

The Construction and Reform of the Quality Management Course based on New Liberal Arts Education Certification

Fangyu Pan^a, Yuewei Bai^{b,*}, Kai Liu^c, Wei Yang^d, Yanchun Xia^e,
Hongbing Zeng^f

School of Intelligent Manufacturing and Control Engineering, Shanghai Polytechnic University,
Shanghai 201209, China

^a fypan@sspu.edu.cn, ^{b,*} ywbai@sspu.edu.cn, ^c liukai@sspu.edu.cn, ^d yw@sspu.edu.cn,
^e ycxia@sspu.edu.cn, ^f hbzeng@sspu.edu.cn

* Corresponding Author: Yuewei Bai

Abstract. Facing with the fierce competition, the Industrial Engineering (IE) major takes the new liberal arts education certification as an opportunity to promote the cultivation of students' abilities, which can prompt them to better address challenges. As a core curriculum of IE major, Quality Management (QM) is necessary to undertake the development of students' capacities which are required in certification. Therefore, this paper first introduces graduation requirements of the certification, then expounds the relationship between QM course and graduation requirements, it makes clear that QM course can train students' abilities of Moral Cultivation, Subject Knowledge, Innovation Ability, Information Application, Teamwork and Communication&Expression. However, traditional teaching methods and mode can hardly achieve the above goals,so the disadvantages of traditional ones are analyzed,and the solutions to these problems are put forward, which are strengthening practice teaching, encourage interactive teaching and diversification of assessment methods. These measures lay a foundation for mobilizing students' enthusiasm for study, enhancing learning effects and improving students' abilities.

Keywords: New Liberal Arts Education Certification; Quality Management Course; Graduation Requirements; Reform; Teaching Methods.

1. Introduction

China has joined the Washington Agreement, the world's most influential international agreement for mutual recognition of undergraduate engineering degrees, since 2016. In order to bring engineering education more in line with international practice, our country developed the own engineering education accreditation system.By the end of 2021, 1977 specialties in 288 universities had passed the engineering education certification[1].It greatly improved the quality of Chinese engineering education and promoted the abilities of Chinese engineering and technical personnels to deal with international competition.Meanwhile, liberal arts majors, which are as numerous as engineering majors in China, are actively seeking to develop to face the same competitive environment. Therefore,new liberal arts education certification comes into existence, which drew on the idea and principle of engineering education certification[2].

In this context, the Industrial Engineering(IE) specialty in our university,the typical liberal arts majors, is striving to pass the new liberal arts education certification. And the course of Quality Management(QM) is the core curriculum of IE major,it plays an important role on the specialty,so the construction and reform of the Quality Management course should follow the principle of the new liberal arts education certification.

2. Graduation Requirements of the New Liberal Arts Education Certification

Since the QM course's construction follows the standard of the new liberal arts education certification, it is necessary to figure out its standard first, especially the graduation requirements. 9 aspects are involved in the requirements[3], which are Moral Cultivation, Subject Knowledge, Innovation Ability, Application Ability, Information Application, Communication&Expression, Teamwork, International Visions and Learning&Development, respectively, given in Fig.1

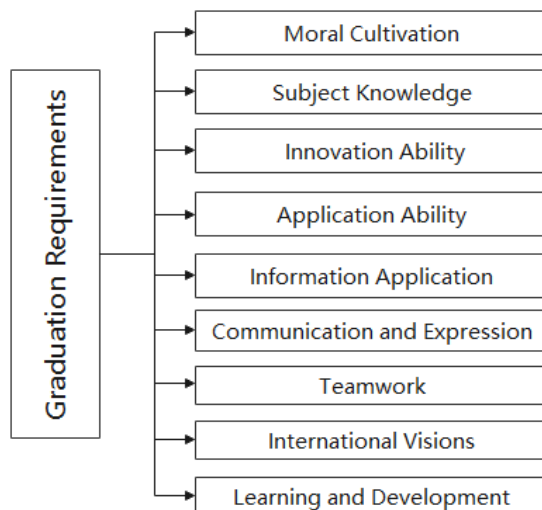


Fig 1. Graduation requirements of the new liberal arts education certification

(1) Moral Cultivation

Moral Cultivation requires graduates to have a humanistic background, scientific spirit, professional quality, social responsibility and a positive attitude towards life, understand national and social conditions, and practice socialist core values

(2) Subject Knowledge

Subject Knowledge requires graduates to have solid basic knowledge, professional knowledge and professional skills, master the basic research methods of the major, and understand the latest trends and development trends of the specialty.

(3) Innovation Ability

Innovation Ability requires graduates to have abilities of logical thinking and creativity. Graduates should be able to discover, discriminate and evaluate the phenomena and problems in the major and in its related fields, as a consequence, form personal judgments and opinions.

(4) Application Ability

Application Ability requires graduates to have an ability to solve complex problems. Graduates should be able to comprehensively analyze and investigate the complex problems in the professional field, and put forward corresponding solutions

(5) Information Application

Information Application requires graduates have an ability to take use of information technology. Graduates should be able to apply modern information technology tools to solve practical problems.

(6) Communication&Expression

Communication&Expression requires graduates to have good communication skills. Graduates should be able to communicate effectively with peers and the public, both in oral and written expression.

(7) Teamwork

Teamwork requires graduates to have good teamwork skills. Graduates should be able to get along well with other team members, work collaboratively and play an active role in team activities as a member or leader.

(8) International Visions

International Visions requires graduates to have an international vision and understanding. Graduates should understand international trends, pay attention to global issues, understand and respect the differences and diversity of different cultures in the world.

(9) Learning&Development

Learning&Development requires graduates to have a sense of lifelong learning, self-management and self-learning ability. Graduates should be able to adapt to social and personal sustainable development through continuous learning.

3. The Relationship between QM Course and Graduation Requirements

According to cultivation objective of our IE specialty, QM course can support 6 aspects of graduation requirements, which are Moral Cultivation, Subject Knowledge, Innovation Ability, Information Application, Teamwork and Communication&Expression.

Table 1. The relationship between QM course and graduation requirements

QM course	Moral Cultivation	Be familiar with industry standards and quality-related legal regulations; compliance with professional ethics
	Subject Knowledge	Be able to memorize relevant basic concepts of quality and quality management and realize their importance ; Clearly understand the basic knowledge and construction of quality management system; Master methods of design quality; Understand the principle and operation procedure of quality inspection; Comprehend the concept and method of process control, especially for manufacturing system; Master the method of quality cost management. Based on the above theory, analysis, planning, design and management can be carried out for complex or key quality problems in the manufacturing system and service system
	Innovation Ability	Be able to provide independent opinions, judgments and comments on the above quality issues.
	Information Application	Be able to identify the basic tools and methods of quality management, and choose appropriate tools and methods to analyze and make decisions about quality problems in daily life and in routine production, such as quality problem cause analysis, quality improvement and optimization.
	Teamwork	Through cooperation, team members can complete case discussion, research, analysis, summary and sharing.
	Communication&Expression	Be able to accurately express own opinions on quality issues by verbal, manuscripts and charts, etc.

4. The Construction and Reform of QM Course based on Graduation Requirements of the Certification

According to the standards of the accreditation , it pays more attention to the cultivation of students' ability, rather than limited to the teaching of knowledge. Therefore ,in this case, only relying on the traditional teaching methods and mode is difficult to achieve the above ability goals. Traditional teaching methods and mode of QM course have some disadvantages, given in Table 2.

Table 2. The disadvantages of traditional teaching methods and mode

The disadvantages of traditional teaching methods and mode	Highly theoretical of the teaching content	The theoretical knowledge of quality management is boring, so students can't devote themselves to learning, and they can't have an in-depth understanding of the practical methods and applications of quality management
	Single teaching mode	The face-to-face traditional teaching in class is the mainly mode. In this situation, students are easily distracted, unfocused and less motivated.
	The simplification of evaluation methods	Assessment methods lack variety, only examination, which make assessment content one-side. It means the evaluations only cover the theoretical knowledge and it does not involve students' abilities

Therefore, it is imperative to construct and reform of QM course. The construction and reform mainly focus on the following 3 aspects.

(1) Strengthen practice teaching

It is well known that genuine knowledge comes from practice. The knowledge gained from books or from teachers can hardly leave a lasting impression, especially the theoretical knowledge. Take quality management system for example, there are a lot of information related to ISO9000, including its generation, development, constitution, foundation, basic requirements and its construction in enterprises. And this theoretical information is dry, if by the traditional method, it is difficult for students to concentrate on listening for a long time, and the information can hardly be remembered in heart. But if it is by practice teaching, the results are different. Students can be separated into several groups and assigned to investigate the enterprises which have passed ISO9000, they should find out the experience and problems of quality management in the enterprises, and explore the solutions. According to the above practice, write down the case report and share with other groups. Therefore, it can arouse the enthusiasm of students and enhance their understanding and application of theoretical knowledge. From the process, several abilities of graduation requirements can be trained, including Moral Cultivation, Subject Knowledge, Teamwork and Communication & Expression.

Process capability analysis is core knowledge of QM course, it involves Multi-Variate Analysis (MVA), calculation and analysis of Process Capability Index (CPI). When learning this part, students can be separated into several teams and assigned to research the bus system, to collect bus arriving time. By the quality management statistical analysis tool MINITAB, they can find out the key factors which affect service quality of bus system, based on the theory of MVA. Aiming at the key factors, they can put forward improved schemes. Then, they write down the case report and also share with other groups. From the process, several abilities can be trained, including Subject Knowledge, Innovation Ability, Teamwork, Communication & Expression and Information Application.

(2) Encourage interactive teaching

Interactive teaching can create a good and democratic atmosphere, promote the relationship between teachers and students, and mobilize students' autonomous initiative in learning. Case discussion is one kind of interactive teaching. Students can discuss social focus cases in groups at QM course. For example, the following 3 cases can be discussed from the perspective of quality and quality management. Case 1: The success of MOTOROLA V3 series mobile phones and the decline of MOTOROLA Co.; Case 2: The transformation of Apple Computer company to Apple company; Case 3: The rise of Huawei Technology Co.. After discussing, students can share their ideas with teachers and other classmates in class or on smart teaching platform, such as "Chaoxing Erya" and "Rain Classroom" [4]. Teachers and classmates can interact on the platform, including discussion, answer race, voting, questionnaire and grouping task. Therefore, students can take an active part in their learning by this way, and their two abilities can be trained, including Teamwork and Communication & Expression.

(3) Diversification of assessment methods

Assessment no longer only focuses on theoretical knowledge, it pays more attention to students' abilities now. So, its methods are more diversified, including 5 components. They are homework(10%), examination(40%), group discussion(10%), report(30%) and case report sharing(10%), respectively. The relationship between assessment and graduation requirements of the certification is given in Table 3. Hence, by the above evaluation methods, students can be driven to improve their abilities.

Table 3. The relationship between assessment and graduation requirements of the certification

Assessment	Graduation requirements of the certification
Homework(10%)	Subject Knowledge(10%)
Examination(40%)	Moral Cultivation(5%); Subject Knowledge(35%)
Group discussion(10%)	Teamwork(4%); Communication&Expression(4%); Subject Knowledge(2%)
Report(30%)	Moral Cultivation(5%); Subject Knowledge(10%); Innovation Ability(10%); Information Application(5%)
Case report sharing (10%)	Communication&Expression(5%); Teamwork(5%)

5. Conclusion

In the context of the new liberal arts education certification, QM course, as a core curriculum of IE major, should undertake the development of capacities for the certification. So, firstly, graduation requirements of certification are introduced in this paper, which clearly explain the required capacities of graduates. Secondly, the relationship between QM course (in our major) and graduation requirements is discussed, it shows that QM course can support 6 aspects of graduation requirements, including Moral Cultivation, Subject Knowledge, Innovation Ability, Information Application, Teamwork and Communication&Expression. But traditional teaching methods and mode of QM course cannot achieve the above goals, so the problems of teaching methods and mode are analyzed. Aimed at the problems, the improvement way are put forward, including strengthening practice teaching, encourage interactive teaching and diversification of assessment methods. These measures lay a foundation for mobilizing students' enthusiasm for study, enhancing learning effects and improving students' abilities.

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