

Reform and Practice of Operational Research Experiment Teaching in Local Universities

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Abstract: With the deepening of the reform process of colleges and universities, in order to train students' engineering practice ability, this paper discusses the reform of operation research experiment teaching in local colleges and universities based on the background of "new engineering". This paper analyzes the current situation of operational research experiment teaching in local colleges and universities, points out that the current situation of operational research experiment teaching in local colleges and universities is still heavy on theory and light on practice, lack of innovation in experimental teaching, and single evaluation form of practical teaching. The aim is to help the successful reform of operational research experimental teaching in local colleges and universities, improve teaching quality, fully stimulate students' interest in learning, and cultivate students' ability to solve and analyze problems.

Keywords: Universities; Operations research; Experimental teaching; Teaching reform; Classroom practice

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1. Introduction

The course of Operations research has strong practicality in college engineering teaching, which involves systematic and scientific quantitative analysis and optimal decision-making based on modeling in teaching practice. At present, operations research has been widely applied in various industries such as national defense, finance, transportation, energy and communication, and plays an important role in the management of social and economic construction in China^[1]. However, at present, local colleges and universities still use the traditional teaching mode, the teaching form is not new, the teaching concept is outdated, the experimental teaching does not pay attention to, and the experimental teaching ignores the cultivation of students' innovative application ability. Therefore, in order to train new engineering practical talents needed for future social development, the experimental teaching of operations research in local colleges and universities needs to be reformed urgently. Based on the background of "new engineering" teaching reform and combined with the training objectives of operations research talents in local colleges and universities, the reform of experimental teaching of operations research should be carried out in an all-round way, hoping to provide references for the reform of experimental teaching of operations research in local colleges and universities. Provide important support for the development of students.

2. Current situation of operational research experiment teaching

2.1 Emphasis on theory over practice

As a highly theoretical and applied subject, Operations research is equally important in both theory and practice teaching. However, most local college teachers attach more importance to theory teaching and neglect practice teaching in the teaching practice of Operations research. The mathematical theory derivation in the course of operations research is more important than the practical application, which leads to the inability of students to improve their practical application ability. In such a teaching mode, students are prone to misunderstand the grasp of course knowledge points and misunderstand that it is only necessary to master theoretical knowledge. In the end, high scores and low abilities cannot meet the needs of various industries for interdisciplinary talents in engineering practice^[2].

2.2 Lack of innovation in experimental teaching

Most local colleges and universities choose teachers to organize students to experiment on the computer in the operation research experiment teaching, in this relatively simple practice teaching method, does not fully cultivate students' practical ability. At present, the experimental teaching of comedy operations research is more just to verify the experiment. The teacher presets the experiment process before class, and students only need to verify the theoretical algorithm according to the ideal model in class. In the process of such experimental teaching, the purpose of operational research practice teaching can not be truly demonstrated, and students can not apply what they learn in the book to practice. Therefore, in order to promote the reform of operational research experimental teaching in local universities, it is necessary to innovate the current practical teaching methods, improve the competitiveness of students and introduce more diverse and flexible practice forms^[3].

2.3 Single evaluation of practical teaching

At present, most local colleges and universities still adopt the traditional evaluation methods for the teaching of operations research, 30% (normal grades) and 70% (final grades). However, such evaluation methods are more focused on the theoretical level of students, while the practical ability assessment is ignored, so teachers and students are prone to learning errors in daily teaching. Therefore, if universities ignore the examination of students' practical ability in the teaching evaluation of operations research, it will deviate from the target of application-oriented talents needed by society. Therefore, it is urgent to change the evaluation method of operational research practice teaching in local universities to cooperate with the practical experiment teaching.

3. Operational research experimental teaching reform strategies in local universities

3.1 Attach importance to practical teaching reform

As a further extension of theoretical teaching, practical teaching is an important means to train students to use what they have learned, which requires teachers to deal with the student-oriented classroom relationship, play their own leading role, and fully stimulate students' enthusiasm to participate in experiments. For teachers themselves, they should have profound knowledge and be able to introduce typical cases of the application of operations research in all walks of life to students in class^[4]. And summarize their rich practical experience, so that students realize the importance of experimental teaching of operations research, but also regularly organize students to visit enterprises and institutions to learn how operations research solves practical problems in business management. For students, teachers need to give full play to the main role of students in the experimental course, require students to complete tasks in accordance with regulations, and use spare time to solve problems with operations research in practice.

3.2 Emphasis on innovation in experimental teaching

In the process of operation research experimental teaching reform, the innovation of experimental teaching method is a crucial part, which is the key to achieve the goal of personnel training, complete the teaching task and improve the teaching quality. The case teaching method can be applied to cultivate students' practical ability of operations research. Students will combine the knowledge they have mastered with typical cases to form ideas for solving problems. In such class, the interaction between teachers and students will also produce a certain degree of thinking collision. In addition, in the context of practical problems, students are guided to discover, explore, analyze and solve problems independently, and participate in solving problems in their own shoes, which not only enlivens the classroom atmosphere, but also forms teaching appeal and cultivates students' ability to respond to situations^[5]. The cooperative learning method can also be applied to divide the class into several learning groups with 3 to 5 students, designate the group leader to divide the content of the course chapters, and each group is responsible for analyzing each specific case. After the theoretical knowledge is taught, the groups can apply the knowledge to practical problems, discuss, analyze and solve them together. At last, the group should discuss the comprehensive and designed experiment and carry out inter-group communication. Each group can raise questions at the first time, complete the final simulation verification, and write the summary report of the in-class experiment. Finally, computer software is combined to demonstrate various models and algorithms of operations research, such as simplex method teaching. Teachers can operate Excel tables to show students the correct iterative process of simplex method. After completing the spreadsheet modeling, students can dynamically show the changes of value vector and wire harness conditions, which is very beneficial for sensitivity analysis. Finally, in view of the important difficulty of modeling and model solving in the course of operations research, experimental method can be applied in teaching, and special operational research software can be used to conduct experiments, such as Excel, Mathematica, Matlab, Lingo, QSB and Maple. Teachers guide students to master the correct software operation methods in class, and can complete modeling, solving and generating reports independently.

3.3 Optimize practical evaluation methods

In order to innovate the evaluation methods of operational research experimental teaching in local colleges and universities, diversified assessment forms can be adopted, such as the traditional closed-book assessment, online assessment can be organized, and end-of-course papers can be written, so as to have a more comprehensive understanding of students' operational research course practical ability. As the knowledge of operations research involves a wide range, the coverage of the examination content should be large, which can broaden the scope of assessment. It is not only necessary to test the degree of students' mastery of the theoretical knowledge of the subject, but also to test the ability of students to apply the knowledge to solve practical problems. For example, reform the assessment question type, adjust the proportion of subjective questions and objective questions, increase the open question type assessment, and the comprehensive performance of students' participation in enterprise practice. The specific evaluation method can be composed of 20% (usual grades), case study and analysis reports, 30% (computer experiments), 50% (final exams).

Conclusion

All in all, the experimental teaching of operational research in colleges and universities is indispensable for cultivating practical composite talents under the background of new engineering. In order to solve the current teaching situation in colleges and universities, which emphasizes theory over practice, lacks innovation in experimental teaching, and has a single form of practical teaching evaluation, we can attach importance to the reform of practical teaching, emphasize the innovation of experimental teaching, and optimize the method of practical evaluation. Help local college students to build a good learning foundation of combining theory with practice in the course of operations research, and improve their comprehensive ability of future employment.

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