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# A Probe into the Teaching of Operational Research Courses for Management Majors in Applied Undergraduate Universities

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***Abstract:*** *In recent years, local normal colleges have begun to carry out reforms in discipline construction and curriculum settings to enhance students' application-oriented abilities. Operational research is an important basic course for management majors. It plays a vital role in cultivating and improving students' innovative ability, improving quantitative analysis in management practice, and improving scientific decision-making ability. Based on the comparison of the status quo of operations research at home and abroad, combined with the characteristics and requirements of talent training in the new era, this paper proposes constructive ideas for the teaching reform of operations research from the perspective of its own professional curriculum construction.*

***Keywords:*** *operations research, teaching mode, application-oriented, undergraduate universities, courses*

## 1. The importance of operations research in management majors

Operations research originated in the Second World War, and its ideas and methods were widely developed and applied to all aspects of society. As one of the important disciplines of management, operations research has introduced modeling and quantitative analysis in the field of management, which has provided theoretical tools for the development of management science in the depth direction. The ever-deepening economic globalization and more complicated international and domestic forms have put forward higher-level requirements and more severe challenges for the level of managers in various industries. Cultivating more qualified management talents in different industries has important practical significance for the development of applied undergraduate universities. Setting the course of operations research as a backbone course for management majors is of great significance for students to improve their ability in decision-making and quantitative analysis. Therefore, in the teaching activities and practical design of operations research in colleges and universities, the scientific thinking and research methods of operations research should be fully utilized, and the main purpose is to cultivate students' innovative consciousness, creative thinking ability and innovative spirit.

## 2. The teaching status of operations research at home and abroad

### *2.1 Domestic*

There is a big difference between operations research in science and engineering universities that emphasize mathematical deduction and algorithm design. Operations research in management majors mainly focuses on economic management, with more emphasis on the interpretation and re-optimization of model establishment and optimization results. The courses mainly include planning theory, decision theory, inventory management, queue management, network and graph analysis and other modules. Some of the more prominent problems in practical teaching are:

#### *2.1.1 Disconnection between theory and practice*

The knowledge content and curriculum system of operations research covers a large amount of mathematical knowledge and management knowledge. The application of operations research in practical problems reflects the construction of models and quantitative thinking. However, in the actual teaching of operations research, theoretical knowledge and practice are often not organically integrated. Based on the students' mathematics and computer foundation, many teachers focus more on the

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explanation of theoretical knowledge, which reduces the educational effect of operations research. Exercises are often too simplified and separate from actual problems. As a result, students do not have the ability to solve practical problems. In addition, students lack the ability to solve complex models by computer means. The final result is the ability of management students to apply operational research to management problems and theoretical principles after graduation. I can't understand and eat well, and my hands-on application ability is not strong.

#### *2.1.2 The focus of teaching content is not clear*

The teaching mode of operations research is relatively fixed, and some teachers do not consider the impact of professional differences on teaching content. The curriculum teaching of operations research lacks a certain degree of flexibility, and the focus of teaching content is not clear enough, which makes it difficult to reflect the practicality of teaching operations research.

#### *2.1.3 The lack of design of students' internal drive in teaching methods*

Due to the small number of class hours and the fact that the teaching content of operations research is not selected according to the professional direction, the teaching task of operations research is very large. What is shown in actual teaching is that teachers blindly complete the teaching tasks. "Full House" is the main method, ignoring the internal drive that stimulates students to learn. This teaching method cannot make the theory and practice better organically integrate, but gradually cultivates students' bad habit of passive learning.

#### *2.1.4 Ignore the differences in students' knowledge base and learning ability*

The traditional teaching process of operations research often ignores the differences in students' mathematics foundation, learning ability and learning motivation, sets unified teaching standards for students, adopts unified teaching methods, and lacks a certain level and pertinence in course teaching. The mathematical foundation is the cornerstone of the smooth understanding of the principles of operation research model solving. The interest in learning operations research is more closely related to students' learning initiative, exploration awareness and learning efficiency.

### *2.2 Overseas*

From the perspective of some business schools in the United Kingdom, France, and the United States, foreign countries pay more attention to the cultivation of the ability to cross application of theory and practice.

In the relevant French institutions, operations research courses are often placed in the sophomore stage. The mastery of mathematics and computer programming is a very important part of the advanced courses. In order to urge students to study and test their learning effects, a variety of methods should be used to assess the teaching status of operations research courses, such as homework (10%) + class status (10%) + practical problem analysis (including computer assessment) (25%) ) + Final exam (55). Most of the practical problems used for assessment are practical problems in all walks of life in real life, and there is no uniform standard for assessment. As long as students can get more convincing and logical results than the current results, it will be consistent require. The above assessment methods not only assess the theoretical knowledge of the course, but also take into account the cultivation of the ability to transform theory into practice. There are many problems waiting for us to solve in real life, but learners often feel that the problems that need to be solved but can be solved in reality have already been solved; and for the remaining problems, either cannot be solved or they are meaningless. The purpose of teaching through model discussion is to enable learners to understand the process of identifying and solving problems, and to master the methods of solving problems through the study of the predecessor's model construction process; to truly experience how to apply the knowledge they have learned practice.

The operations research course offered by the British Business School is divided into five modules, including management forecasting, optimization, network analysis and inventory control, simulation, and spreadsheet-based business decision modeling. Management forecasting mainly learns the forecasting technology of customer demand. The goal of this module is to learn modern business forecasting methods and introduce a series of forecasting models. Provide knowledge on how to generate the best forecasts in different real situations. Enable students to use different forecasting methods based on induction and reasoning to effectively forecast business needs and provide decision support for demand and income management. Optimization, network analysis and inventory control mainly learn a series of optimization algorithms, network planning methods and inventory control, and

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how to use these technologies to model actual enterprise problems. It mainly includes general linear programming, linear programming with special structure, integer and mixed integer programming, heuristic algorithms for large-scale problems, network planning, inventory models, etc. The business modeling and simulation module learns computer simulation technology, and simulates business operations based on mathematical models and computing technology. The study of this module is based on witness, a widely used commercial simulation software package. Through the combination of learning business modeling technology and software package, the actual business application is emphasized to business decision modeling based on spreadsheets. Learn Excel functions, Visual Basic programming in Excel and data filtering processing technology. Generate effective data summaries and charts. Learn optimization, forecasting, simulation and other model-assisted management decision-making methods through a series of Excel business model cases. It can be seen that they pay more attention to the teaching design of business forecasting, simulation technology, and actual enterprise cases.

The United States pays more attention to localized teaching, makes full use of local social resources, and selects materials from the local area to prepare teaching activities, aiming to help local students better meet the teaching requirements, while enhancing their understanding of local society, culture and ecological environment, to strengthen their emotional connection and responsibility for the local area. With rapid development in recent years, two basic types have been formed: discipline integration and discipline penetration. In practice, localized teaching requires teachers and students to change the role relationship, encourage students to actively participate, and call on school leaders to build a rooted local teaching culture and expand teaching resource space. Localized teaching in the United States advocates extending the teaching space beyond the classroom and into the real reality scene, aiming to bridge the disconnect between school education and real life, allowing students to construct knowledge and exercise abilities in real situations. The separation of school and life is a major problem that localized teaching tries to alleviate. It not only troubles American schools, but is also one of the crux of our country's school education.

## 3. Reform ideas-cultivation of innovation and application ability

Optimizing the teaching module: According to the nature of the course, the course should be divided into the corresponding department, which is conducive to in-depth exchanges with teachers in the same direction; at the same time, multiple teachers with different expertise are encouraged to jointly undertake the teaching tasks of the course and compile appropriate textbooks based on their expertise; according to the requirements of teaching students' majors and application-oriented talent training, the main and secondary key points of the teaching modules are selected in a targeted manner.

Reasonably set up advance courses for operations research courses, emphasizing students' mathematical foundation and computer programming ability.

In terms of content, closely integrate the direction of professional training and optimize content teaching. Simplify general optimization techniques and add content such as game theory and business forecasting in operations research. Although forecasting is generally regarded as econometrics and statistics courses, these courses mainly involve general model theory, which is not very professional and separate from management applications. The training of applied undergraduate talents is in line with the actual needs of enterprises, and business forecasting is the prerequisite and basis for enterprise decision-making. Therefore, the forecasting module of operations research, which was originally considered weakened by the weak mathematical foundation of the students in class, must be strengthened in accordance with the requirements of the times. Increase the simulation technology in operations research. The domestic operations research textbooks and course content generally weaken the simulation technology, and tend to describe the traditional mathematical model. However, some complex modeling problems are always difficult to describe with traditional mathematical models, so simulation technology has become the main method to solve complex enterprise modeling problems in recent years.

It is recommended that management, economics, and finance majors should be targeted to construct different teaching modules in accordance with the training requirements of different directions.

Improvement of learning mode: teachers as designers, students as knowledge builders. Pay attention to the combination of theory and practical problem solving ability, close to the actual needs of the company, and further focus on cultivating students' practical application ability; classroom teaching is combined with narration and student independent learning, and a large number of cases and projects are

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interspersed in the curriculum, which requires students to form a team to complete, cultivate students' communication and collaboration skills, grasp the close connection between "what students learn" and "social needs".

Strengthen the training of modeling techniques and implementation methods. Combined with commonly used software, such as Excel, R, Matlab, Lingo, etc., the modeling and software implementation are combined to strengthen the experimental link of this course in the existing comprehensive course training. Divide the current student training process from centralized completion into several separate stages, allowing students to discover the actual problem needs by themselves, and then learn with the needs, complete the knowledge internalization process of theory-practice-theory, and continue to accept the society practice test. In this process, the integration and penetration of operations research and multidisciplinary are realized.

Relying on the school-enterprise cooperation council, build an off-campus practice teaching platform. Strengthen internal and external contacts, establish a school-enterprise cooperation council, make full use of social resources, establish an off-campus training base, and hire relevant industry experts and technical backbones as internship instructors;

Establish the college-level practical training teaching management center, and construct an open practical training teaching management mechanism. The effective use of the internship training base is the guarantee for the cultivation of students' ability. Through the management mechanism of "centralized management and open use", the internship training base in the hospital is open to all students. Subject interest groups, competition training teams or individuals can apply for the use of laboratories and related experimental equipment outside of class to independently carry out experimental research, so as to improve model understanding and construction capabilities.

Introduce actual business cases, encourage the establishment of student teams to study, jointly analyze problems, establish models, improve models, use computers to solve models and explain, and cultivate students' ability to solve practical problems.

## 4. Conclusion

Curriculum reform of management operations research is a process of long-term exploration. During the exploration, we should continue to explore student-centered and student-oriented thinking and innovative cultivating models through continuous accumulation of experience. It is suitable for students and adapts to the current environment teaching mode. Through training students' abilities in each teaching practice link, students can improve their ability to analyze and solve practical problems, and then improve students' innovative thinking level, so as to adapt to the cultivation of applied undergraduate talents.

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