

Exploration on the Education for Master of Engineering Management

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Abstract. Many universities and colleges have presently offered such major as engineering management, and can award bachelor's degree, master's degree and doctor's degree to students of this major. This paper analyses the differences between engineering management education for undergraduates and graduate, and explores education for Master of Engineering Management (MEM) in terms of education goal, curriculum setting, and teaching method, in order to better cultivate talents in this area.

Introduction

With the development of the project management specialization and socialization, the education of engineering management is more emphasis and the major of project management has been rapid development. At present, many colleges and universities have a project management major college level, undergraduate level and graduate level. Project management major has a master degree, master, professional master of management, engineering master's and doctoral candidate in the field of postgraduate education. Engineering management major has formed distinct, relatively perfect education and degree education system.

An overview of Project Management Major in China

The undergraduate course education of project management major in our country can be traced back to the early 1960s, then had a technical and economic discipline, mainly is the study of the project and technical economic analysis. In 1979, Xi'an Jiao Tong University and other 11 colleges and universities set up the management of engineering, Hua Zhong Institute of Technology began to recruit supplies management engineering undergraduate students in 1980. Harbin University of Architecture recruited engineering construction management students in 1981, and then established a real estate management, international engineering management and so on. Undergraduate majors in colleges and universities have four times of revision in 1963, 1989, 1993 and 1998. The engineering management major was intergraded on original construction management engineering, basic construction management engineering, management engineering (construction management engineering direction), real estate operation and management, the foreign construction engineering construction and management, international engineering management and so on, and became a major of management science and engineering which is the first level discipline in 1998. In 1999, the steering committee of the thirteenth higher engineering management discipline made the fundamental course of project management major four kind of curriculum according to the technology, economy, management and law. The engineering management major is divided into five professional directions: project management, real estate operation and management, investment and cost management, property management and international engineering management. In accordance with the requirements of the ministry of education, project management major should raise the talent who is engaged in engineering construction field project decision-making and whole process management

compound senior management personnel, has the basic knowledge such as management, economics, engineering, master the modern scientific management theory, method and means. By 2006, a total of 121 colleges and universities in China have had the project management undergraduate majors. These colleges and universities include comprehensive universities, engineering colleges, economics colleges, agriculture and forestry universities and normal universities. They have a major common characteristic that is depend on the advantage of subject or with the aid of the strong industry background, such as Tianjin University, Tongji University, Chongqing University, set project management major mainly depends on the construction industry. Northwestern Jiao Tong University set project management major mainly relying on railway industry. Northwestern Polytechnic University set project management major mainly depends on aerospace industry. Petroleum University set project management major mainly depends on oil drilling industry. China Three Gorges University set project management major mainly relying on the hydraulic and electric engineering. In view of this, the unit that undertake project management major teaching mainly have three kinds of situations. One is undertaken by institute of economy and management, such as Xi 'an Jiaotong University. Two is undertaken by building and civil engineering institute or other institute which has advantage disciplines and major in the university, such as Tsinghua University, Tongji University, and the China Three Gorges University. Three is undertaken by special institute, such as Chongqing University set up construction management and real estate institute carrying out the teaching of engineering management major. Therefore, engineering management undergraduate programs can be awarded bachelor's degree in engineering, can also be awarded bachelor's degree in management. Master of engineering management (MEM) is established in 2010. Its purpose is to adapt to the urgent need of management talents with modern engineering career developing in our country, to improve project management talent cultivation system, to innovate project management personnel training mode, and to improve the quality of the engineering management talents in China. The cultivation of engineering management master graduate student pays attention to provide students with the understanding of core management domain knowledge ability; Pay attention to provide students with understanding of the inherent and common management knowledge; Pay attention to provide students with different management level management knowledge and skills required for engineering function; Pay attention to provide students with technology and management in the practical engineering projects or problems for integration of experience. So far, more than 80 colleges and universities have carried out the education of the master of engineering management in our country.

The different educational focus for bachelor's degree and master's degree of engineering management

The master of engineering management has deference as follows compared with the bachelor of engineering management. One is the goal of personnel training is different. The talents of engineering management undergraduate training is applied talents who are geared to the needs of production and social, and the talents are most directly involved in the project construction and management. However the cultivation goal of engineering management master is to improve the quality of engineering management talents. Because the master of engineering management are all have a few years of work experience, so its talent training goal is to further enrich the students' knowledge, improve the ability of students, master more system technology and management methods and experience of the integration. Two is the emphasis of knowledge and ability to learn is different. The undergraduate students of project management major should mainly obtain the knowledge and ability are as follows. (1) Mastering the basic theory of project management and methods; (2) Grasping the basic theory on economic investment and knowledge; (3) Being familiar with engineering and technical knowledge;(4) Being familiar with the guidelines, policies, laws and regulations of the construction of the project; (5) Understanding of the dynamic development of engineering management at home and abroad; (6) Having the ability to solve management problems using

computers; (7) Having project decision-making and whole process management ability; (8) Mastering the basic methods of literature search, data query, and having the preliminary scientific research and practical work ability; (9) Mastering relevant business knowledge about international engineering project management and having strong ability of foreign language. Generally, the undergraduate of project management major should have access to the national registered construction engineer, national certified supervision engineer, national registered cost engineer qualification, etc. However the master of engineering management mainly obtain the knowledge and ability are as follows. (1) Focus on the analysis of project management methodology and decision-making and learning and improvement; (2) Pay attention to the project, quality, cost, progress, the environment, learning and improve risk management, as well as the comprehensive use of related knowledge; (3) Pay attention to the continuous new knowledge learning of the economic, management, business ethics, law and finance; (4) Pay attention to improve ability of solving practical problems utilizing project management theory and methods combining the reality of their own work or work experience; (5) Pay close attention to the dynamic of domestic and international project management development, understand the latest research results and information of domestic and international project management, have a certain ability of project management research. Three is the degree combined with the practice is different. The research object of project management discipline is the management problem of engineering activity. The problem is not simply involved management thinking, management methods and other issues, but is on the basis of engineering practice, its premise is to be familiar with and master relevant engineering technical knowledge and engineering activity rule. So, the project management major has strong practicality. In the teaching of undergraduate course, although practice teaching link is arranged, theoretical teaching is still priority, and because students are lack of understanding of the relevant knowledge and methods, they can not make knowledge and methods into practice, they are only stay on the level of perception for the engineering management practice, their goal is to lay a good foundation for the employment. However, the education of engineering management master is completely based on the engineering practice and the degree combining with the practice is very high. In the teaching system, the credit of practice and theory of credits is usually 1:1 and the practice credit of some colleges and universities are higher. Students' graduation thesis topics are all from project management practice. Students can solve the problem of project management practices through the integration of the theory of engineering technology and management. It is also closely linked with engineering practice even involve the theory teaching.

Exploration on the Education of MEM

Firstly, exploration on the goal of education. The following factors should be considered about positioning of talent cultivation goal. One is to depend on characteristic industry background of the colleges and universities. Two is to rely on the advantages of disciplines and majors existing in colleges and universities. Three is to meet the needs of society and to cultivate application-oriented high-level talents. Four is to be consistent with training direction of international project management major. There are five focus directions in the field of international engineering management: (1) Object-oriented modeling language research. (2) Product developments and related technology research. (3) Research of enterprise reengineering or enterprise restructuring. (4) Quality management research. (5) Innovation management research. For example, the graduate cultivation goal of MEM in Hubei University of Automobile Technology is to cultivate application-oriented high-level talents who are engaged in the project planning and implementation, field management and improvement, logistics and information system planning and design facing on related engineering field of automobile industry. They also master system of project management theory, management innovation and engineering practice ability. So the training goal exactly meets the requirements above. Secondly, exploration on the curriculum setting. In general, the theory courses of MEM are two main types of degree courses and non degree courses. Degree courses are two types of common course degree and degree course. For example, the degree courses of MEM in Hubei University of Automobile

Technology have Introduction to Project Management, Engineering Economics, Systems Engineering Theory and Application, Engineering Project Management and so on. Non degree courses include engineering technical elective courses and management class elective course. Engineering technical elective courses have Product Development and Innovation Management, Modern Automobile Design Method, Advanced Manufacturing Technology, Production and Operation System Modeling and Simulation and so on. Management class elective course have Applied Statistics, Modern Industrial Engineering and Management, Production and Operation Management, Project Budget and Cost Control, Logistics and Supply Chain Management, Principle and Application of ERP, System Analysis and Design, Big Data Technology and Application, QCD Management and Improve Technology, Marketing Engineering, Intellectual Property and Information Retrieval and so on. Theory curriculum settings shall be effectively support talents training goal of positioning, and accords with the practice of engineering management master's degree education. The education of MEM should be the intersection of technology, economy, management and law. Specifically, the theory curriculum of MEM can consider the following direction: one is the further compaction degree courses, focuses on training students to master engineering management research methods; Two is to further refine the theme of the elective course of science and technology, showing the features of advantage disciplines; Three is to further enrich the economics and management class courses; Four is to consider to open international project management courses when the time is ripe. Thirdly, exploration on the engineering practice. In general, the practice education of MEM includes academic lectures, project management practice, project research, degree thesis writing, etc. The speakers of academic lectures mainly are experts of enterprise and discussion is had after the lecture. Engineering management practices must be combined with specific engineering project, the practice time shall not be less than 6 months, and practice report should be written after the practice. Project research refers to participate in project management research at least twice in the enterprises. It is requirement that the analysis report of project planning demonstration and implementation process should be submitted. The writing of degree thesis should be combined with project management practices and the effective time shall not be less than one year. It is necessary to implementer double tutorial system including school tutorial and off-campus mentor for project management practice, project research, and the writing of degree thesis. Tutors are not only responsible for the entire instruction, but also responsible for the evaluation through reply will or seminar. The practice achievement does play a role in engineering practice. Fourthly, exploration on the teaching method. One of the basic laws of MEM education is the combination of theoretical research and engineering practice, and the activities of the project management is the process of practice, knowledge, again practice. Therefore, the education method of MEM shall conform to the laws of epistemology and the viewpoint of system theory, theory teaching and practice teaching can not be isolated from each other, and they shall be conducted at the same time. Students should hardly study project management theory and method at the same time to carry out project management theory and method into practice and research, and the subject in the research and practice should be discussed in the theoretical teaching. Students should consciously learn to apply the theories and methods to the practice and research. So the double tutorial system in the number of teacher is more than just two mentors. Off-campus tutor can be more than one, and the mentor of project management practice, project research, and the degree thesis guidance can be different persons. Students of MEM should be enrolled implement the double tutorial system, and engaged in engineering practice. In fact, because the student is in office, the work itself has the property of engineering practice, and just to make it more organized and explicit. In addition, the main classroom teaching method of MEM has not given priority to with teacher's teaching, but the teacher guides the student to carry out the corresponding research work and organize seminars, and then to refine and sublimation. The most effective time of graduate students mastering knowledge is not in the class, but is after the class. In spite of in the class, the teacher probably teaches cross section in order to solve a practical problem or research projects needs instead of the mode of undergraduate teaching. So the students should systemically study, pay attention to the connection of different section, and learn to the integrated use of knowledge and methods to solve practical problems instead

of beginning to practice when the course has finished. Self-study and learning to self-study is especially important for graduate students. In classroom teaching, the teacher is not dominant, but guidance and students are the main body and protagonist of classroom teaching.

Summary

The engineering practice activities will be more extensive, more complex, and the demand for engineering management talents will be more urgent with the proposal of “China's Dream” and "made in China 2025". The education of MEM has a broad and beautiful prospect because it meets the needs of economic and social development.

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