



Exploration and Practice of Ideological and Political Education in Operations Research

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Abstract. This paper takes the practical course of operations research to carry out the exploration of ideological and political teaching of professional courses, takes knowledge exploration as the main line, takes moral cultivation and on-demand teaching as the standard, integrates the knowledge structure of operations research to dig deep into the connotation of the course, and integrates ideological and political elements into four aspects: the introduction of classic operations research cases, allusions to operations research masters, theoretical summary and sublimation, and frontier exploration of disciplines, so as to realize the integration of operations research thinking into the brain and heart.

Keywords: Operations Research, Operations Thinking, Ideological and Political Education.

1 Introduction

Comprehensively promote ideological and political education in professional courses, implement the requirements of the "Guiding Outline for the Ideological and Political Construction of Curriculum in Colleges and Universities", return the educational goals to the original intention of value guidance and ability training, improve the quality and efficiency of curriculum education, and implement the fundamental compliance of moral education. The operations research course is a difficult and boring practical application course, which runs through the curriculum and professional education goals, deeply excavates the ideological value and spiritual connotation contained in the professional knowledge system, carefully designs the ideological and political teaching design and elements of the course, skillfully integrates the patriotic spirit, craftsman consciousness and team consciousness, improves the students' awareness of the overall situation, the sense of cooperation and the spirit of innovation, realizes value guidance.

2 The Ideological and Political Connotation of the Operations Research Course

Carrying out the exploration of ideological and political practice in operations research course is not only a response to the education policy of the new era, but also an important opportunity to improve the connotation of the curriculum and implement the curriculum reform. The content of operations research is huge and complex, each of which can be independently formed into a systematic framework, and the multidisciplinary complexity presented leads to low students' enthusiasm for learning. Give temperature to the knowledge points and stimulate students' enthusiasm for learning and deeper understanding.

2.1 Value Dissemination Gathers Knowledge Base

From a macro perspective, the ideological and political construction of operations research courses should explore the ideological and political elements of the course from the experience of operations research masters, the contributions of Chinese scholars in the field of operations research, and the integration of operations research and artificial intelligence. Taking the enlightenment and development of operations research in China as the ideological and political entry point, typical examples such as Sun Tzu's Art of War, Ding Wei's repair of the palace and the Dujiangyan Water Conservancy Project, etc., are used to integrate the situation and lay the operational research framework from point to surface. Since Qian Xuesen, Xu Guozhi and others introduced modern operations research to China, Chinese scholars have combined operations research thinking with Chinese practice, and the results have been remarkable. From a mesoscopic perspective, the ideological and political elements of various branches of operations research are compared horizontally in the form of a list. Cases such as production inventory arrangement and ingredient problems used in linear programming are essentially how to use limited resources to get the maximum benefit. The ideological and political direction aims to guide students to establish a sense of optimization, support the sustainable development concept of a higher level of social welfare with as little resource consumption as possible. From a micro perspective, combined with the specific professional background of students, the operation research tools, professional quality and curriculum ideology and politics are integrated. Due to the complexity of the actual problem, there are a variety of unbalanced transportation problems in the transportation problem, and the solution algorithm is not designed separately for each type of problem, but it is transformed into a standard supply and demand balance problem. And use the on-table operation method to solve quickly^[1]. It aims to guide students to understand the importance of standardization in the industry, and use standardized procedures and methods to reduce costs and increase efficiency, such as the biggest problem of railway-public intermodal transport is that there are too many types of trucks in China, and it is difficult to match the standard with railway containers. It is an important tool to guide students to look beyond the superficial phenomenon to see the essence and connotation, and to lay a solid foundation of professional knowledge.

2.2 Knowledge Dissemination and Integration Value Guidance

Breaking the boundaries of operations research methods, the operation research content is arranged and reorganized with operations research problems as the traction, and the ideological and political materials are selected, and the knowledge is used as the carrier to activate the vitality of the operations research course.

Feel the Glorious Achievements of the Motherland in the Application and Practice Scenarios. Operations research is about innovating and developing in solving various complex practical problems, creating new models, new theories and new methods. In the course of teaching, through examples, we will appreciate the wide application and brilliant value of operations research in military, industry and commerce, finance and society. For example, various queuing and storage models are introduced into military exercises to improve the quality and efficiency of training, save national defense assets. Integrate into the rapid development trend of China's logistics industry in transportation issues, especially during the new crown pneumonia epidemic, logistics practitioners have been brave and retrograde, making great contributions to the fight against the epidemic. Through these examples full of warmth and enthusiasm, the enthusiasm for course learning and the sense of social responsibility for learning for the country are stimulated, and the self-confidence of the socialist system is enhanced.

Use the Stories of Operations Research Masters to Cultivate Value Orientation and Scientific Attitude. The brilliance of humanity in the study and exploration of scientists can move the soul even more. The content of the design operations research course is interspersed with the resumes and deeds of the operations research masters in a timely manner, combining rational knowledge with fresh life, paying attention to their scientific attitudes and value orientations, and understanding the feelings of family and country, whimsical ideas, and the spirit of innovation and perseverance in scientific research in the process of scientific discovery. Danziger, the father of linear programming, invented the simplex method and his long-term mathematical thinking training, educating students to have an innovative spirit of independent thinking. When explaining the shortest circuit problem, it introduces the way of thinking of computer scientist Dijkstra, his continuous and down-to-earth attitude towards setbacks at the trough of life, and the encouragement of students to aim high and challenge themselves. Professor Guan Meigu, the proposer of China's postal route, on the road to the internationalization and promotion of scientific research, and the exhortation to young scholars to lay a good foundation and not rush for success^[2]. Learning the stories of ancient Chinese operations research and the outstanding contributions of modern and contemporary Chinese scholars to operations research can effectively enhance our national and cultural self-confidence.

2.3 Stimulate Independent Innovation and Learn the Social Responsibility of Serving the Country with the Frontier of Disciplines

Throughout the history of operations research, the development of operations research is not only related to the national economy and people's livelihood, but also the key to victory in the intelligent era. Through the promotion and implementation of cutting-edge knowledge of operations research, students are guided to grasp the development trends of the discipline. On the one hand, learn about the innovative achievements of Chinese scientists and enterprises, such as Jingdong unmanned warehouse, rookie path planning, and Lenovo intelligent workshop, which were shortlisted for the Franz Edelman Outstanding Achievement Award, the highest award in the field of operations research; Ali Dharma Academy and Shanshu Science and Technology Mathematical Programming Solver have successively won the world's first place in the international authoritative third-party evaluation Mittelmann, so that students are proud of China's scientific and technological progress, and at the same time enhance their confidence in scientific and technological innovation; On the other hand, it is necessary to think deeply about the independent intellectual property rights of the "stuck neck" technology, such as the rapid growth of the model scale, the solver for solving the ultra-large-scale optimization problem is indispensable, and guide students to think deeply about the localization of the mathematical programming solver. Through the core questions, students are guided to conduct deeper exploration, and inspire students' sense of social responsibility to win glory for the country.

3 The Construction Content of Ideology and Politics in the Course of Operations Research

The ideological and political curriculum focuses on stimulating students' initiative in knowledge construction, and provides an effective way to enhance the effectiveness of ideological and political education in the curriculum. Teachers not only impart knowledge, but also guide students to transform the knowledge they have learned into a spiritual core, which becomes the ability and method for students to understand and transform the world.

3.1 Dig Deep into the Ideological and Political Elements of the Operations Research Course

The philosophical connotation of the operations research branch should be explored, and the core of Chinese wisdom should be given to each branch: supply and demand balance-transportation problem, tracing the source-dynamic planning, adhering to the principle of execution-network planning, bounded rationality-decision theory, judging the situation-game theory, etc. The integration of ideological and political education in the curriculum should be driven by the "problem chain" to identify the demand points,

so as to achieve the deep integration of explicit knowledge and implicit ideological and political education^[3].

3.2 Integrate the Ideological and Political Content of the Operations Research Course

The ideological and political elements and their value connotations of the operations research course are mainly reflected in: first, the simple ideas and wisdom of operations research in ancient China. For example, Tian Ji horse racing, Shen Kuo's grain transportation, Ding Wei's repair of the imperial palace, the Romance of the Three Kingdoms, Dujiangyan, Qi Min's important arts, etc., think about the fields in which the past is used for the present, especially in the stage of military planning and development, and integrate national defense education. The second is the optimal use of limited resources. For example, we should pay attention to cultivating students' systematic and overall view, energy conservation and efficiency, and solve the pain points in the field of production and circulation. Third, sensitivity analysis highlights supply chain risks. Introduce the current chip crisis example, and analyze how to adjust the production plan when the available capacity, price, technology and process of resources change. Pay attention to the shortcomings of the economy and society, have a sense of risk management, and be able to analyze the operating principles and countermeasures of changes such as trade wars. Fourth, build a modern logistics system. When constructing the transportation problem of balancing production and marketing, set up emergency material dispatch tasks, and combine national strategies such as transportation power, new development pattern, and supply and demand balance. Fifth, solve the problem of the shortest circuit in the network and optimize the laying of energy pipelines. Driven by tasks such as rural express station transportation and site selection of cold storage for agricultural products, we should pay attention to rural revitalization, advocate green logistics, and provide suggestions for the "three rural" issues. Sixth, the problem of maximum flow combines traffic management and traffic civilization. Identify network bottlenecks, optimize the spatio-temporal layout, and provide suggestions for the governance of transportation infrastructure^[4].

3.3 Innovate Teaching Methods and Teaching Models

The first is to give full play to the guiding effectiveness of teachers. Create high-quality teacher resources for courses, establish a teaching platform for symbiosis, sharing and mutual benefit, and open up channels for teachers to improve their ideological level, political consciousness, moral quality and cultural literacy. Based on network resources, MOOC resources and three-dimensional course teaching resources, based on the concepts, methods and technologies of knowledge management and learning community, the sharing between teachers, students, colleges and enterprises is realized. The second is to activate students' initiative. Combined with the internal needs and ideological characteristics of students, enhance the comprehensive quality of students, and promote the all-round development of students. Through social networks, big data analysis, face-to-face communication, questionnaire surveys and other forms, we understand

students' confusion, problems and demands in professional learning, science and technology competitions, job hunting, career selection, social communication, etc., deeply analyze the learning needs, psychological characteristics, growth laws and value orientations of different students, light up students' concentration on professional course learning, and arouse students' cognitive resonance, emotional resonance, and behavioral resonance. The third is to flexibly choose the form of teaching organization. The online and offline blended teaching mode is adopted, and the teaching activities are designed before, during and after class. Pay attention to the diversity of classroom forms and the effectiveness of discourse communication, avoid additive, label-style blunt preaching, and guide people with deeds, serve people, emotional people, and cultural people. In addition to curriculum design, classroom teaching, and teaching organization, it is also necessary to make good use of practical links and scientific and technological competitions to maintain the consistency of moral literacy, innovative practice ability, and information literacy.

4 The Implementation of Ideology and Politics in the Operations Research Course

The ideological and political construction of the curriculum focuses on political identity, family and country feelings, cultural literacy, awareness of the constitution and the rule of law, and moral cultivation to optimize the supply of ideological and political content of the curriculum. Professional courses are the basic carrier of ideological and political construction. In the course of operations research, it is necessary to focus on strengthening students' engineering ethics education, cultivating students' spirit of striving for perfection as a great craftsman, and stimulating students' feelings and mission to serve the country with science and technology.

4.1 A Multi-Level Teaching System to Realize the Whole Process of Ideological and Political Education

The ideological and political education course of operations research focuses on connecting the inside and outside of the curriculum, building a specific and vivid ideological and political education practice system, and achieving the goal of ideological and political education in the whole process and stage. Operations research enriches the extended learning of red culture outside the classroom, forms a joint force that promotes ideological and political education in the curriculum, and achieves the goal of long-term and in-depth ideological and political education. Make full use of the advantages of scientific research and modern digital technology, actively explore the effective path of ideological and political construction of the curriculum, implement the ideological and political education work into the whole process of professional education and student practice, and promote the precise and connotative development of ideological and political education, so that students can harvest a "win-win" in professional knowledge learning and ideological and political learning. Teachers integrate ideological and political education into the practical teaching system of characteristic competitions, so as to

achieve the practical education effect of "promoting learning through competition - applying what you have learned" and moisturizing things silently^[5].

4.2 Understand the Principle of Optimality and Guide the Understanding of the Social Nature of Efficiency

Operations research is essentially optimality. The principle of optimality is the driving force of the economy and society. Economic and social resources are always limited, and how to meet as many needs as possible with limited resources is the core issue of economic and social development. The principle of optimality provides ideas and methods to solve this problem by optimizing resource allocation, improving production efficiency, and reducing operating costs. Efficient social operation means that resources can be fully utilized, waste and loss are minimized, and the ideas and methods of operations research are used to scientifically plan and organize social and economic activities to achieve optimal allocation and efficient use of resources. Cultivate the awareness of formulating scientific and reasonable policy planning, optimize the industrial structure and resource allocation, respond to the challenges of resource shortage and environmental pressure, and promote sustainable economic and social development.

4.3 Take Case Analysis as the Main Line to Shape the Thinking Mode of Mathematical Operations Research

With case analysis as the main line, the teaching objectives are clarified, and students are guided to form a mathematical operations research thinking mode, and cultivate the ability to solve practical problems. The first is to select diverse cases to enrich the content, and select cases covering different fields and types, such as production management, logistics and transportation, resource allocation, economic decision-making, etc., to demonstrate the wide application of operations research. The second is to select representative cases to enlighten and guide, and select representative and inspiring cases that can reflect the core ideas and practical problem-solving process of operations research. The third is to use innovative cases to adapt to development, as much as possible to reflect the latest progress in operations research and new problems in practical application. The case presentation describes the case background, problem description, and initial conditions in detail; The questions guide students to identify the key problems in the case, clarify the solution goals, encourage students to put forward their own opinions and questions, and stimulate their desire to explore. Organize students to have a group discussion or a class discussion to analyze the mathematical research models and methods in the case. Students are guided to use mathematical thinking modes such as abstract thinking, logical thinking and inductive thinking to conduct in-depth analysis of cases. It also organizes teaching summaries and reflections, provides guidance and feedback in a timely manner, and helps students correct their wrong ideas and expand their thinking angles.

5 Conclusion

By effectively integrating operations research theory with ideological and political cases, we aim to cultivate students' abilities in solving optimization problems using operational thinking, strengthen their patriotism and national self-confidence, foster enthusiasm for learning and applying knowledge, optimize teaching design, and ultimately promote the rapid development of ideological and political education within operations research courses.

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