

Analysis on the Writing Skills of Mathematical Modeling Papers in Colleges and Universities

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Abstract: This paper is divided into three stages: before, during and after the writing of mathematical contest in modeling paper in college. It discusses the points of attention and writing skills in the writing process, and summarizes the error-prone problems with the modeling process combined with teaching experience, and puts forward improvement measures.

Since 1992, China organized the first College Student Mathematical Modeling Competition (CMCM), which is held by the Higher Education Department of the Ministry of Education and the China Society of Industrial and Applied Mathematics (CSIAM) on the second weekend of September each year. Due to the characteristics of comprehensiveness, innovation and openness, mathematical contest in modeling has attracted more and more attention. The final basis for the score of the three-day competition is the paper submitted by modeling, so the paper writing plays a decisive role. Based on my practical experience in guiding the modeling contest, we discussed and learned from the three stages before, during and after writing.

1. Before writing

In previous years, when forming a team for mathematical modeling, the three members were responsible for modeling, programming and writing. The team member responsible for writing is under pressure, because it does not build a model, does not have a program, how does the classmate write? Team member who are responsible for programming think that how to write without creating a model program? It is easy to cause conflicts between the team members, which is not conducive to the following work. Because of this, papers writing should be done by three people together to create success.

Before the competition, each team member should check whether the hardware of each computer is normal and whether practical mathematical software (such as MATLAB, LINGO, SPSS, etc.) is installed on the computer. Whether the commonly used mathematical methods of modeling and the necessary mathematical knowledge are sorted out can be easily found if needed. Before we met some of our classmates who had been working for a long time, because there was no MATLAB installed on the computer. Then it took a lot of time to install the software, which seriously affected the morale of the team members. Therefore, it should be repeatedly confirmed that the installation of mathematical software is normal and can be used normally. In addition, we need to contact the software maintenance staff to ensure the smooth progress of the competition for three days.

When you get the topic, don't rush to write. The first morning time is all used for discussion. The three people first carefully understand the topic, analyze the background of the problem, collect a large amount of relevant literature, and each team member elaborates his own ideas and opinions. In order to avoid some of the team disorder, I do not know where to start the problem. We use the form of question-and-answer. One team member throws out the questions, let the other team members answer each other, cycle back and forth, in order to discuss the topic more comprehensively. In the process of the discussion, each team member should timely record the problems that have not been solved.

According to the following three questions, do a good job of writing: (1) Topic: Choose C or D? This mainly depends on the results of the discussion between the three people, as far as possible to choose the clear thinking, play a larger space, strong penetration, comprehensive application of the topic. The team members had better collect more relevant references to facilitate the writing of the paper. (2) Answer: After the topic is completed, it should list which problems need to be solved for the selected topic, what key data should be calculated, and how the results will be presented. These questions can also be discussed with the instructor. (3)Arrangement: List items according to the order of questions, make notes, and write the preliminary solution. Finally, each of the three people creates a new folder, the contents of the collation into the folder. The purpose of arrangement is to prevent the loss of found information while improving the efficiency of the work.

2. During writing

Mathematical modeling paper is divided into two parts: abstract and text. Abstract is the key to winning the prize, which accounts for 10% of total score. The abstract reflects the soul of mathematical model paper, including the understanding of the topic, modeling ideas, solution ideas, algorithm ideas. To give you a few examples: in order to get enough words, some teams have charts in the summary section. Although the number of pages is enough, the scores will be greatly reduced. Therefore, we suggest that formulas can appear and that a large number of charts should not appear. Some teams scribbled a lot of nonsense, and the first sentence removed did not affect the full text at all. Therefore, it must be repeatedly think about it, so that the statement is pertinent, concise, and get rid of redundant statements. In addition, the number of words is up to standard, and there is no emphasis on language link descriptions, which does not meet the standards for writing scientific papers. So we give you a reference template: "first of all, in response to the first question put forward '...' question, and then, the second question was introduced on the basis of the first question '...' What changes were made to the previous model? Finally, you can answer the third question. The key words should be 3-5, not too much. We recommend that the abstract of the paper be written at the end. After writing, each team member each team member should take turns to revise it and select the best one.

The text is the core of the paper, which includes problem restatement, problem analysis, symbol description, model hypothesis, model establishment and solution, model evaluation and promotion and model improvement. These 7 aspects interlink and influence each other. The usual mistake in the restatement of the question is to copy the original text. It shows that the team members themselves do not understand the meaning of the question thoroughly. Advice for everyone: you can refer to the preparation notes before writing, clarify the meaning of topic, combine the knowledge background and describe it in your own language. Problem analysis is often analyzed so much that there is nothing to say when building a model. Therefore, this part should be handed over the team members who have unique ideas, concise language, and explain the thought formation process. From time to time, the team members complain that there are too many assumptions, and they still wonder whether to consider all of them when handing in the paper on the last day. The title of

mathematical contest in modeling is taken from the real life. and there are too many factors affecting the model. It is impossible to cover all aspects of the model hypothesis. We can combine the practical significance of the problem, grasp the key to the problem, distinguish the priority, and make a brief and reasonable hypothesis, which is of high value. Symbol description part of the full text to achieve uniform norms. Some students quoted inconsistent symbols, so please check again and again. The establishment and solution of the model is the most important part of the text. The common problem in this section is that when students quote mathematical formulas, they do not attach a symbol description. Some students think that before mentioned, it is no longer necessary. In the paper, you must remember to mark the meaning represented by the letters at the bottom of the formula. If it is a chart, you must also indicate the name of the table. It is convenient for teachers to consult, and it is not necessary to find them in the whole article. The modeling process can be appropriately inserted into mathematical formulas, charts, algorithm procedures, and so on. When solving the model, a variety of methods can be combined to improve the previous algorithm, so as to avoid monotony.

The use of mathematical software (MATLAB, LINGO, etc.) combines practical problems with computer technology. In addition to testing the results of the solution, it also enhances the new height of scientific writing. The evaluation and improvement part of the model mainly aims at combining the results of the participating group with the actual situation, and adjusting the model appropriately through the sensitivity analysis and error analysis learned by operational research. Based on the shortcomings and the results of the modeling, suggestions and improvement schemes are given. The final improvement suggestions must be consistent with the actual problems, so as to reflect the characteristics of mathematical contest in modeling in college.

After the abstract and the text are completed, the next step is the references. Many freshmen do not know the writing format of the references, which leads to writing errors and affects the full-text score. It should be written according to the fixed format specification. At the same time, it should be noted that there are different writing methods for quoting books, papers and websites, and it is necessary to make corrections in time. We suggest that the players prepare the correct template of the references before the competition, so that they can use it when you were writing. It will save time.

3. After writing

Generally, the team will finish the whole paper from the afternoon of the first day to the afternoon of the third day. Some teams seemed to have a good discussion and wanted to have a comprehensive content, but it was futile not to finish the paper on the third day. Therefore, in the process of guidance, I asked the team members to control the time and the first draft was handed in the afternoon of the third day. The next work to be done.

3.1. Check the typos.

A lot of students care about the speed of typing, did not look carefully, too many typos. It is worth noting that the abstract must be carefully checked in order to give teachers a good impression. The three members are united and jointly examined, which is more efficient.

3.2. Specification the writing format.

Carefully check whether letters, characters, numbers are consistent. In addition to the first page, the information of the team members cannot be exposed. Some teams input their own information into the header and footer in the paper, which is absolutely not allowed.

3.3. Full-text layout.

The final step is to typeset and organize the whole paper. The team members checked and corrected the paper according to the typesetting format. Choose single space for the space between the lines. The text should be in Song type with small number 4, and the first level title should be in black type 4, the second level title should be in black type 4, and the third level title should be in black type 3. Finally, please reconfirm that the writing of the reference is consistent with the requirements.

3.4. Backup.

These modeling topics generally have a clear application background or a specific application. Although the difficulty is not very large, it can be applied in different places. Some can be used as research topics, some can be used as teaching cases, and applied in related courses; others can be used as topics for student research training, innovative projects or as students' graduation design. So it's all possible to organize all the content for backup, archive and view, so that it can be used later. In particular, as a teacher, you can also compare the content of the students each year.

As mathematical modeling instructors, we know very well that mathematical modeling in college requires a solid mathematical foundation, as well as reading a lot of literature and studying hard. Therefore, teachers should try their best to improve their responsibility and conduct, infect students with the idea of modeling, and stimulate students' interest in modeling. In the three days of the game, we can be calm, mutual understanding, do not give up. Do not complain between the same team members who do more, who do less, we must unite and work together. As instructors, we understand the hard and difficulty of participating students. Therefore, in the three-day competition, it is recommended that you pay attention to rest in the first two days, and the third night can be based on the specific situation. In the end, as long as the modeling is correct, the assumptions and results are reasonable, and the statements are clear, you will be able to achieve excellent results.

The role of mathematical contest in modeling in the development of science and technology has been paid more and more attention by mathematical and engineering circles. In order to adapt to the development of science and technology and the cultivation of high-quality and high-level scientific and technological talents, more and more colleges and universities at home and abroad are carrying out mathematical modeling courses. As a math teacher, I have integrated mathematical modeling into the math class and integrated mathematical modeling with blended teaching. In the math class, the mathematical modeling content and materials will be sent to students, writing skills will be taught to students, and students will be prepared to participate in the modeling competition mobilization work. At present, we have achieved some results, and hope to get better and better.

References

- [1] Wu Yali, Zhang Junmin. *Operations Research*. Peking University Press, 2011.
- [2] Yin Xiaobo, Zhang Lei. *On the team formation and division skills in mathematical modeling*. *Science and Technology Information [J]*. 2010(23):709.
- [3] Han Zhonggeng. *Writing Method of Mathematical Modeling Competition Papers[J]*. *Mathematical Modeling and Its Application*, 2017 (2):42-48.
- [4] Yang Guanghui, Liu Hecai. *On the Writing of Mathematical Modeling Contest[J]*. *Journal of Qiannan Normal College for Nationalities*, 2009 (3):73-76.