

Implementation of CDIO Initiative in Bachelor's Programs of Management Specialties at St.-Petersburg Electrotechnical University

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"CDIO Initiative" international project was conceived to reform engineering education by eliminating the gap between theory and practice in engineering activity. In the Initiative authors' opinion, an engineer with higher education should be able to create and modernize products and systems during their life cycle (Conceive (C) – Design (D) – Implement (I) – Operate (O)).

CDIO Initiative adopted 12 standards which are guiding principles to design education programs, supply educational resources and provide continuing professional education for teachers. The CDIO Standards taken together represent a comprehensive approach to engineering education.

CDIO Initiative was created to reform engineering education, but the problem of gap between the education and professional activities is of great concern for many management specialties as well. The analysis of several management training programs which were offered by Russian employers in 2014. Looking for young managers employers concentrate their attention not on the specialty, which an applicant has according to his diploma, but on individual competences and his/her "keenness of wit". To recognize the latter qualities the employers use logical tests, role plays and case competitions.

There is also a tendency to employ the applicants with engineering education as managers, rather than those with management education proper, and many today top managers confess to be proud of their engineering education [1]. In such situation management competences are developed while working, when the person takes continuing professional education courses or participate in projects headed by experienced managers. This allows us to make the conclusion that lacking practical application, management education in Russia does not satisfy the employers' demands.

The lack of practical problem-oriented activities may become a serious disadvantage of alumni who studied Quality management at Management and Quality Systems Department (MQS) of St-Petersburg Electrotechnical University (SETU). Firstly, MQS, as well as SETU itself, prepare specialists for high-tech industries where the gap between theory and practice is especially tangible. Secondly, quality management at enterprises means to increase the efficiency of work under the current social and economical circumstances. Therefore, it is equally important to get theoretical knowledge as well as to plunge in current social and economical context and acquire problem-solving



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skills. One of CDIO Initiative priorities is problem-oriented education which presupposes inseparable connection between theoretical knowledge and practical skills by means of integrated courses and interactive learning.

The elements of the CDIO Standards have been implemented at Management and Quality Systems Department since the beginning of 2014. At the first stage the discipline "Introduction to the Specialty Training Program" is in the focus of attention. The discipline curriculum was developed in accordance with CDIO Standards requirements and the discipline was introduced into the curriculum for bachelor students of the second year of studying.

According to the CDIO Standards, there should be an introductory course which is directed to develop personal and interpersonal competences and serves like a fundamental base for further professional activities. The main objective of such course is to make the student aware of the educational goals and to prepare him/her for the program comprehension. This means to teach the student to be motivated for professional activities, to understand what kind of problems he/she is to solve as a specialist, to be aware of the importance of the disciplines which will be taught and personal and interpersonal skills necessary to take the specialty training course [2, p. 8-9].

There are other CDIO Standards requirements which the discipline "Introduction to the Specialty Training Program" fits as well. The discipline determines the role of the quality management specialist at every stage of CDIO products life cycle; develops personal, interpersonal and professional competences by means of integrated educational tasks; regards the subject from the practical perspective; explains social significance of the profession; deals with the questions of professional ethics etc.

Within the scope of the course there are four modules regarding four different topics. Each module is of integrated

character or, in other word, is directed to both providing students with professional knowledge and developing competences of all necessary types. Every module includes theoretical part and practical tasks.

The objective of the first module is to determine the role of a quality manager in the technological progress under the circumstances of postindustrial society.

Theoretical part: Within this module historical, cultural and social contexts of the profession are determined: social conditionality of the development of management principles, concepts and methods depends on the level of social development. The module concerns current problems and responsibilities of the quality manager under the conditions of market globalization and ecological and social problems of consumer society.
– The module also deals with the questions of professional ethics and social responsibilities.

Practical part: within this block students work on their own to study the evolution of approaches to quality management which are based on the "classical" systems of Ford and Toyota and acquire practical skills of note taking, preparing reports and making presentations on the results of their studies, which will be used on the following educational stages.

To regard the questions of professional ethics the moderated discussion on ethical codes of different companies is organized. There is also a role play on the problem of deforestation caused by the need in agricultural lands. The students play roles representing different parts and protecting their interests during the round table discussion. Regarding the questions of professional ethics, the role play helps students to acquire skills of proper behaviour in actual conflict situations. [3, p.188]

The second module concerns different stages of products, processes and systems life cycles and the function of quality management at each of the stages.

Theoretical part: deals with “Conceive” stage of a new product and such important steps as consumer demand survey, “product” or “service quality” definition; analysis of the enterprise and technology potential, standard requirements study. At the stage of “Design” the quality of product is adjusted to technical requirements to products, processes and systems. The stage of “Implement” is production based on the plans, testing, probation and certification. “Operate” stage is after-sale support for the products and their recycling.

Practical part: to comprehend the stages of product life cycle and to develop problem-solving skills there is a case study “Technological process” designed by the students and teachers of the department. The case study is to represent a technological process by the example of paper planes assembling. The authors of the case study designed special traps which students have to overcome independently with the help of the teacher developing the most efficient ways to organize the production and to manage the quality.

Within this block there is another case study describing product life cycle in one of well-known companies. The case study not only provides students with knowledge of product life cycle stages but also develops the skills of getting information from open sources.

The third module objective is to introduce diverse options of professional realization within the scope of quality management.

Theoretical part: within this block students get information about the wide range of enterprises where the specialists of their professional profile are in demand. As far as quality is an essential characteristic of any product or service, quality managers have good job opportunities in almost any industry where there is a consumer who is concerned about the quality. Today, at Russian labour market the greatest demand for quality managers is made by manufacturing firms (in St-Petersburg it is, first of all, automobile industry and

mass consumption products), the sphere of service (IT, telecommunications and retail), the sphere of certification, consulting and audit.

Practical part: to comprehend the information student visit the enterprises of the department partners (several manufacturing firms, service companies and IT-companies, an accreditation agency) and meet with specialists participating in different stages of a product life cycle – logistic specialists, technologists, product designers.

The fourth module is dedicated to skills, knowledge, abilities and competences necessary to conduct professional activities effectively. The module is also designed to develop the skills of career planning.

Theoretical part: the students get information about the requirements to professional, personal and interpersonal qualities of the specialists, which are designated in educational and professional standards, including the CDIO standards. To teach the module successfully a professional psychologist is invited; this specialist suggests different ways to develop personal and interpersonal competences.

The HR-manager of the big company also teaches some classes sharing the experience of career planning, drawing up a CV, acting a job interview, taking continuous professional development courses and participating in case competitions.

Practical part: every student makes his/her own “career journal”, which contains a detailed plan of both class and out-of-class activities necessary to develop the knowledge, professional and personal qualities essential to reach a desirable milestone on the career pathway.

The necessity of assessment is one of the important principles of the CDIO Standards. It is important to identify whether the goals and objectives have been reached and whether the students have comprehended the knowledge and developed the skills. The complex of indicators have been designed for the

discipline “Introduction to the Specialty Training Program”, which are applied to assess the motivation for professional activities, comprehension of the profession social context etc.

The problem is that the assessment has not been made as the course has not been completed yet. But it is indisputable that the implementation of CDIO Standards principles in teaching students of management specialties makes the educational process closer to real life conditions which young specialists will have to face. There is a hope that CDIO and other similar initiatives being implemented, Russian employers will not hire “smart guys” to be retrained while future alumni won’t recall a sad joke which says: “Now you may forget everything you’ve been taught at the institute and should start learning again”.

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