

# Research on the Construction of Mathematical Modeling Teaching Team

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**Abstract:** *Cultivating students' creative spirit and practical ability is the primary goal of higher education, and the teaching and competition of mathematical modelling is one of the important ways to achieve this goal. Mathematical modelling teaching team is an important guarantee to do a good job in competition, and is an important part of teaching infrastructure construction in colleges and universities. This paper analyzes the current situation and existing problems of mathematical modelling teaching teams in colleges and universities, and puts forward effective countermeasures for the construction of mathematical modelling teaching teams in colleges and universities.*

**Keywords:** *Mathematical modelling, Teaching team, Construction of strategy*

## 1. Background

The task of higher education is to cultivate senior specialized talents with "innovative spirit and practical ability"[1-2]. Practice teaching is a very important way to cultivate innovative talents. Discipline competition is an important carrier of college students' innovation ability training, an important supplementary form of teaching, and an important way to carry out second class activities and activate campus culture in colleges and universities. Mathematical Modeling competition is an important academic competition widely carried out in colleges and universities at home and abroad. It aims to cultivate the ability of college students to solve practical problems through comprehensive application of mathematics, computer and related background knowledge. Mathematical Modeling competition is of great significance to improve students' comprehensive quality, cultivate innovative spirit and spirit of unity and cooperation, and cultivate high-quality talents in line with social needs [3-4].

Innovation ability is the synthesis and highest form of all kinds of human ability. The key to the cultivation of innovative ability is the cultivation of innovative thinking, and the core of innovative thinking lies in the uniqueness and novelty of thinking, which is embodied in intuitive thinking, logical thinking, associative thinking, divergent thinking and reverse thinking. Mathematical modeling itself is a creative thinking process. Mathematical modeling is to solve practical problems in the society, involving engineering technology, economic management, social life and other fields, is very practical and challenging. There is no fixed way to solve the problems. The participants need to use all available resources to explore and solve the problems in a very short time. Therefore, students' innovative thinking can be brought into play. Schools should give full play to the role of mathematical modeling in the cultivation of innovation ability and encourage students to participate in mathematical modeling activities.

Mathematical model competition is also a specific form of quality education for contemporary college students. Race to let the students in the face of a never exposed to practical problems, using the theory of existing mathematical knowledge and computer software is analyzed, the solution, they must broaden the thinking, give full play to their creativity and imagination, this is to improve students' innovative quality and physical quality, is a comprehensive embodiment of teaching reform of the school. At present, colleges and universities generally carry out various specific activities to enrich students' scientific and cultural life. On the one hand, it helps to improve teachers' professional level and teaching ability. On the other hand, cultivate students' comprehensive quality and innovation ability. In addition, the winners of mathematical modeling competition have a greater advantage in the competition for employment and further education. They have more opportunities to work in large

enterprises and institutions, and are more likely to get opportunities for further education and study abroad.

Mathematical modeling teaching team is an important guarantee for the competition work. The competition team is not only the disseminator of knowledge, but also the navigator of students' progress, and also the organizer of students' participation in the competition activities [5-7]. But at present, the construction of mathematical modeling contest teams in universities is uneven, and there are very few elite and efficient contest guidance teams. Some schools have competition teams, but there is no in-depth research and thinking on the construction and management of the team. The team lacks cohesion and the team members are highly mobile. In some schools, the competition team has a single function and only serves the competition, completely divorced from teaching and scientific research. Subject competition is not only an important supplementary form of teaching, but also an embryonic scientific research work. Competition teams often rely on teaching and scientific research teams. Without a good team, it is difficult to achieve a virtuous circle of coordinated development between teaching, scientific research and competition [8-9].

Founded in 1992, THE National Mathematical Contest in Modeling for University Students is held every year. It has become the largest basic discipline competition among universities in China and the largest mathematical Contest in modeling in the world. Many schools begin to attach importance to the existing academic teams, actively set up new promising teaching teams, constantly improve the support scheme for teaching teams, and begin to study the construction and operation mode of high-level teaching teams. At present, scholars at home and abroad generally focus on the management and construction of the teaching team based on curriculum and the research team based on scientific research projects, but there are few studies on how to build and manage an innovative team integrating teaching, research and competition guidance. Therefore, it is very important to study the construction and management of teaching team and to build a teaching and scientific research team based on the guidance of mathematical modeling competition.

## **2. Problems in the Construction of Mathematical Modeling Teaching Team**

At present, most of the teaching teams of mathematical modeling contest in colleges and universities in Our country play a role in guiding students to participate in the contest, but there are many problems such as weak cohesion, lack of teamwork consciousness, difficult resource integration, less original achievements, and lack of integrated innovation ability. But in today's knowledge-based economy society, the teaching content is increasingly comprehensive, integrated and international, and it is difficult for a person to master everything. The wide application of information technology makes the teaching process more complicated [10]. Therefore, it is necessary to exert the strength of teachers' groups and build a teaching team composed of teachers. Local universities also need to set up a powerful teaching team for mathematical modeling [11-12]. However, there are many problems in the current mathematical modeling teaching team construction in local universities, which are mainly reflected in the following points:

### ***2.1. Teachers Lack the Sense of Teamwork***

On the one hand, the form of cooperation is limited. As the teaching organization form of the school is still subject doctrine as the guiding ideology, the implementation of the subject teaching mode, teachers in different departments of different disciplines exchange activities have been artificially separated, the cooperation between teachers is mostly in the same department. Therefore, the current mathematical modeling teaching team is basically composed of mathematics teachers, without the participation of professional teachers and other members. Such homogeneous composition of members inevitably leads to problems such as teachers' short-sighted vision and weak innovation ability, which makes it difficult for mathematical modeling teaching to bring its real effect into play. On the other hand, the concept of cooperation is lacking. Most teachers believe that teacher development is a personal matter. Therefore, in the process of mathematical modeling teaching team construction, some members are independent and stick to the original teaching methods, and seldom cooperate with other members to discuss advanced teaching methods and teaching methods. There are few teaching seminars, teaching experience and academic exchange activities among team members, and there is a lack of communication and cooperation among team members. Due to the lack of cooperation concept of teachers, it is impossible to form complementary advantages among members, which greatly affects the improvement of the overall level of the teaching team.

### ***2.2. The Teaching Team Lacks Effective Management Mechanism and Rewards and Punishments Are Unknown***

Team cohesion is the basis of combat effectiveness, but without effective management mechanism and clear reward and punishment system, it is inevitable that instructors will "eat from the same pot". In the actual work of the team, there is work procrastination, lazy style, mutual buck-passing, inaction and so on. This not only affects the work enthusiasm of other instructors, but also makes it difficult to form a cohesive competition guidance team.

### ***2.3. The Internal and External Environment System is Not Perfect***

Teaching and scientific research are the main tasks of colleges and universities, and guiding students' innovation competition as an important supplement of college teaching and scientific research has been paid more and more attention. However, the current assessment mechanism and policy of professional title assessment still lay emphasis on teaching and scientific research. Teaching team in the competition, teachers generally feel competition in guiding students spent a lot of time and energy, and some local colleges restricted by different kinds of objective conditions, failed to mathematical modeling teaching team to provide a good external environment, and also to the attention of the mathematical modeling teaching team construction is not enough, the returns to guide teachers and recognition, Far less than teachers with grants, projects, articles. Therefore, some teachers in the competition team vacillate in their thoughts and quit the team to concentrate on scientific research and routine teaching, which leads to a relatively large turnover of staff and makes it difficult to give full play to the overall advantages of the team.

## **3. Construction Strategy of Teaching Team in Mathematical Modeling Contest**

It is a complex and systematic project to build a professional teaching team of mathematical modeling contest, which should be carried out in a planned and systematic way. The concrete practice scheme is shown in the following aspects.

### ***3.1. Maintain the Right Team Size and Structure***

Mathematical modeling involves almost all mathematical branches, and is widely used in various fields. So the mathematical modeling teaching team should be composed of multiple disciplines, advocating interdisciplinary and integration, and considering not only teachers from different directions of mathematics, but also professional teachers from different disciplines. Full-time and part-time teachers should work together to coordinate and innovate, so as to achieve the goal of teaching team construction. It is necessary to determine the main direction of each instructor in the team, realize complementary advantages, and build a mathematical modeling competition teaching guidance team with broad professional scope, reasonable professional title and moderate structure, competition guidance and management coexist after a certain period of time. In addition, we should pay attention to the combination of the old, the middle and the young, give full play to the role of the teaching team in "spreading, helping and guiding" young teachers, and strive to lead young teachers well and build a sustainable development of the teaching team.

### ***3.2. Develop Effective Internal Management System and Reward and Punishment Measures***

We should clearly establish a set of team rules recognized and followed by all, and clarify the working mode, communication mode, communication channels and principles of dealing with contradictions of team cooperation. Formulate a complete set of competition training, competition guidance, competition leadership, team discussion, out research, exchange and learning management systems, and formulate clear reward and punishment measures, the implementation of fair competition, gain from work, and work more to get more incentive mechanism. Within the team, the responsibility mechanism of the team leader should be strengthened to motivate team members. At the same time, we should adhere to the combination of student evaluation and team internal self-evaluation to provide a good operation mechanism for the sustainable development of teaching team.

### ***3.3. The Idea of Mathematical Model is integrated into the Teaching of Mathematics Foundation Course***

Organizing students to participate in various kinds of mathematical modeling contests in a planned way is conducive to cultivating students' innovation ability, perfecting their knowledge structure and improving the quality of teaching. In "higher mathematics", "probability and mathematical statistics", "linear algebra" and so on the basic mathematical courses and the teaching of mathematical modeling course series, conscious of introducing the idea of mathematical modeling, case teaching, heuristic teaching mode, introducing problems drive about students' interest in mathematics theory was applied to scientific practice, expand the nationality, Create the atmosphere of mathematical modeling activities and competition, and truly realize the interaction between teaching and competition.

### ***3.4. Carry Out Competition Research and Teaching Research Activities***

Carry out competition research activities in a planned and step-by-step manner, including competition questions research, competition solution skills research, competition guidance methods research, to comprehensively improve the level of team guidance teachers. At the same time, we should carry out teaching reform and research related to mathematical modeling, optimize teaching content, reform teaching methods and enhance teaching skills from the perspective of training talents. Gradually build the team into a high-level innovation team with high teaching level, strong scientific research ability and superb competition guidance skills. Based on the competition guidance teaching team, the function of the teaching team is expanded, and the provincial excellent course of mathematical modeling and provincial teaching team are applied.

### ***3.5. Project Leading, Strengthening the Cultivation of Team Scientific Research Ability***

The improvement of scientific research ability is conducive to the improvement of the level of mathematical modeling competition, and the planned strengthening of the research ability of teachers within the team, and the application of various topics. The mathematical modeling teaching team should pay attention to the mutual support of "teaching, scientific research and competition", and promote teachers' scientific research work, study classroom, improve teaching, enhance scientific research level and improve the ability of competition guidance by teaching reform projects, scientific research projects and competition guidance projects. The completion of each project is carried out in the form of project team, which really reflects the characteristics of cooperation, interaction, democracy and freedom, and resource sharing in the process of project completion. Project team members to foster a sense of responsibility, collaboration, clear goal, each member should participate in and through the whole process of project research, at the same time requires each member to reflect, summarizes the project itself, namely each member is not only the team members, and project leader, to lead and promote the scientific research level of the whole team.

### ***3.6. Share and Communicate, Advocate Cooperation Culture and Establish Cooperation Mechanism***

In the construction of mathematical modeling teaching team, the cooperative consciousness of teachers needs to be gradually cultivated and formed, and sharing and communication is an effective catalyst for the evolution of this process. From the perspective of personnel structure, there are responsible persons and team members, old teachers and young teachers, mathematics teachers and professional teachers, etc. From the perspective of the content of sharing and communication, it can involve teaching contents, teaching methods, teaching styles, academic research and teachers' professional development. Look from the form that shares communication, can have teach research prepare lesson, symposium, lecture, dialogue meeting, network wait for a variety of forms. Through sharing communication, interaction between teacher, the teacher can in thoughts, beliefs, attitudes, etc between affect and promote each other, to change the organizational culture, from the isolated technical work to the work of teachers professional discussion and the pursuit of culture, build up mutual understanding, and the team concept of symbiosis, form the education together, Work together to achieve the goal of teaching team construction.

### ***3.7. Create Good External Environment***

As for the external environment of team building, on the one hand, the school should provide strong external resource support, including material support and institutional support, and encourage and

support teaching teams through policies and benefit orientation. On the other hand, school-enterprise cooperation can be strengthened to organically combine what students learn at school with enterprises and institutions, so as to effectively improve the pertinence and timeliness of school education.

#### 4. Conclusions

It is the primary goal of higher education to train senior professionals with innovative spirit and practical ability, while the teaching and competition activities of mathematical modeling insist on student-centered and strengthen the cultivation of students' innovative spirit and practical ability. In the process of teaching and competition activities, students' independent research and cooperative discussion teaching methods are vigorously promoted to highlight students' dominant position. Teaching team construction is an important part of teaching infrastructure construction in colleges and universities. It is a pioneering work to promote teaching team construction and play an important role in talent training. And build teachers cooperative culture, realize the teachers' personal development, team ability and the teaching quality and improve the harmonious coexistence of the situation, understand the connotation of mathematical modeling teaching and competition, in order to cultivate students' comprehensive quality, efforts to improve students' inquiry learning and innovative ability to apply for the idea, build a teaching, scientific research and the development of the competition to guide the various competition guidance team, It is the key to create an excellent teaching team, an important way to improve the level of competition, and an important measure to reflect the cohesion of teachers' team and improve the level of scientific research and teaching.

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