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Exploration and Design of "Flipped Classroom" in the Teaching of Operations Research in the Background of "Internet +"

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Abstract. In the background of "Internet +" strategy, flipped classroom which is a new teaching mode has gradually risen. As a teaching mode combined with class and extracurricular, flipped classroom overturns the traditional teaching mode which is mainly taught by teachers. Flipped classroom provides a new direction for exploration and practice of teaching reform. Operations research is a practical and applied discipline, which aims to cultivate applied and innovative talents. The paper explores the necessity of introducing flipped classroom to operations research, and designs flipped classroom teaching mode which is suitable for operations research, in order to provide reference for teaching reform of other management courses.

Introduction

As an important basic course of management specialty, Operational Research occupies an important position in management discipline and modern management methods. It relies on mathematical methods to construct mathematical models to realize the optimization and overall management of various problems, Help decision-makers make the best decision-making, with strong practicality and applicability. At present, the research and practice of OCR course have obtained some achievements, but there are still some outstanding problems in teaching, such as the contradiction between "more content" and "less teaching hours", the model-driven dominance and the actual life There are some problems with derailment and the enthusiasm of learning operations research is not high. Therefore, in order to optimize the curriculum system, change the traditional model-driven teaching mode, arouse the enthusiasm of students and cultivate students' ability to solve practical problems, it is urgent to explore a new teaching mode. Since 2015, "Internet +" has been put forward for the first time in the government work report and has been incorporated into the national development strategy. The Internet is rapidly integrating with various traditional industries and gradually transforming, upgrading and innovating in all walks of life. In the integration of the Internet with many traditional industries, "Internet + Education" is a model that continues to drive the reform and innovation of traditional educational models [1]. Flip classroom is a new teaching mode that subverts traditional teaching and learning in classroom. This teaching mode conforms to the goals and requirements of online education in "Internet + Education", which provides the direction for the transformation of traditional education. Therefore, in this paper, this teaching mode of flip classroom changes the traditional model-driven teaching mode in OCR course and changes the inherent teaching and learning style in classroom. Teachers and students can stimulate students' learning enthusiasm through the interaction and exchange in flip classroom, While cultivating and enhancing the enthusiasm and ability of students to independently study and solve problems independently, teachers' teaching practice ability is also improved, which brings new directions and new ideas for the teaching reform of various specialized courses in management.

Flip the Meaning of Classroom Teaching Mode

Flipped Classroom, also known as "Upside Down Classroom" or "Reversal Classroom," is a new teaching mode [2] that originated in Woodland Park High School in Colorado, USA. Scholars think

that "information transfer" and "knowledge internalization" are two stages of the traditional teaching mode. The former refers to the teacher's lectures in class, and the latter refers to the students' learning[1] and digestion after class. Therefore, the former is the main body of the teacher, fewer students involved in the interaction; the latter is the main student, the lack of teacher guidance and help. To some extent, this traditional model poses a barrier to teaching. Teachers in class only teach according to their own thinking. After class students often encounter various problems and lost their motivation to learn, and even frustration. In view of this, flip the classroom teaching model to teachers and students "teaching" and "learning" process has been redesigned. "Information transfer" is changed from class teacher to class student preview, that is, students through the network courses or network handouts provided by teachers in the class before the upcoming knowledge points to carry out self-learning and learning process arising from the question or Difficulties are passed to the teacher through the online platform. "Internalization of Knowledge" is changed from self-digestion after class to communication and interaction between teachers and students in class and between students and students. During the interactive process, teachers can give specific answers and guidance to the questions and difficulties collected At the same time, the interaction between students further deepens students' understanding and absorption of knowledge [3-4]. To sum up, turning the classroom into teaching video as an adjunct to change the traditional teaching process, and promote the "teacher-centered" to "teachers and students" change.

The Necessity of Introducing Overturned Classroom Teaching Mode in Operations Research Curriculum

At present, the content of the operation research course does not match with the class time. Most undergraduate colleges offer only 48-56 hours of operation research courses, which are far from enough to finish many branches and classical methods of operations research. Therefore, most teachers will be based on different professional content of the course cut and elect election to Dalian University of Technology, for example, logistics management professional operations research courses for 48 hours, only opted for linear operations planning research, transport Problem, integer programming, graph and network model, storage theory, game theory and decision analysis. In addition, the OR teaching methods are still dominated by "Injecting" and "Model Driven". The characteristic of the "Injecting" teaching method is that teachers are mainly "teaching" and "speaking" in the process of teaching and seldom "ask", and the designed problems are often based on teaching materials and syllabus, Talk about the content and actual problems, from reality. From the student's point of view, "Injected" teaching method makes the students mainly "passive acceptance", in the classroom are often passively follow the teacher's ideas to listen, answer, rarely "active and independent thinking", lack of learning Initiative and enthusiasm, so that this teaching cannot be for students to build a platform for independent thinking and problem solving. The "model-driven" teaching method leads students not to combine with the actual problems after constructing the model according to the methods in the teachers and textbooks. When they encounter practical problems, they still feel that they cannot start. The study of the model only stays in the theory Level, the lack of application capacity, which in turn may form the concept of useless operations research methods, reducing student interest in learning. The constant use of these traditional teaching methods can lead to the loss of students' ability to innovate, their initiative, and their ability to solve practical problems. Operational research has become the core course of current management specialty, aimed at students to turn mathematical problems common in life into mathematical models, and through the construction of mathematical models to find the best way to solve practical problems and the optimal path. The teaching practice in the past tells us that it is difficult for students to master the essence of operational research alone by the traditional teaching mode, not to mention the cultivation of applied and innovative talents. The flip classroom teaching mode pays more attention to students in the process of learning the dominant position and autonomy. Before class, the students preview the

course through online courses or instructional videos provided by the teachers to learn some theoretical knowledge and meanwhile, they will give feedback to the teachers before or during the classes. Class teachers focused on the explanation, and through the depth of exchange and discussion between teachers and students to solve the problems encountered. This teaching model enhances students' self-learning ability and changes the roles of teachers and students. Teachers are no longer just the teacher of the course. Targeted explanations and interactions make teachers become the guides and confusion of students. This role change allows teachers to improve teaching methods and methods to provide more space, but also allow students to truly become the subject of this teaching model.

The Design of Flip Classroom Teaching Mode in Operations Research Course under the Background of "Internet +"

Flip class has transformed the inherent mode of teaching and learning in traditional classrooms and is in line with the new requirements of the implementation of the "Internet +" strategic plan. It combines the flip class with the strategy of "Internet +" in order to achieve the transformation and optimization of the traditional educational mode of operations research. The design of overthrow classroom teaching mode under the background of "Internet +" will enhance the ability of students to analyze and solve practical problems as their ultimate goal. Using Internet tools such as WeChat, WeChat and QQ as teaching resources, Internal knowledge in class and feedback after class three processes as the core link. In the course of pre-school knowledge transfer, teachers should first modularize teaching tasks according to the teaching syllabus, make teaching materials such as micro-class, and then establish a public platform through WeChat to share learning materials such as micro-courses to students and students to release Learning materials to learn their own theoretical knowledge, which in fact adjust the transfer of knowledge and knowledge of the order of knowledge transfer process of knowledge in front of the class rather than in the classroom; knowledge in the class of internalization, no longer teachers But mainly focus on teachers' answering questions, and increase teaching cases such as actual case analysis and students' classroom display, cultivate students' ability of combining theory with practice, and truly master the application of knowledge and model instead of staying at the theoretical level In feedback links after class, students 'feedback, consolidating knowledge and teachers' reflection are the main topics. In the course of knowledge transfer and after-school feedback reflection, students can use the WeChat, QQ and other Internet tools to communicate, exchange and evaluate. Visible, flip the classroom no longer use the traditional theory to the theory of teaching mode, but in the theoretical teaching to add some students practice and self-learning process, and fully stimulate the enthusiasm of students active learning, which help students master operations research Mold skills and theoretical knowledge, and eventually applied to the actual decision-making problems. Specific design and implementation are as follows:

Pre-class Knowledge Transfer Session

(1) Teachers to modularize the teaching task based on the syllabus and record the video of the micro-class. First of all, we break the teaching task system based on the establishment of the basic model in the operation research course. Taking the decision-making cases in the actual enterprise as the starting point, the operation research course is divided into six modules according to the operation research syllabus: mathematical programming, Theory, Storage Theory, Queuing Theory, Game Theory, Decision Analysis. Then, each teaching task module is further decomposed. For example, the math planning section is further decomposed into sub-modules such as linear programming, integer programming, transportation problems, dynamic programming and target programming. Then each sub-module tasks more detailed design of micro-tasks, including learning topics, learning objectives and requirements, learning priorities and difficulties, learning content, constructive learning resources, exercises and so on. For each sub-module in the micro-tasks, collect and organize teaching material, micro-video tutorials. In order to enable students to successfully complete autonomous

learning, micro-video content design, time control, recording and other aspects of the design is the need to focus on the issue. First of all, the content of micro-video should mainly focus on the key teaching contents in micro-task, avoid the theoretical knowledge of excessive esoteric and difficult-to-derive formula derivation, but at the same time it should design some challenging tasks to stimulate students' enthusiasm for learning and learn after the sense of accomplishment. Second, we should control the time of micro-video, try to control the time within 15 minutes, so a basic length of time to ensure that students are in a more focused state of mind. Again, the production of micro-video video is generally used for video recording and recording two. The use of camera in this way, you can make micro-class video in the sound and images have a good effect, and can demonstrate the teacher to explain the process and interaction with students. However, the screen recording also has some advantages, such as lower cost, higher speed, easier to make, can present a detailed study content. So when the theoretical content of learning is strong, and easy to understand, the use of video recording mode to make micro-video. In addition, teachers can also access instructional videos through "love courses" and other channels, making full use of the excellent teaching resources in the network. Finally, interactive links should be added at the end of the video, such as the preparation of exercises with moderate difficulty, the cases to be discussed in the classroom, etc. to motivate students to complete the video learning of the microchips.

(2) Teachers to establish WeChat public number, the micro-curriculum and other learning materials passed to the students. WeChat has the function of establishing a public number. The public number has two types of subscription number and service number, and can transmit information and interact with each other in the form of video, picture, voice, text, and the like. Teachers through the registration, activation, registration, fill in the information and other processes to establish a can release a message every 24 hours WeChat public account, set as operational research. Then the WeChat public account name operational research and two-dimensional code issued to students to guide students concerned about the WeChat public number. Finally, according to the teaching progress, the pre-made good micro-curriculum and other learning materials published in the WeChat public number. In addition, in order to mobilize students' interest and enthusiasm for learning, some lectures, expert blogs and actual cases should also be regularly released to regularly update and maintain public numbers.

(3) Students learn the learning materials released by their own teachers. Before class, students design their own learning plans based on the learning materials published by WeChat account. For example, study time, study duration, study location, number of study and so on are all under the control of their own students so as to improve students' autonomous learning ability. In the process of learning, students should keep record of the difficult points and doubtful points at any time, actively practice the exercises in video and teaching materials of micro-courses, and deepen the memory and consolidation of knowledge points. In addition, students can use the WeChat public number to record the doubts and questions in the exercises and timely feedback to teachers so that their queries can be promptly solved. In addition, students can take the initiative to exchange and share their learning experiences with other students.

The Course of Knowledge Internalization

The internalization of knowledge in class is based on the prior knowledge and self-learning of students. When the students conduct self-study before the class, students will understand and master some basic knowledge and theory, which actually puts forward higher requirements on teachers' performance in the course of knowledge internalization. Teachers need to expand and expand the basic knowledge that students have mastered, to analyze the key points and difficulties in teaching content to students in depth, and to organize and solve the difficult problems raised in the process of students' autonomous learning in time so as to diversify classroom activities as much as possible Arrangements and design, such as group discussion cases, cooperative practice, learning experience sharing and other activities, students in collective counseling, but also individual guidance of individual students, reflecting the essence of individualized teaching. Finally, teachers should

systematically summarize and summarize the knowledge system, the model structure and the key difficulties of the whole class in the classroom so that the students form a clear knowledge and focus on the direction.

After-school Feedback Reflection Link

Feedback and reflection after class is the last phase of turning the classroom upside down. During this period, teachers evaluate the whole course according to the situation of students' self-learning, the completion of the exercises and the status of problem feedback. In the evaluation process, it is necessary to reflect the fairness and diversity, and the main way to take incentives. In addition, teachers should give timely feedback and answers to the questions raised by students during the self-study process and the completion of the practice. After each teaching task is completed, teachers should organize students to summarize and share their learning experiences while continuing to reflect on the problems and shortcomings in the teaching process, to find ways to make micro-curriculum video production more perfect and to optimize teaching programs , Constantly updated and added teaching content.

Conclusion

In this paper, "Internet +" and flip classroom combined to enhance students' ability to analyze and solve practical problems as the teaching resources, pre-class knowledge, class internalization of knowledge and After-school feedback to reflect on the three processes as the core link, the operation mode of teaching design. By adopting the teaching mode of overturning classrooms, the teaching mode of operational research gradually changed from the traditional teachers' class teaching to the pre-school students' self-study, the deepening of class knowledge and the feedback after class, which effectively improved the students' Learning initiative and enthusiasm, is conducive to student self-learning ability, self-control ability, independent thinking ability, practical ability and other aspects of capacity-building and promotion, and promote students to enhance all aspects. At the same time, it also promotes teachers' self-teaching ability and professional construction and development. It can effectively solve such problems as the contradiction between "more content" and "less class hours", the leading of the model and the derailment of the practical problems, the efficiency of teaching and Quality can be effectively improved. In the context of "Internet +", the new teaching mode of overturning classroom will gradually become mature and widely used, providing new ideas for teaching reform of management major courses.

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