Discussion on the Reform of Operations Research Teaching and Multimedia Courseware Making

CHEN Junfei, HU Zhenyun
Business School, Hohai University, P.R.China, 210098
chenjunfei@hhu.edu.cn

Abstract: Operational Research(OR) is an application science which is widely used in every field of social and economic production. The present existing problem of OR teaching is analyzed. The function design, branch module content, production process and some problem which should be paid attention to the operational research multimedia teaching courseware are discussed in this paper. Some revelation of OR CAI teaching is introduced according to authors teaching practice.

Keywords: Operational Research (OR), CAI Courseware, Teaching Reform

1 Introduction

OR is an application mathematics science, it can provides scientific basis for decision making through arranging human, financial, and material resources through analytical, experimental and quantitative method in economic management system. It is one of powerful tool of modern management, widely used in production management, engineering, military operations, scientific experiments, financial and economic and social sciences. OR is a main course in economic and management majors for undergraduates. It has an important practical significance of teaching to do OR for the university, which is regarded as the main positions to do theoretical research and talent education. However, the subject has not been good development and application for a long time because of the theory and application out of line. The methods and means of teaching are relatively backward so that most of the current OR teaching is still the traditional classroom teaching way with "a lesson plan, a piece of chalk, a blackboard", explaining the course content frankly, working on mathematical reasoning systematically and rigorously, teaching smart problem-solving skills, so at the beginning students who feel it very deep and difficult are located in the passive position of learning. Although students can master the problem-solving skills of some models by this way of teaching, but abstract ability and practical ability of OR is generally low. This causes the application situation is not satisfactory, although people have received a lot of OR education in China.

With the development of information technology, computer multimedia technology which is used in teaching has become a hot spot of reform, and CAI has become one of the essential means of teaching. Multimedia network teaching is teaching activities based on computer network. In the teaching process, according to the characteristics of teaching goals and teaching targets, through teaching design, selecting and using modern teaching media reasonably, and combining with traditional teaching means, participating in the whole process of teaching, using multi-media information to students to form rational structure of the teaching process, in order to achieve the most optimal teaching effect. Through the map, text, sound, animation and other media to communicate with students, teachers put the abstract content into visual forms of expression with multi-media courseware. On the one hand, students can easily understand and accept, improving teaching quality; On the other hand, students actively involved in teaching, played consciousness, and trained the capacity of autonomous learning by interactively type multimedia teaching courseware. With the development of higher education, the schools' teaching environment and facilities have been changed a lot in recent years. In this new situation, a new topic which is placed in front of schools and teachers is how to make multi-media courseware for teaching and use appropriate teaching means to improve the quality of teaching effectively. Through many years of reform and construction of teaching. OR courses received encouraging results in business school of Hohai University. OR CAI courseware got good courseware award in Jiangsu Province in 2002 and the course of OR received the title of Excellent course of Jiangsu Province in 2004. Now CAI courseware system has been applied in teaching, realizing the modernization of teaching means and methods.
improving the teaching effect.

2 OR CAI Courseware Content and Module Design

OR courses have many characteristics, such as interdisciplinary nature, widely used, technology of application model and multi-branch. In recent years, the author combines the characteristics and details of course in practical teaching and has made multi-media teaching courseware of OR which applied in teaching. The teaching effect is very well. Now we will explain the design, production and application of OR multi-media courseware.

2.1 Design of courseware function

Multi-media courseware of OR helps teachers to use modern multi-media technology and traditional teaching methods to organize teaching. According to the characteristics of OR courses, the multi-media courseware should have the following main functions: First, based on WINDOWS platform to develop, multi-media and window technology is used to collect text, graphics, images, sounds, music, animation, color, video images and other multi-media information. Therefore, ability and rapid information processing can play the role of multi-media technology to provide realistic performance results for teaching. So, boring abstract learning can be become into interesting and attractive, and the courseware has a good user interface; Second, covering the syllabus content required to facilitate teaching and demonstration in class; Third, enriching the content of case teaching to improve teaching effect, which can play a helpful way to help students master methods of OR; Fourth, it is easy for students to review lecture content and self learning; (5) having the better expansion function.

2.2 Content of OR CAI courseware

According to the situation of OR courses in Business School of Hohai University, the multimedia courseware of OR includes the five major subsystems of teaching presentation subsystem, case teaching subsystem, tutor and answer subsystem, mock examination and self-test subsystem and the computing software subsystem. Each module is divided into branches of mathematical models, solution methods, application example, solution methods with computer, exercises and other sub-modules.

(1) Teaching presentation subsystem. Including eight parts, they are introduction to OR, linear programming, transportation problems, integer programming, goal programming, dynamic programming, graph theory and its applications, network planning. Each part includes the theory, methods and examples. Difficult to make it clear for classroom teaching, it can make clear by visualize model and dynamic icon which has given by courseware. For some questions of these chapters, such as graphic solving method of linear programming, the shortest path problem, the max-flow problem, the key route network planning and optimization problems, they are carried out animation. In the same time, some content has been dubbed, intuitive visualization of the teaching can guide students creative thinking activities.

(2) Case teaching subsystem. Each chapter includes typical cases and a large number of actual cases which are collected from journals. Though the analysis and solution of the typical case, the students can master the basic theory and modeling techniques, and the actual cases which collected from journal can educate their abilities of analysis problem and problem-solving systematically.

(3) Tutor and answer subsystem. The main contents include each chapter’s key, difficult, the degree of grasp and notes, and the links between the chapters, tutoring and answering the key problems of every chapter. Set the focus of study, the basic requirements of learning, guide the students to study by themselves, then, training self-learning ability of the students through the system.

(4) Mock examination and self-test subsystem. Mainly include choice module, fill in the blank module, modeling module title, the math module. The selected topics covered by the knowledge of each chapter’s points, ease of integration. It can score the marks and give the right answer in choice module. The fill in the blank module, modeling module title, the math module give reference answers. Not only the students can self-examination through this subsystem, and also the teachers can know much better
about the situation of their students’ mastery of the knowledge.

(5) Computing software subsystem. Many practical applications are very complex, which will affect students’ interest in learning directly. We have arranged a teaching curriculum link, and to guide students in course design, we have prepared the planning books of OR course design. Through this link, students can grasp the OR software quickly and can be applied to solve OR model skillfully. This inspires their interest in learning and can promoting the students to think and explore consciously. They acquire knowledge from further theoretical and practical lessons, developing their ability of thinking, and innovation ability.

3 The Revelation of OR CAI Teaching

OR CAI courseware is a new teaching method, it will be an important form of education in information society. So, we should pay attention to the development and application of OR CAI.

(1) Selection the software tools rationally. There are many software tools for developing multimedia courseware currently, frequently-used including Director, Authorware, Flash, PowerPoint and other software. Teachers can choose the software tool according to their own advantages and the characteristics of the course, make the courseware more characteristic. This OR multimedia courseware is produced by Authorware, Authorware has a graphical user interface, a variety of icon tools, and a good debugging environment. It is very easy to learn. We can easily use Authorware to create the branch modules, make a presentation document and finally packaged install the software.

(2) Highlight the focus of teaching content. During the production of multimedia courseware, we can not print on the screen directly which should be written on the blackboard or the book’s, but we should combine the characteristics of the course, accordance with the teaching laws, with layers of progressive principles, divide the content into several parts from simple to complex, and make sure that the explain of teachers’ synchronization with the screen display. During the production of courseware, as long as help the students to have a better understanding, the content about these elements should be included in the courseware, present them in the classroom directly or product these elements into a file for reference when necessary. Certainly, it needs to pay attention that the purpose of them is to illustrate the problem whether pictures or animations. We should not pursuit the multimedia effects too much and neglect the main content. One of the main characteristics of the OR course is the technology of mode using, so it must highlight the status of building the mathematical model in the courseware, and stress the importance of analysis the problem with multimedia technology. In the courseware, demonstrate the process of modeling should be selected according to specific issues in different ways, make the students understand and accept the process of modeling more easily, and then, improve the teaching effect.

(3) OR is a practical science. The students of economics and management learn OR to be practical, and to solve a number of practical problems in the production and operation management. Through the use of cases of teaching subsystem in OR, it can improve the students’ ability in analyzing and solving practical problems. In OR courseware, we can set the computer sub-module to solving problems, so that we can use the effective software to solve specific problems.

(4) The exercise of OR are more complex, larger calculation and it is often difficult to quantify. Arranged too much excises will burden on students and the teacher also takes those difficult. Arranged less excises, it is difficult to enable students to consolidate the knowledge. In recent years, computers were used to students’ practice through the use of self-test subsystem in OR. It is not only convenient to test themselves to understand their own weaknesses, but also to make teachers to standardized test students’ situation and adjust teaching progress.

4 Conclusion

OR is a professional foundation course which has strongly theoretical and practical. If we want to achieve good teaching effect, it is necessary for us to implement teaching reform and improve teaching methods. The existing problems in OR teaching process are analyzed and the OR multi-media teaching courseware making is discussed. The multimedia teaching reforms the traditional teaching mode. In
multimedia teaching, teachers spend the less time to write and have enough time to communicate with students. So it can arouse the students' interest in learning and improves the teaching effect.

References