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Teaching Reform of Management Operations Research Course Based on Digital Empowerment and the Integration of Arts and Science

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Abstract

Management Operations Research is a comprehensive subject which applies mathematical knowledge to solve practical management problems. It is an important course in the teaching direction of the integration of arts and sciences and discipline integration for management majors. Under the background of digital age, the traditional teaching of management operations research faces many challenges, which makes it difficult to cultivate new business talents with scientific spirit, humanistic spirit and digital literacy that fit the value of The Times. Therefore, based on the development of digital information technology and the concept of the integration of arts and science, this paper firstly analyses the current situation and problems of management operations research courses. Then, aiming at cultivating application-oriented talents meeting the actual market needs, it proposes teaching reform plans from three aspects: management operations research teaching objectives and concepts, teaching content and design, and teaching strategies and methods. In order to improve the teaching quality of management operations research and cultivate comprehensive new business talents with scientific spirit, humanistic feelings and digital literacy.

Keywords

Digitalization, Integration of Arts and Sciences, Management Operations Research, Teaching Reform

1. Introduction

Management operations research is the integration of mathematical thinking and management thinking, the application of existing scientific knowledge and mathematical methods to solve the management problems in actual production

and life, to provide the decision makers with the best options and quantitative scientific basis, so as to achieve the most effective management of the system. The course content not only involves mathematics, computer science, industrial engineering, transportation and business operation and other interdisciplinary fields, but also contains philosophy and social science thoughts in operational research. Therefore, higher requirements are put forward for the implementation of liberal arts and science integrated teaching (National Academies of Sciences, Engineering, & Medicine, 2018) and the cultivation of students' natural humanities literacy. However, in the current curriculum teaching practice, there is a general lack of consistency between the scientific spirit and humanistic spirit demanded by educational reform and the actual implementation, so it is urgent to reshape the teaching model of management operations research based on the concept of the integration of arts and sciences. In addition, against the background of digitalization, major countries such as the United States, the United Kingdom, South Korea and Japan have successively launched education digitalization and informatization policies to promote the upgrading and iteration of their own education and realize the digital transformation of education (Leino Lindell, 2020). As management operations research focuses on applying the theory and thinking of operations research to solve practical management problems and serve management practice, it should make full use of digital and information means such as artificial intelligence, big data, cloud computing and the Internet of Things, focus on improving students' digital literacy, dialectical thinking and innovative consciousness, and comprehensively promote education transformation from the height of national strategy. Based on this, the course teaching and design of management operations research is faced with challenges and reforms, and it has become an inevitable trend to combine digital content, technology and the concept of the integration of arts and science with course teaching.

In view of this, this paper first analyses the existing problems in the teaching of management operations research courses, and then proposes a teaching reform design scheme of "digital interconnection and innovation integration" for new business courses based on the concept of digital empowerment and the integration of arts and sciences. The innovation of this paper is embodied in theory and practice. In theory, it analyses the deficiencies of the digital construction of management operations research curriculum and the content of the integration of arts and sciences, explains and analyses the connotation of the digital transformation of management operations research curriculum teaching and the integration of arts and sciences, so as to enrich the research results in the field of management operations research curriculum teaching reform. In terms of practicality, compared with the traditional teaching mode and the existing teaching reform schemes, the proposed teaching reform design scheme has the advantages of more diversified teaching contents, more flexible learning methods, more remarkable learning effects, more convenient sharing of educational re-

sources and significant improvement of teachers' teaching ability. The research of this paper can provide reference ideas and guiding value for the training of new business talents in the digital age.

2. Present Situation and Problems of Curriculum Teaching

The teaching reform of traditional management operations research has made some achievements, but the digital age should not only meet students' demand for knowledge, but also bring multi-dimensional spiritual experience and ideological sublimation. At the same time, humanistic spirit and scientific spirit are important components of quality education, and also the basic direction that quality teaching attaches importance to the cultivation of students' ability and knowledge imparting. The social and market demand also requires management courses to pay attention to the cultivation of comprehensive quality of arts and sciences. Therefore, the traditional teaching model and method gradually show its shortcomings and need to be improved.

2.1. Teaching Philosophy and Objectives Are Not Clear

In the teaching process of management operations research, it is found that most undergraduates majoring in business administration are liberal arts students, who usually do not have good natural science literacy, but the humanities literacy of liberal arts students is also not high. This phenomenon leads to unclear teaching concepts and objectives of management operations research in management major. There are three main reasons for this. First of all, the current education system focuses on exam-oriented education and neglects the cultivation of students' all-round quality, making students only pay attention to mastering knowledge while ignoring the cultivation of humanistic and scientific literacy in the learning process. Then there is the problem of teachers. Some teachers lack the cultivation of humanistic and scientific literacy, and cannot effectively integrate these qualities into curriculum teaching, leading to unclear teaching concepts and objectives. Finally, there is the problem of teaching methods. Some teachers only pay attention to imparting knowledge, but ignore the cultivation of students' humanistic and scientific qualities, which cannot be effectively integrated into the curriculum teaching, resulting in unclear teaching concepts and objectives. Unclear teaching concepts and objectives will result in the lack of the cultivation dimension of the integration of students' scientific spirit and humanistic spirit, the orientation of talent cultivation pays too much attention to students' ideological and political quality and subject professional knowledge but ignores the cultivation of vocational and professional skills, and the professional training objectives ignore the cultivation objectives of college students' scientific and humanistic spirit. For example, the teaching of management operations research often fails to start from cases and problems, and lacks practice links and independent exploration process, which is very unfavorable to the cultivation of students' innovative spirit. In addition, the teaching concepts and objectives of tra-

ditional management operations research cannot well reflect the digital, networked and intelligent education and intelligent interconnection, and it is still weak in the application of digital technology to enhance the teaching effect, so it is urgent to reshape the teaching concept and teaching objectives based on the digital concept.

2.2. The Teaching Content Is Closed and Backward

In the teaching process of management operations research, there is a general defect of "emphasizing theory over practice", that is, emphasizing explanation of basic mathematical theories and mathematical methods, lacking discipline integration and cross-integration (especially in the field of humanities), lacking application and practical content (especially in the field of application tools and software to solve practical problems), and it is easy to have poor pertinence or too much emphasis on mathematics in teaching. It cannot be planned reasonably according to students' occupational needs and knowledge structure. For example, in the teaching of the chapter on Transportation Problems, many teachers only pay attention to teaching the table-based method of solving transportation problems, but neglect to enlighten students about the connection and application of transportation problems with other disciplines or practical cases: For example, the problems of agricultural land planning and production planning can be transformed into transportation problems to obtain the optimal solution, so that students can not apply the operational research knowledge to solve practical problems in the future work in the field of agriculture and production. In particular, after learning the chapter on transportation problems, students still do not know that order planning of takeout delivery is closely related to transportation problems, which is also the traditional teaching of management operations research cannot be enlightening education by combining theory with practice. Therefore, the courses of management operations research should be oriented towards the cultivation of application innovation ability, and keep up with the characteristics of The Times and the market demand for new digital talents to update and improve the teaching content.

2.3. The Teaching Mode Is Traditional and Unitary

The traditional teaching mode of management operations research is "speaking-listening-recording", that is, teachers only explain knowledge in class, and students only accept knowledge in class. This mode has certain influence on the imparting and accumulation of knowledge, but it is not effective in cultivating students' scientific spirit of seeking truth and humanistic spirit of seeking goodness and beauty. Because the mode of "speaking-listening-recording" simply emphasizes knowledge imparts, but neglects emotional penetration and spiritual cultivation, this process lacks the stimulation of students' emotions and the guidance of students' values, and it is difficult to transform scientific and humanistic spirit into students' inner personality. In addition, the traditional teaching

method lacks the combination of digital channels and rarely uses digital technology for teaching, so it is divorced from the actual needs and practical requirements of digital transformation. Therefore, the teaching of management operations research must realize the transformation from the traditional teacher-centered knowledge imparts to the teaching method combining knowledge imparts with innovation and practice, enhance the interaction and communication between teachers and students, introduce digital theories and methods into the classroom, and mobilize students' thirst for knowledge and creativity in independent learning.

3. Teaching Reform Design of "Digital Interconnection and Innovation Integration"

Based on the concept of digitalization and integration of arts and science, a teaching reform plan of "digital interconnection and innovation integration" is proposed for management operations research. The teaching reform plan is based on the analysis of the learning situation of the school unit: mathematics, management, computer and other basic courses can be applied and sublimated; Lay a solid foundation for courses and practices of management system engineering, enterprise decision simulation, operation management, etc. During science and technology and discipline competitions such as "Challenge Cup" Entrepreneurship Planning Competition, "Internet Plus" Innovation and Entrepreneurship Competition and College Students Mathematical Modelling Competition, competition cases, knowledge modules and research projects are introduced to increase students' innovation and comprehensive practical ability. The following is mainly from teaching objectives and ideas, teaching content and design, and teaching strategies and methods of teaching reform ideas and ideas of management operations research proposed in this paper.

3.1. Teaching Objectives and Concepts

Teaching objectives mainly include four levels: discipline construction level, personnel training level, curriculum teaching level and teacher development level. At the level of discipline construction, the association between intelligent manufacturing, artificial intelligence, digital logistics, Internet of Things, big data and other emerging industries and management majors in new business is studied, the interdisciplinary knowledge map is constructed, the integration of disciplinary resources is promoted and the multi-subject collaboration of industry, university and research is ensured, the degree application and teaching certification are guaranteed, and the "double first-class" construction of business colleges is promoted. At the level of talent training, it is guided by industrial demand and talent market demand, takes moral cultivation as the educational purpose, takes coping with global challenges and changes and shaping comprehensive development of talents as the educational concept, takes inheritance and innovation, crossover and integration, coordination and sharing as the educational approach,

and integrates humanistic feelings of manufacturing power, innovation power and great craftsman. To cultivate innovative applied talents with global vision, who are competent for industrial revolution and global economic integration. At the level of curriculum teaching, it is necessary to update the curriculum system adapted to the digital age, explore the cultivation system of innovation and entrepreneurship ability and practical ability, and carry out the reform of people-oriented teaching methods and teaching modes. At the level of teacher development, it is necessary to improve teachers' digital, information and intelligent level, build a lifelong learning teaching organization conducive to knowledge sharing and knowledge innovation, and promote collaborative innovation of scientific research and teaching.

The teaching concept includes two dimensions of "digital interconnection" and "innovative integration". Digital Internet should first implement digital education, that is, in the digital teaching environment, follow the modern education theory and law, use digital, networked, intelligent teaching resources, with the digital teaching mode to train the innovative consciousness and innovative ability to meet the needs of the new century, interdisciplinary talents teaching activities. Digital Internet also introduces digital industry background, cases and problems into the teaching process, such as digital transportation, digital logistics, intelligent manufacturing, Internet of things and other related industries, to connect classroom teaching with social practice and theory with practice. Finally, digital Internet should integrate humanities and science, pay attention to information interconnection and resource sharing, realize the interconnection of campus, teachers, multimedia and various learning terminals (such as Learning Through, Cloud Class and MOOCs and other platforms), cultivate students' Internet thinking, skills and awareness, teachers and students can discuss problems without barriers and communicate smoothly on social networks. Innovation integration requires the inheritance of innovation spirit, the enhancement of innovation ability and the enlightenment of innovation consciousness in the teaching of management operations research, and the integration development in multiple dimensions: Horizontal integration of management majors, cross-integration of new business and management majors, integration of humanities and natural sciences, integration of online and offline teaching, integration of case teaching (Harling & Akridge, 1998), heuristic teaching, project-driven teaching, OBE-based teaching (Morcke, Dornan, & Eika, 2013) and other teaching methods.

Specifically, based on the above teaching concepts, the teaching objectives of management operations research courses are set, which can be divided into knowledge objectives, ability objectives and value objectives. Knowledge objectives include: clarifying the knowledge system and methodology of operations research, understanding the comprehensibility of operations research across disciplines, mastering the basic concepts, principles, models and solution methods of linear programming, objective programming, integer programming, dynamic programming, graphs and networks, game theory, decision theory and other branches,

and being able to apply computer software to solve operations research models. The ability goal requires students to closely relate to the application scenarios in industrial production, transportation, economic management and systems engineering, and improve the methods, techniques and abilities of quantitative analysis, overall optimization, system analysis and scientific decision-making. The value goal is to cultivate students' overall awareness, strategic vision and interdisciplinary thinking, improve their ability to discover, analyze and solve problems, cultivate innovation awareness and strengthen information literacy, and adapt to the development trend of new scientific and technological revolution and industrial revolution. It serves national and regional development strategies such as industrial digitalization, intelligent manufacturing, modern service industry, new retail and e-commerce industries.

3.2. Teaching Content and Design

Digital revolution and the concept of integration of arts and science have challenged the existing knowledge system of management operations research, and in the process of quality teaching reform, the teaching content of management operations research has also put forward higher requirements. In this context, teachers need to constantly update, expand or even overturn the previously established knowledge system, and constantly incorporate new management and operational research knowledge to meet the needs of The Times and talents. Specifically, it includes the update of multimedia courseware, the update of question bank and the update of case bank, among which the case bank needs to be newly added to the digital economy, philosophy and social sciences, systems engineering, discipline competition and science and technology frontier and other fields of classic cases. In addition, a variety of online resources, such as MOOC platforms (Dang & Xue, 2020), micro-class videos, Learning Through and WeChat public accounts, should be utilized to improve teaching effectiveness and supplement students' knowledge. Finally, it advocates the requirements of the intelligent age and teaches students to solve practical problems using operational research computing software tools, such as Excel, WinQSB, Lingo and MATLAB.

Instructional design frameworks can usually be divided into four layers. The top layer is the teaching target layer, which aims to achieve the digital ability, innovation and entrepreneurship ability, management practice ability and new business requirements. The second layer is the teaching reasoning layer, including OBE concept, AACSB certification oriented (Dumond & Johnson, 2013), arts and science cross integration concept, wisdom education concept and knowledge management concept; The third layer is the offline implementation layer, that is, teachers adopt a variety of teaching methods (such as case teaching, heuristic teaching, etc.) based on scientific and reasonable teaching models (such as divided classroom, flipped classroom, etc.) to realize diversified and humanized teaching. The bottom layer is the online resource layer, which reflects digitaliza-

tion and Internet, including mobile learning terminals, MOOCs, micro courses, public accounts, etc.

Taking "Transportation problem and its Mathematical model" chapter teaching as an example. First of all, the teaching background is clear: transportation is to change the spatial location of goods to create its place utility, which is an indispensable and important link in logistics activities. With the development of society and economy, transportation becomes more and more complex. Scientific organization of transportation activities can effectively reduce logistics costs. Therefore, transportation problems are particularly important. Then it analyses the learning situation, including the teaching objects: the second-year undergraduate students majoring in business administration; Student Foundation: proficient in linear programming; Student Needs: How are transportation problems modelled and solved? The following teaching objectives are set, including knowledge objectives: master the mathematical model and the characteristics of the solution of the production-marketing balanced transportation problem, master the characteristics of the model and the characteristics of the solution of the transportation problem; Ability goal: train students' understanding and analysis ability of pure mathematical calculation; Quality goal: to cultivate the spirit of scientific exploration and rigorous mathematical thinking. Secondly, let students understand the key points and difficulties of this section. The key points of knowledge include: mathematical model of production and marketing balance transportation problem and the characteristics of its solution; the difficult points are: model characteristics of transportation problem and the characteristics of reconciliation. Then design the teaching methods and ideas, prepare the teaching content, and implement the teaching process through information means, which will be detailed in the next section. The last part is classroom teaching, including pre-class check-in, introduction, pre-school test, learning content, post-school test and summary. It can also set up extracurricular communication and discussion links, such as teachers assigning homework and answering questions, and students discussing and communicating with teachers and completing homework. In addition, teaching evaluation and summary is essential, which is helpful to improve teaching effect and improve teaching efficiency.

3.3. Teaching Strategies and Methods

Under the background of the current digital era, the fundamental purpose of digital network teaching system design and teaching reform for management operations research is to better train modern talents and improve students' comprehensive ability in management and operations research. With the help of network technology, media technology and digital technology, teachers and students can better collect learning materials and expand course resources, further enrich the learning content of management operations research, so as to adapt to the actual needs of the current society and posts. In addition, under the teaching mode of large class, there are dozens of students in one class, so the teacher cannot

know the learning situation of each individual student. Teachers post learning tasks and content on relevant platforms to monitor students' learning. The application of digitalization in teaching has been effective, but it needs to be developed in depth. By using these cloud platforms to create an environment for autonomous learning, teachers become a guide, and students can learn theoretical knowledge not covered in teaching on the premise of completing the tasks arranged by learning. In addition, through the current online teaching and online homework acceptance, teachers can more specifically understand each student's learning characteristics and learning deficiencies, and adopt targeted teaching strategies to improve students' learning level. This can not only greatly meet the needs of diversified learning subjects in the class, but also make the learning of management operations research more personalized.

Taking "Transportation Problem and its Mathematical Model" chapter teaching for example. Teaching means include: multimedia courseware, the use of learning course function and blackboard writing; Teaching resources include: learning general teaching video, online test question bank and online question answering group, and network digital courses: online question bank and self-test. The teaching method is mainly to use multimedia courseware demonstration in the classroom, and adopt the teaching method combining enlightening and guiding style with teaching method. It focuses on explaining the mathematical model of transportation problems and the characteristics of the solution of transportation problems. It also uses specific cases to explain in detail to help students deepen their understanding. The teaching design ideas can be as follows: First, the question: What is the transportation problem? What are the characteristics and functions of transportation problems in real life? Secondly, model building: according to the general formulation of transportation problems, analysis and establishment of mathematical planning model; Then the observation model: observe the characteristics of each parameter of the transportation model, excavate the characteristics of the solution of the transportation problem; Finally, the conclusion is made to prepare for the next study. In addition, in the pre-class preview, teachers can carry out the following activities: Use QQ, WeChat and other platforms to send preview notices, publish course materials, upload courseware, urge students to preview, browse students' after-class discussion and homework self-test published in the last class, and take snapshots of representative students' questions for class comments and timely check students' responses to preview questions. Preview, and do preview test questions in advance, to see how they do. The above are examples of teaching strategies and methods of diversification, individuation, digitization, informatization and integration of arts and sciences.

4. Conclusion

At present, the traditional teaching mode of management operations research can no longer meet the needs of the digital age. There are some problems in the

course, such as unclear teaching concept and goal, closed teaching content and lagging teaching mode. Under the background of digital age, the teaching reform of management operations research is imperative. Based on the background of digital era and the concept of integration of arts and sciences, this paper analyses the deficiencies of digital construction and integration of arts and sciences in current management operations research courses from three aspects: teaching objectives and ideas, teaching content and teaching mode, and then puts forward the teaching reform design of "digital interconnection and innovative integration". Thus, the teaching objectives, contents and modes of digital transformation of management operations research courses and the integration effect of arts and sciences are enhanced and perfected. The teaching reform plan of management operations research proposed in this paper not only attaches importance to the cross-integration of liberal arts and science disciplines and multi-disciplines, but also guides students to use theoretical tools to exert their decision-making and analysis ability and carry out diversified application and practice, so that students can better adapt to the training mode of management majors in the digital age to become a skilled use of digital technology and creative business talent.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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