

Exploration on the Teaching Reform of Operations Research Course

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Abstract: operation research is a required course for e-commerce majors. It is an important course to cultivate students' optimization thought, improve students' ability to analyze and solve problems. It plays an important role in many decision-making problems in the field of e-commerce. In order to improve the teaching quality of operations research course, this paper explores the teaching reform of operations research course from the perspective of theory + practice + cases. In the whole teaching process, it focuses on solving the three key optimization problems in the field of e-commerce and conducts theoretical study and practical application of what it has learned. The results show that the teaching effect has been greatly improved and the students' innovation ability has been effectively improved.

1. Introduction

Operational research refers to the application of analytical, experimental and quantitative methods to make an overall arrangement of the limited human, material, financial and other resources in the economic management system, so as to provide the decision-makers with the best solution based on the basis to achieve the most effective management^[1]. Through the study of this course, undergraduate and graduate students majoring in management science and engineering will be trained to have good scientific management ability. The main feature of this course is to solve practical problems through the establishment of abstract mathematical methods, and its industrial applications are very wide, such as production and manufacturing, logistics, military and other fields. Operations research is not only a subject with rich theories, but also a subject with extensive application background.

As a subject with strong application, its research content reflects the characteristics of diversification and multi-discipline crossover^[2]. After more than 60 years of development, operations research has gradually formed a set of systematic methods to solve and deal with practical problems, which can be summarized into the following stages: building a corresponding mathematical model, a practical problem through the way of building a model, abstract into an operational research problem; Analyze the problem, including the nature of (optimal) solution and the difficulty degree of solution, and seek for the appropriate solution method; Design the algorithm that can solve the problem, and analyze the performance of the algorithm; The algorithm is programmed and the numerical results are analyzed. The solution is substituted into the model to judge the validity of the above process, and the concrete solution to the actual problem is given. These stages are neither independent of each other nor sequential.

Case teaching refers to the teaching method that combines theory with practice through active exploration and solution of practical problems in the teaching process. It can make students change from passive to active learning, so as to fully stimulate students' learning enthusiasm^[3,4]. For the cases used in the teaching process, students should choose backgrounds that are easy to understand and create conditions for scientific experiments^[5]. Students use case teaching to start with a specific problem, through the analysis of the problem, the establishment of operational research model, and then through the teacher's theoretical explanation, solve the model and implement the specific algorithm on the computer. In this process, not only conforms to the operational research to solve the problem the train of thought, but also has exercised the student's practical ability. In this process, students focus on problem analysis, mathematical modeling and mathematical experiments to carry out learning, stimulate students' interest in learning, active thinking, active analysis, greatly improve

their ability.

2. Current Situation of Operations Research Teaching

2.1 The Teaching is Based on Theory, But the Practice Teaching is Weak

Now the operation research course that each university offers, basically include theory teaching and practice two parts. In the concrete teaching process, the theory teaching is the main part and the practice teaching is the auxiliary part. It mainly teaches theories and algorithms. Too much theoretical explanation makes students feel that the content is too abstract and boring in the past. It makes it difficult for them to develop their enthusiasm and interest in learning. In particular, some students with poor mathematics foundation are discouraged from taking this course and are unable to get started. It is even more difficult for them to use this course as a tool to solve problems. This violates the teaching purpose of operational research, which makes the teaching effect unsatisfactory. Through the enhancement of the practice link, this course reflects the characteristics of “combining theory with practice”.

2.2 The Assessment Method is Mainly Based on Theory and Examination, Which is Difficult to Cultivate Scientific Decision-Making Ability

What kind of assessment mechanism, brings what kind of learning method. Most courses in colleges and universities nowadays, especially such compulsory courses as operations research Classes, often in the form of a final closed - book exam. As a result, students tend to get high marks by brushing the questions and choosing the questions. However, this kind of assessment method is relatively unitary, which is difficult to truly and scientifically measure students' ability. This examination-oriented assessment method cannot comprehensively manage students' learning, nor can it reflect the improvement of students' modeling ability and problem-solving ability in the learning process. Therefore, it is suggested to reform the assessment method of the course, pay attention to the evaluation of students' learning process, and improve the proportion of students' usual scores in the total scores. To be specific, it centers on solving practical problems and designs case experiments accordingly. Students submit experimental reports on solving cases. This includes how to analyze the abstract model, the establishment of operational research model, how to solve the model, the content of the computer experiment, the significance of the solution obtained. By presenting the case report and giving the corresponding grades, students can improve their learning. Interested, consciously complete the theoretical and experimental learning, so as to guide students from the exam-oriented to build models and solve problems direction change.

2.3 Lack of Specific Operational Research Cases

As operations research is a course for economic management and applied mathematics, most of the cases in the textbooks are universal. The case, although very classic, is not consistent with e-commerce as a specific major. After 2-3 years of professional study, students majoring in e-commerce have a wide range of interests in the professional field. If we can add operational research cases familiar to students majoring in e-commerce, we can stimulate their interest in learning. Based on this, we add cases that are highly relevant to students' professional background in the actual teaching, and solve these case problems throughout the course.

3. Innovative Ideas of Operational Research Courses

3.1 Select Case Teaching for e-Commerce Majors

Design and select cases that accord with students' actual level and professional characteristics. To adapt to the learning level of different students, such as undergraduates, Graduate students, who are also management types, can choose cases with different difficulty coefficients. For the case of e-commerce major, the background of e-commerce should be widely used to make students have professional resonance and improve their interest in learning. The selection of cases should be

combined with practical scientific research problems and problems faced by enterprises, and it should be able to guide students to better understand the theory of each chapter of operations research.

3.2 Improve the Students' Enthusiasm to Participate in the Discipline Competition

There are many academic competitions applied to the theoretical knowledge of operations research, such as mathematical modeling contest or some scientific research projects. In the teacher's teaching process, more opportunities should be given to students to show such opportunities, so as to encourage students to take an active part in discipline competitions and other activities. Through the organization and development of various forms of activities, so that students can learn in the operations research classroom knowledge, real application to the subject competition, feel the practicality of this subject. In these activities, the students' ability of unity and cooperation has been trained, so that students can better join the scientific research team in the future.

4. Operational Research in the Field of e-Commerce Cases

As a science, operations research originated from its application in the military field during world War II. Allies such as Britain and the United States set up operational groups to counter Germany. The key task of this operational team is how to make the most of the limited military resources in the war. After The Second World War, this operation group will promote operations research and make it play its important role in various fields, especially in the industrial field. In the 21st century, as the big data, cloud computing and the introduction of artificial intelligence such as science, combined with the new science, in order to discover useful information from huge amounts of data are used to guide decisions, many large enterprises to establish the operational research laboratory, to carry out the services in enterprise decision-making research topic "Internet +" opens the era of big data, also need to provide scientific decision method of operational research.

Take e-commerce enterprises as an example, their core businesses facing c-terminal (Customer) usually include:

- How to help consumers find the most suitable products;

- How to timely deliver the goods purchased by consumers;

- How to provide consumers with more personalized and diverse after-sales service.

These three typical problems all need the theory and algorithm of operations research For support.

4.1 Pricing and Portfolio Sales of Goods

Take an e-commerce platform as an example. When consumers use a search engine, what commodities are displayed in the search results of the e-commerce platform that attract the most? Attract consumers? Are these goods priced exactly in line with what consumers are most willing to accept? Are there any items on display that consumers might want to buy? This requires a comprehensive consideration of a variety of factors to make decisions, such as the relevance of commodities and search keywords, the pricing strategy of commodities, as well as the relevance and substitutability of displayed commodities, and consumers' acceptance range of commodity prices. With the development of big data technology, various e-commerce platforms have accumulated relevant data. To solve such problems, cannot leave the operational research theory, such as commodity Dynamic Pricing Problem (Dynamic Pricing Problem), goods group with combined Optimal Problem (Assortment Optimization Problem), the Optimal Matching Problem (Optimal Matching Problem), etc.

4.2 Inventory Management and Cargo Transportation Issues

After the user purchases from the e-commerce platform, the order is generated and then enters the logistics stage. E-commerce logistics involves storage center, distribution Delivery center, and the final delivery problem. After picking up and packaging, the goods are transported from the

storage center to the distribution center, transferred, and finally delivered to the client. In this process, logistics enterprises have such a few key core questions: where to establish storage center and distribution center? To solve these problems, we need to use the Hub Location Problem in operations research. What is the storage capacity of the storage center? When will the inventory alert be reached? To solve these problems, we need to use the Inventory Management Problem in operations research. How large a distribution center needs to be built, how many dispatchers are needed, and how to plan the distribution path. To solve these problems, the Vehicle Routing in operational research is needed Problem).

4.3 Staffing Problem

In order to provide timely service for consumers in the sales process and after-sales stage, customer service relationship management of e-commerce is particularly important. Especially with the fierce competition in the e-commerce market, it has become a key issue for e-commerce enterprises to solve whether they can meet users' personalized and diversified demands for after-sales service. On the other hand, enterprises are also facing the continuous increase of labor costs. Therefore, how to make the limited human resources, give full play to the customer service effect, becomes the core task to solve this problem. Is it possible to hire fewer customer service staff to meet customer needs? Could you arrange the customer service staff's time more rationally? How to divide customer service personnel according to the needs of customers to provide the most effective service? This involves the Call Center Staffing Problem in operations research, Queueing Theory, etc. The above three cases of e-commerce majors need to be solved throughout the entire teaching process. Through the analysis, modeling, solution and verification of these problems, the operational research theory can be vividly explained and the ability of students to solve practical problems can be improved.

5. Student Learning Process Requirements

5.1 Think about Problems in the Way of Making Decisions

When students are faced with a problem with a large amount of information, a tight schedule or a complex structure, they may not be able to think for a while. However, if you can think from the perspective of a decision, what can be done now? What are the main problems? What are certain? What can be relatively quantified? Trying to make such strategic decisions and thinking, students will have a different way of thinking when they encounter more complex decision-making problems.

5.2 Master Some Mathematical Methods

There are many kinds of mathematical methods. If you have a mathematical background, you can pay attention to some quantitative mathematical methods, whether it is basic operations research, probability theory to describe uncertainty, differential equations to solve continuous problems, all the application scenarios, in fact, you can try to train from the method.

5.3 Focus on Specific Application Scenarios

In addition to mastering theoretical knowledge, if there is not a suitable application scenario, or in the application of theory to apply to the actual question. Still can't solve the problem well. Students can be more interested in industry practitioners to communicate with them, because they face the industry characteristic of the scene and unique dimension, more communication with them, while the students had a way of thinking to solve the problem very clear and some quantitative methods, in a particular application scenario, can be used to solve the very core of the decision problem. In the teaching process of e-commerce major, by introducing cases related to the major that students are interested in, in order to stimulate the enthusiasm of students, good practical effect has been achieved.

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