Cultivating College Students' Innovative Ability through Mathematical Modeling Competition

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Abstract: Mathematical model is the link between practical problems and mathematical theory, and it is an effective way to cultivate college students' innovative ability. Using the platform of mathematical modeling to cultivate students' innovative ability, it is necessary to grasp the basic knowledge and cultivate students' ability to analyze and solve problems cooperatively. The cultivation of innovation ability starts from the subtleties. Innovation results should stand the test of reality.

1. Introduction

In recent years, Chinese college students have participated in the Mathematical Modeling Competition, in addition to the National College Students Mathematical Modeling Competition, as well as the American College Students Mathematical Modeling Competition. The National College Students Mathematical Modeling Competition was founded in 1992 and is held annually. In 2016, more than 93000 college students from 33 provinces/municipalities/districts (including Hong Kong and Macao) and 1367 colleges and universities in Singapore, 31199 teams (28046 undergraduate teams, 3153 specialist teams) signed up for the competition. The American University Mathematical Modeling Competition is the only international mathematical modelling competition and the most influential mathematical modelling competition in the world. In 2016, a total of 12 countries and regions, 919 universities and 7421 teams participated, with Chinese students participating in more than 93.5%.

In recent years, China's economy has gradually entered a new stage of development with innovation as the main driving force. Innovation-driven strategy requires us to pay attention to the source of innovative talents. For a long time in the past, the main body of innovation and entrepreneurship was immigrants. For today's and future innovative entrepreneurship plans, we need to train internal innovative talents, and then replace the previous dependence on immigrant innovation, which is what we have been doing. Inner training of innovative entrepreneurs mainly comes from universities which train innovative entrepreneurs. Therefore, colleges and universities must closely follow the national development strategy and undertake the task of cultivating innovative and entrepreneurial talents.

2. Mathematical Modeling and Cultivation of Innovative Ability

Mathematical modeling means that we need to extract mathematical problems from practical problems, then simplify the problem, build a mathematical model, solve the model, and finally solve the actual problem. Mathematical models are the link between practical problems and mathematical theory. Many scholars have done a lot of research on the role of mathematical modeling competition in the cultivation of innovative ability [1,2,3,4,5]. Most scholars believe that the training of innovative ability of college students by mathematical modeling contest is mainly manifested in the following aspects:1) The process of mathematical modeling in the contest of

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mathematical modeling is a process of analyzing and solving practical problems. It creates favorable conditions for cultivating students' ability from practice to theory and then from theory to practice. 2) The process of mathematical modeling is a process of continuous exploration. Therefore, Mathematical Modeling Competition is an effective way to cultivate students' innovative ability. Therefore, we should make full use of the mathematical modeling platform to enhance the innovative ability of College students.

How to use the platform of mathematical modeling to cultivate the innovative ability of college students is the main problem faced by many colleges and universities at present. We can solve it from the following aspects:

3. Basic Knowledge is the Basis of Innovation

Only after students have mastered the basic knowledge related to mathematical modeling, can they be proficient in mathematical modeling, can they question the existing knowledge, and then can they be innovative. In the process of mathematical modeling training, if we want students to maintain a strong thirst for knowledge, and willing to accept the existing knowledge, we must strive to improve the level of training teachers. We need to let students make full use of network resources to learn the knowledge of mathematical modeling. In addition, in the process of mathematical modeling, certain incentives are a good measure to fully mobilize the innovation enthusiasm of College students. For example, when there are innovative ideas and practices in the training process, and the school achieves excellent results in the competition, the school can reward these achievements, which will greatly stimulate the innovation enthusiasm of college students.

Anyone who has participated in a mathematical modeling training or a mathematical modeling competition knows that the topics of the mathematical modeling competition involve a wide range of industries, so the knowledge used in modeling and solving problems is also involved in various fields. Therefore, when learning the basic knowledge, in addition to systematically mastering relevant knowledge, students should try to broaden their knowledge. Only with profound knowledge will we be able to make full use of each other's resources and be able to get a chance to bring together all the individual parts of these courses.

4. The Ability of College Students to Analyze Problems and Solve Problems in Cooperation is an Indispensable Part of Cultivating Innovation Ability

Innovation cannot be accomplished at one stroke. Only after a great deal of training can innovation be possible, as is the case in mathematical modeling competitions. Mathematical Modeling Competition only lasts 3-4 days. In order to prepare for this competition, students need to spend a lot of time and energy on Pre-competition training. In the stage of establishing mathematical model, students will get a competition topic. In order to solve the problem, he will first analyze the problem, and then establish a mathematical model. At this stage, students need to complete a lot of tasks in a limited time, so the three students in a group will work closely together. Students will do many simulation training before the competition, and their ability to analyze and solve problems cooperatively will be improved in varying degrees in this process.

Only after they have the ability to analyze and solve problems will they dare to question the achievements of their predecessors and dare to surpass their predecessors and innovate when they encounter problems in the future.

5. Innovation Starts from Subtleties

With the reserve of cultivating innovation ability in front of us, we have the soil of innovation. At the beginning of innovation, we should realize that it is not only a huge change that belongs to innovation. In many areas, subtle changes are also great innovations. Even if you are only questioning the original practice of others, and have not yet come up with a better solution, it is also an innovation. For example, if you can point out the inadequacies of an article that has been published in some top academic journals, it is also an innovative article. So when we start to innovate, we start with questioning, and we start with subtle changes. This requires us to teach students some innovative methods in mathematical modeling training, such as thinking about problems with divergent thinking. We can try to solve the same topic in a variety of ways. In the process, students may integrate some methods, which is the beginning of innovation.

6. Practice is the Only Way to Test the Results of Innovation

Not all changes made by innovation are effective and have good results. When we use a new method or a new model to solve an old problem, it is possible that the effect is not as good as the previous method or model, so many good ideas still have to be tested by mathematical models. Because each problem has its own specific conditions, though many problems can be solved by a certain method in theory, only when the problem is solved by this method and the results are obtained, can we know whether it is suitable or not. Therefore, practice is the only way to test the results of innovation.

7. Conclusion

Mathematical modeling is to extract mathematical problems from practical problems, establish mathematical models, solve the models, and finally solve practical problems. Mathematical modeling is the application of theoretical knowledge in practice, so mathematical modeling competition is an effective way to cultivate students' innovation ability. Having mastered the basic knowledge related to mathematical modeling, one can apply it skillfully. As long as you have the ability to analyze and solve problems, you will surpass and innovate when you encounter problems. Innovation in mathematical modeling starts from the subtleties. Whether mathematical modeling can cultivate students' innovation ability needs to be tested by practice.

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