

A new teaching mode for production and operation management using case practices and ERP sandbox simulation experiments

Tinggui Chen

Zhejiang Gongshang University
Hangzhou, Zhejiang, People's Republic of China

ABSTRACT: In light of a course being held on production operation management, the new teaching mode for production and operation management, combined with case study practices and enterprise resource planning (ERP) sandbox simulation experiments, is presented in this article. There is an exhaustive implementation procedure outlined and a further discussion on the outcomes included. The simulation results demonstrate that this new teaching mode may further improve students' enthusiasm and their recognition of this course's importance.

INTRODUCTION

The production and operational management course requires a strong practical background and experience. During teaching, it is common for teachers to experience difficulty and it is equally difficult for students to learn [1]. With the increased understanding of production and operation management, its influence has been extended from the management of manufacturing enterprises to the management of all enterprises. Production and operation management has become a mature research field to which this course contributes a sound theoretical basis. However, this course requires a link between theory and practice.

The traditional teaching mode is teacher-oriented, which usually makes the contents of the course bland and its difficulty results in students losing interest and confidence, and some give up on the subject. As a result, a more innovative teaching method and teaching mode is required to address such an urgent problem [2]. The purpose of the author in presenting this article is to reform the teaching of production and operation management based upon the author's teaching experience, case studies and enterprise resource planning (ERP) sandbox simulation experiments.

BACKGROUND AND DEFICIENCIES IN TEACHING

Production is the most basic of human activities and is the source of wealth. Improving productive efficiency is the main way for enterprises to improve competitiveness and profit. A production management course is one of the core courses of undergraduate business administration majors [3]. Because students do not have an understanding of production operation management, they generally regard the course as abstract and not easy to understand, resulting in a lack of enthusiasm [4]. A more innovative teaching method and teaching model provides an alternative to such an urgent problem. These are the current problems in teaching the course:

- Teaching methods lack flexibility. The traditional teaching mode is teacher-oriented in which teachers explain the contents of a textbook to students. The merit of this mode lies in the effectiveness of the teacher's leading role in organising and managing the classroom. Nevertheless, the main flaw of this mode is the passivity of students. This teaching mode focuses on theory and concepts but neglects the exploitation of a student's learning potential. Students lack learning autonomy, making it difficult to obtain ideal teaching efficiency.
- Separation between theory and practice. Production and operation management is a practical subject. Before studying this course, students may lack knowledge about enterprise production and operation management if they have not visited enterprises. This may also affect the student's understanding of management theory. Students mainly receive theoretical knowledge from teachers, which may result in a loss of enthusiasm. This teaching method with its lack of practical background can reduce students' interest.

- Singular assessment: the examination is an important part of teaching. The examination determines the student's learning and reveals deficiencies in the teaching process. At present, most colleges' and universities' assessment of operation management are mainly the final grades produced from test scores plus a lesser proportion of attendance scores. The attendance scores measure participation, lecture attendance and assignments. The examination is the main criterion for judging the student. The examination is closed and written. The topic distribution is more objective and less subjective. The objective questions test the student's knowledge and memory but not the quality and ability of the students. All in all it is necessary to reform this course.

REFORM CONTENT

It is necessary to set clear programme and teaching objectives to foster high-quality professional talent with employability as the priority. *Problem orientation* is the main teaching method emphasising professional ability. The curriculum is structured on the basis of tasks associated with this position. The teaching is based on realistic situations. The practical course in production and operation management has three aspects: case studies, project and specialist seminars, and the ERP sandbox [5]. The reform content includes the following:

- Reform of the curriculum and relationship to the manufacturing and services industry: in teaching, all kinds of methods and practices should be used to encourage students to find, analyse and solve problems and, at the same time, motivate their learning, initiative, independence and creativeness. The reformed curriculum takes the practical application ability of students as a main objective. Therefore, it is necessary to integrate into the teaching the contents of operation management of the manufacturing and services industries.
- Combination of case teaching, project teaching and specialist seminars: the course of production and operation management has practical, case study and project based elements. Modern enterprises have many efficient management and production methods that may be studied. Teachers should select some representative enterprises to study their production and operation management methods. This will enhance the interest of students and their ability to solve practical problems.
- The application of the ERP sandbox in the teaching of production operation management: with the ERP sandbox teaching tool, students develop an understanding of the behaviour of an enterprise with limited resources in an unstable dynamic environment. This helps them to have a deep insight into the importance of making long- and short-term quantitative forecasting decisions. The teaching content covers the following aspects: plant site selection, layout, design, production process and production line design, and work measurement; demand management and demand forecasting; production planning, production planning and control; manufacturing resource planning, material management and production process quality management. The students develop a more profound knowledge and understanding of production operation and management.

REFORM DETAILS

The following relate to the three aspects of reform mentioned above.

Curriculum teaching content :

- Textbooks: the textbook content for production and operation management should be changed, from an emphasis on the manufacturing industry to the services industry. In teaching, instructors should use the original textbooks, as well as some service operation management material. For example, when the author teaches product development and technology, six student teams are required to carry out a service development. Specifically, they are required to do a feasibility demonstration, a structured design process of the service and to explore the main difficulties in the service development. Usually, students are very interested in doing this and all the teams have established an on-line store on the Taobao network (Taobao is the biggest C2C shopping Web site in China). Their working projects range from second-hand books to old clothing. After a few weeks, students solve all the operational problems. In doing so, they realise what needs to be studied.
- Understanding production and operation management in the manufacturing industry: because students do not have knowledge of manufacturing enterprises, the author plays steel production and automobile production videos to acquaint students with manufacturing production. When teaching some chapters of the textbook, the author uses Excel to simplify the computational process.
- Understanding the service industry: students often, as part of their daily lives, take part in the operation of the service industry and have a thirst for knowledge about the operation of the service industry. For instance, when teaching facility location and layout, the author lets students select a facility and, then, analyse its location and layout. In doing so, students can learn to meet practical needs and their learning may also be improved.

Combination of case teaching, project teaching and specialist seminars:

- Suitable cases are required for case teaching. Generally, selected cases should not be too long or short, and should be concise. In addition, typical and practical cases are more popular with students.
- Project teaching is used to develop a student's practical operational ability. Project teaching is practice-oriented with the teacher as the leader and the student as the subject; teaching is carried out through undertaking a complete

project by teachers and students. Selected projects should be practical and professionally significant. Furthermore, the complexity of projects should be moderate with the aim of cultivating a student's enthusiasm. Students may select a familiar bookstore, convenience store, restaurant, and so on as an objective, and analyse the advantages and disadvantages of a particular location according to its geographic position, transportation, visitor flow rate and the competition. Through such a project, the theory about facility location is understood and mastered, but also students' abilities to analyse and solve problems are improved.

- For some material connected with enterprise development, scholars, entrepreneurs and engineers could be invited into the classroom. Their work experience, combined with concrete enterprise examples, would enable students to understand production and operation. In doing so the students can see theory converted into practice. Compared with teachers, these enterprise scholars have more experience and may leave a more profound impression on students; for example, when teaching new product design and development, field management and improvement, business process re-engineering, quality management, and so on.

The application of the ERP sandbox in the teaching of production operation management:

- ERP sandbox teaching cultivates the students' ability to combine theory with practice. The teaching emphasises the framework of knowledge from an overall perspective. It helps students to understand the relationship between enterprise production control management and other management activities. When students transition from theory to practice and, then, back to theory, they are able to fully understand the importance of strategic management, production planning and material requirement planning, demand management and demand forecasting, and comprehensive management. They would learn to make production plans according to specific requirements; learn to master the best purchasing model; learn how inventory management is used to meet market demand.

When they engage in wholesale production planning, they can grasp the best opportunity to maximise profits and benefits. The traditional method of learning should change to cultivate students' understanding. In the enterprise business strategy, students simulate supply chain management in an enterprise, which involves each student only doing their own part but co-operating across the enterprise. Regarding production management, ERP sandbox teaching crosses the professional divisions and departmental barriers, combining procurement management and quality management into production management. In the face of new product development, materials procurement, production and operation management, brand building and problem-solving, students make full use of their existing knowledge and obtain new knowledge driven by successes and failures. It can not only enhance students' ability to fuse interdisciplinary knowledge, but can also greatly enhance their view of the overall situation; hence, promoting innovation and analysis and problem-solving abilities. Additionally, if an enterprise is in recession, students learn to cope with adversity and the frustration of management. Conversely, when the enterprise is doing well, students learn to cope with an environment of opportunity.

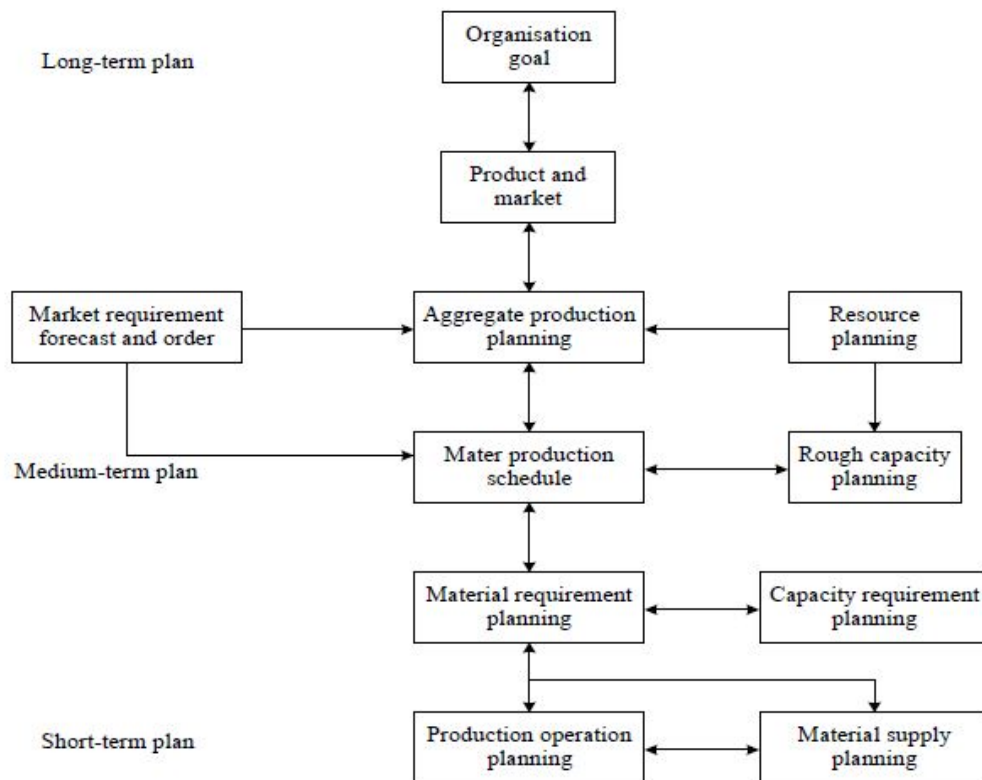


Figure 1: The structural framework for an enterprise production planning system.

Finally, the financial management in ERP supplies interfaces to other modules and can simplify input processes. The traditional manual operation can be substituted in this way. Its main functions lie in finance analysis and its ability to support decisions, such as fund procurement.

Through these improvements, the students' interests are increased, and their abilities to analyse and solve problems are strengthened, so that it enhances the effect of the teaching. More and better improvements in teaching are possible in the future.

PRACTICAL EFFECTS

After the introduction of the new teaching mode of production and operation management, the outcomes were as follows:

- Students were able to comprehend the whole production process through case-study teaching and the ERP simulation experiment.
- Students' abilities to analyse and solve problems, obviously, have improved.
- Students' enthusiasm has increased.
- Recognition of the importance of this course has risen among students.

In addition, some other outcomes also have been obtained. For example, the employment rates of related majors, such as information management, electronic commerce, logistics engineering, etc, has risen in the past five years, as shown in Figure 3. This was mainly because there was a shortage of business process management talent in China. More students in this University could engage in this profession due to their having abilities to conduct business process re-engineering through ERP sandbox simulation experiments. Furthermore, as can be seen from Figure 3, during the first two or three years, the employment rates increased slowly. The possible reason might be that the innovative teaching model was not understood immediately and the other reason might lie in the economic crisis from the latter half of 2008. However, during the latter two or three years, the employment rates increased quickly, and the reason was that more and more students recognised the importance of this teaching model and showed more interest in participating in production operation simulation experiments. Another potential factor might be that the global economy has started to recover since 2010. (Note that the abbreviate letters IM, EC and LE represent information management, electronic commerce, and logistics engineering, respectively). Table 1 lists the outcomes related to several key education quality improvement indexes through adopting this new teaching mode in the past five years.

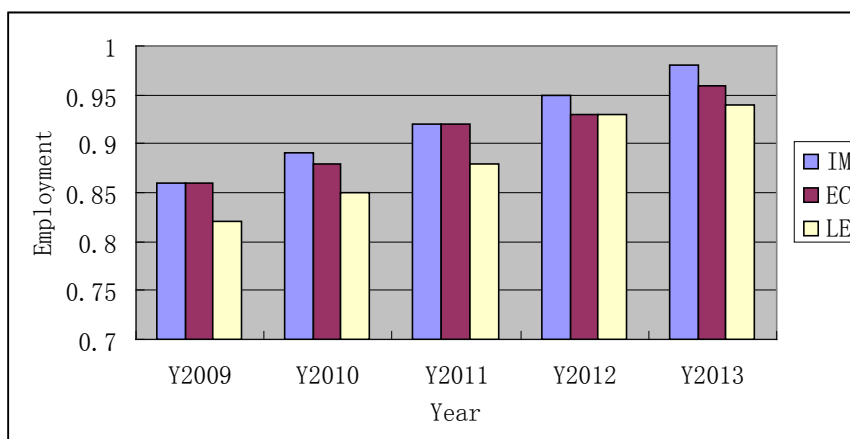


Figure 3: The employment rates in the past five years.

Table 1: Outcomes after adopting this new teaching mode.

	2009	2010	2011	2012	2013
	%	%	%	%	%
Enrolment rate	90	92	94	96	99
Employment rate	84	88	90	93	96
Wage level	3,000 RMB	3,300 RMB	3,600 RMB	4,000 RMB	4,500 RMB
Social certification	85	85	89	94	99

CONCLUSIONS

In this article, the new teaching mode for production and operation management combined with case practices and ERP sandbox simulation experiments are presented. This model of *teaching and practice* not only increases the interest of students but also trains students to analyse and solve problems. Moreover, recognition of the importance of this course

has risen among students. Through their personal experience, students could have a deeper understanding of the concept of production management. Finally, it may improve the employment rate, social certification and enrolment rate for students.

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REFERENCES

1. Chen, R.Q. and Ma, S.H., *Production and Operations Management*. Beijing: Higher Education Press, 155-160 (2010).
2. Feng, G.Y., Practical teaching research on the course of production and operation management. *J. of Research on Exploration in Laboratory*, 8, 1, 12-15 (2009).
3. Shang, R., Fu Z.J. and Zhang, T.S., The research of scheme in course design of the production and operation management based on production planning system. *J. of Development & Innovation of Machinery & Electrical Products*, 25, 1, 202-203 (2012).
4. Wang, Q., Li, Q., Chen, Y.L. and Yang, J.J., Collaborative operation information management and its application. *J. of Computer Integrated Manufacturing Systems*, 12, 8, 1300-1307 (2006).
5. Li, F. and Ye, C.M., An innovation and practice on the teaching of production operation management, *J. of Industrial Engng.*, 12, 4, 135-138 (2009).
6. Motwani, J., Mirchandani, D., Madan, M. and Gunasekaran, A., Successful implementation of ERP projects: evidence from two case studies. *Inter. J. of Production Economics*, 75, 1-2, 83-96 (2002).