with the new training program and the actual situation of students, carried out the relevant mathematics teaching reform, the reform of mathematics teaching, (Such as: to achieve better modeling results, increase the credits.) College in the theory of teaching appropriate to open the teaching content, to stimulate students' innovation (such as the teaching of mathematics, mathematics teaching methods, mathematics teaching content and mathematics assessment and a series of reform measures Consciousness through the training of mathematical modeling to develop students to collect information processing capacity, students can set a clear concept of quantity, keenly aware of the number of things and their changes in the same time, the rigorous deduction of mathematics to help students carefully , Meticulous style and habits, to improve students' logical thinking ability, so that they are clear thinking, structured, orderly handling of the various tasks, from the surface to the essence, the final situation, and ultimately solve the problem, improve their use of mathematical knowledge The ability to solve practical problems, improve the university Mathematical literacy.

Set up a mathematical experiment course, change the teaching mode. With the deepening of mathematical modeling teaching and its competition to promote and carry out, mathematical modeling teaching to break the traditional mathematics teaching process, changed the teacher in the class on the stage to derive, prove that after school to strengthen the problem-solving techniques and methods of teaching Mathematical experiment course. The mathematics experiment class includes the verification experiment, the comprehensive experiment and the design experiment, through the students to verify the "higher mathematics" and "linear

algebra" and other courses in some computing problems, such as limit, derivative, definite integral, differential equation, Eigenvalues and eigenvectors, which greatly stimulated the enthusiasm of students to learn mathematics, so that students ability and the ability to use the computer has been significantly improved. In the design experiment and the comprehensive experiment, let the students analyze the practical problems, establish the mathematical model, let the students build their own mathematical model with computer and Matlab, SPSS and other software programming, calculation process is simple, intuitive results, This kind of link strengthens the students from the establishment of the model to the preparation of innovative ways of thinking training, students also feel the sense of accomplishment of learning, to encourage them to explore the method of innovation.

To the laboratory, modeling sites and mathematical associations as the basis, to build students self-learning platform for students to lay the foundation for innovation and initiative.

1. To expand the mathematical laboratory into an open position for students' innovative training. Due to the need of mathematical modeling, the school has built a mathematical laboratory. The laboratory mainly undertakes the mathematical modeling experiment and the software practice experiment course, as the training and competition venues for the annual national mathematical modeling competition and American competition. In addition, the majority of students should be requested, the laboratory open to the students, for college students research and training program project research, challenge Cup competition, large data mining competition and other activities to provide on the service.

2. The mathematical modeling site into an open learning information sharing platform. 2011 built mathematical modeling network, designed the "modeling skills, 'competition home", "mathematical experiment", "software download" and "online Q & A" and more than 10 columns, uploaded over the years at home and abroad mathematical modeling contest Such as information, excellent papers, mathematical modeling methods, mathematical software and other information, sharing a wealth of learning resources, students use their spare time according to their own time, their own needs and their own choice of learning content, improved learning methods and models, Especially online Q & A, an increase of teachers and students exchange channels. Two years to click the number of learning to reach nearly 8 million times.

3. The activities of the Association of mathematics to create the second classroom to self-study. Mathematical Association is a college student math student community, in order to give full play to the leadership and lead the role of the association, one of its main task is to actively carry out our university students mathematical modeling learning the second classroom activities. The main courses are: yu, engineering, agriculture, management and other disciplines and college classification, the organization has the experience of modeling students to carry out mathematical modeling discussion, exchange and preaching activities, about 4 times a year, greatly promote and mobilize a large number of students to join (2) by the College of mathematics teachers on the Association of mathematics top students and the elite team members of the Association of unified counseling, and then by the students as a speaker, for the whole school students at the same time to carry out 3} 4 field modeling learning seminars, Listening to students choose to listen to their own lectures, lectures students compete with each other to improve, attract students to listen to his lectures, so effectively improve the learning results. This kind of student "self-study initiative, the lecturer to further study in depth, their learning experience and understanding of the process introduced to other students, to improve the enthusiasm of other students to learn a great role in promoting; (3) mathematics association to further explore the students Service, through the QQ group, micro-group and Bowen and other new media for students to solve the difficult problems in

modeling learning, in order to answer questions, these students should actively access information, self-learning. Mathematics Association played a student learning, communication, The role of communication bridge link.

4. to mathematical modeling competition as the carrier to strengthen the process of training, innovation ability training As one of the key disciplines supported by the school, the mathematical modeling competition has become a distinctive event, which has formed an orderly and effective competition mechanism and incentive mechanism. As long as the self-talk "self-learning model, give full play to the students subjective initiative, the lecturers further study in depth, their learning experience and understanding of the process introduced to other students, to improve the enthusiasm of other students have a great role in promoting (3) mathematics association to further explore the way for the students, through the QQ group, micro-credit groups and Bowen and other new media, for students to solve modeling problems in the study, in order to answer questions, these students to actively access to information, Autonomous learning. Mathematical associations play a student learning, communication, communication bridge link role.

In short, the mathematical model curriculum as the carrier, to mathematical modeling comprehensive experiment for the practice of relying on mathematical modeling competition training as a breakthrough, the quality of education and innovation ability of students, so that students' insight and abstract thinking ability, computer Ability, mutual communication and collaboration ability, team spirit and innovation ability, and so on. It provides an effective way and beneficial experience for higher education to carry out quality education and innovation education for college students. Carrying out Quality Education and Cultivating Ability of Innovation.

References

- [1]. Wang Hanping, Chi Jie Ru, Yu Haisheng, Zhuang Xiaodong, "Mathematical modeling and competition and the cultivation of innovative ability of undergraduates" *Experimental technology and management*, September 2009
- [2]. Yue Xiaopeng, Zheng Enwei, "the use of mathematical modeling training of science and technology applied talents to explore the practical ability", *Gakuen*, 2013 No. 1
- [3]. Zhang Zaoyun, Ding Weiping, Xiao Zhengang, Li Songhua, Gan Xiangyang, "Mathematical modeling and the cultivation of mathematics innovation ability of college students research and exploration", *Journal of Hunan Institute of Technology (Natural Science Edition)*, Vol.28 No.2
- [4]. Wang Jinshan, Hu Guian, Qiu Guoxin, "the mathematical modeling ideas into the university mathematics teaching to enhance the quality of teaching - to cultivate students innovative spirit and innovation ability of exploration and practice", *University of mathematics*, April 2010 Volume 26 season2
- [5]. Yu Bo, "Mathematical modeling and the cultivation of students' ability to innovate", *Science and Technology Information*, 2009, No. 35
- [6]. Liu Tangwei, Xiong Sican, Le Laihua, "Mathematical modeling competition and innovation ability of college students", *Journal of East China University of Science and Technology (Social Science Edition)*, March 2008 Volume 27, No. 1
- [7]. Fu Jun, Zhu Hong, Wang Xianchang, "in the mathematical modeling education to cultivate students' innovative ability of practice and thinking", *Journal of Mathematics Education*, November 2007 Volume 16, No. 4
- [8]. Xu Xianyun, Yang Yongqing, "highlighting the mathematical modeling ideas to develop students'

- innovative ability", *University Mathematics*, Volume 23, No. 4
- [9]. Chen Zhaohui, "to explore the mathematical modeling activities on the application of innovative talents training ability", teaching reform
- [10]. Zhang Qinghua, Yang Shude, Shen Shiyun, "to mathematical modeling competition as an opportunity to strengthen the training of students' ability to innovate," *Journal of Chongqing University of Posts and Telecommunications*, June 2008 supplement
- [11]. Liu Renyi, "to strengthen the construction of students in mathematical modeling courses, to deepen the university mathematics teaching reform", *Journal of Weinan Teachers College*, March 2005 Volume 20, No. 2
- [12]. Li Baoping, "Mathematical modeling and the cultivation of college students' innovative ability", *Journal of Changchun University of Science and Technology*, Vol. 8, No. 1