Available online at www.sciencedirect.com

ScienceDirect

Procedia - Social and Behavioral Sciences 141 (2014) 35 – 44

Procedia
Social and Behavioral Sciences

WCLTA 2013

The Role of Technology Faculties in Engineering Education

Assoc. Prof. Dr. Murat Sönmez*

Middle East Technical University Northern Cyprus Campus Mechanical Engineering Program, Güzelyurt/ TRNC, Mersin 10, Turkey

Abstract

Today, engineering applications require engineers to develop and update their knowledge in professional life in a continuous manner since technology is rapidly changing and becoming more complex. Unfortunately, due to lack of knowledge and training, trial and error method is widely used in most of the applications by newly graduated technical staff. However, this method could be a cause of huge economic losses, and undermines occupational safety and health at work. At present, in most countries, Bachelor of Sciences education in engineering is a four-year program. Although, in light of the Bologna Declaration, there is a trend in recent reforms towards 3-year Bachelors in EU countries, since, today engineering activities require high level education giving theory and the related knowledge and training on application in detail on different, interrelated branches of science and technology, engineering education should be more scientifically oriented. Such an education requires more than 3 years for students graduated from general High Schools. There is today a consensus that the professional engineering degree should take totally five years in a two-tier structure following secondary school. In this paper, it is proposed that the period of engineering education in the first cycle should be 3 years for the graduates of technical high schools and a minimum of 4 for the ones of other schools. Instead of Master of Science programs, master of engineering programs offering courses with a content giving basic knowledge, which is not renewed in a period of few years, on the design of engineering systems and structures and on the operation details of complicated engineering systems should be the prerequisite for professional engineering degree. The mission statement of technology faculties is discussed and interpreted. The mission laid out during the formation of Technology Faculties, established as an alternative to Engineering Faculties, which have now been providing education for a few years (in Turkey) should be reconsidered. These schools should be restructured as graduate schools in order to take on the role for teaching graduates of Engineering Faculties, who select technical track for being a professional engineer, to provide them with application details in a scientific manner.

Selection and peer-review under responsibility of the Organizing Committee of WCLTA 2013.

Keywords: Technology faculty, master of engineering, engineering education;

* Corresponding Author: Murat Sönmez. Tel.: +90-392-661-2934
E-mail address: sonmez@metu.edu.tr

Selection and peer-review under responsibility of the Organizing Committee of WCLTA 2013.
doi:10.1016/j.sbspro.2014.05.009

1. Main text

When the increasing complexity of engineering systems, the expectations and demands of job market from engineers and the status quo of engineering faculties are considered, it is clearly seen that today, engineers need to get broader interdisciplinary training, to be able to adapt to the technological innovations and to succeed in a globally competitive business world via restructured engineering education system.

These necessities have occasioned to the Sorbonne and the Bologna Declarations and new debates about the competencies of the graduates of university were started, and the studies for restructuring the education systems were speeded up. The Sorbonne Declaration, signed in 1998, recommended that university education should be organized in an undergraduate and a graduate cycle, but did not provide an indication of their duration. The Bologna Declaration, signed in 1999 by 30 European Ministers of education, on the other hand, is a remarkable document containing an action plan and implementation process. One of the objectives defined in this Declaration is the adoption of a system essentially based on two main cycles, as it is mentioned in the Sorbonne Declaration, requiring successful completion of the first cycle, lasting a minimum of three years, for the access to the second cycle. In this system the degree awarded after the first cycle shall also be relevant to the European labour market as an appropriate level of qualification. The three core objectives of the Bologna Declaration for the European higher education area are free mobility, employability on the European labour market, and international competitiveness/ attractiveness of European higher education. In the Bologna Declaration, the gradual adoption of an ECTS-compatible credit accumulation system enhancing the flexibility of education system (in particular in view of the development of life-long learning and work-based learning), and ease mobility both within and from outside the EU area is suggested. Length of studies is expressed not in years, but as the number of academic credits that must be successfully completed (one academic year corresponds to 60 ECTS credits) [1].
The Declaration has had a strong and positive effect on the debate about the relationship between higher education and professional life, in particular concerning the preparation of graduates for employability. It increased the awareness that it is a shared concern all over Europe.

There are examples of two-tier structures in all branches of engineering. However in many countries, contrary to the expectation mentioned in the Bologna Declaration, the Bachelor/ Master structure does not concern certain professional curricula. Therefore, unfortunately, trial- error is a widely used method in applications by young, non-professional technical staff due to insufficient knowledge and skill on application. This causes economic losses, and undermines occupational safety and health at work. For being a professional engineer, the correct method is graduating from master of engineering program with a curriculum that teaches the bases of application, which do not change in time and participating short-term courses offered by lifelong learning centres to learn the details of application. The following part of this paper briefly reviews the structure of Turkish Education System, which is one of the common systems in the world, and then the engineering education structure is taken into consideration from the perspective of the Declarations mentioned above.

1.1. The structure of Turkish Education System

The demographic feature of the Turkish population shows that up to the year 2020, 40 million people will be in the working age 14-44. This represents an opportunity for Turkey both for the economic and social developments. This opportunity requires adequate investments to education and training, but above all, restructuring the education system, especially the technical education and master structure of engineering. the Ministry of National Education (MoNE) supervises kindergarten, basic and secondary education. The basic education, which is compulsory, has been extended to 8 years in 1997 by combining elementary school and lower secondary school. Secondary schooling, which starts at the age of 14, consists of 4 years of academic schools or vocational or technical high schools. In the first group, mainly, general high schools, Anatolian high schools and science high schools take their places. In these schools the education has been structured to complete the deficiencies of basic education and to prepare the students for university education. Although the general high schools are defined as the schools that prepare students for higher education, contrary to this mission, the percentage of the students who could pass the university selection exam is quite low, (5% of the candidates graduated). Since the curriculum of these schools does not include any courses directed to a profession, almost 95% of the graduates remain unskilled, idle. The science