A Novel Model Investigation for Turkish Vocational and Technical Higher Education System

*Mustafa NURSOY**

Abstract

The skills necessary for the training of technical staff during their training and education vary according to the viewpoint of the employees. Like the nature of the industry, the skills of the staff are evolving continuously. The conformity of training institutions to this evolution is always among current issues; however, the implementation is not as easy as it may seem. According to the results of this study which was held to determine the applicability of a training system applied by the EC, USA, and other developed countries for decades and to make our vocational technical training system more efficient for meeting the requirement of the industry. This study is aimed to determine the needs of the industry on this issue. The industrial plants around Ankara were chosen as the sample of the study. The need for a new system and regulations is clearly seen to be necessary. A novel model thought to be suitable for Turkey's conditions and the developments over the world is proposed after the results of the study.

Keywords

Vocational and Technical Education, Engineering Education, Technology Engineering.

* *Correspondence*: Assist. Prof. Dr. Mustafa NURSOY, Abant Izzet Baysal University, Faculty of Engineering and Architecture, Department of Mechanical Engineering, 14280 Bolu.

E-mail: ;

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Skilled technical staff is an important cornerstone for scientific and technological development. Developed countries share great proportions of their national budget for education, research, and development (R&D). Engineering and technology education in our country has many problems including the shortness of practical training, outdated curricula, lack of communication with industry, qualitative and quantitative insufficiency of faculty members, incompatibility between the skills earned at colleges and required by the industry, infrastructural problems of institutions, and student unawareness due to improper professional choice. The curriculum should be harmonious with the industry's needs (Moreno, C. Gonzalez, Castilla, E. Gonzalez and Sigut, 2007). The training of technical staff should not be irrelevant to the global developments.

In this study, an alternative program for engineering education is proposed as technology engineering, which is new for Turkey but has been used in the EC, USA, and developed countries for more than 50 years. We can consider this application as a late start. Our country should aim the highest quality and standards in production and get larger shares from the global market (Altıparmak, 2005).

Engineering technology education in the United States can trace its history back to the 30s, which identified the place of engineering technology education in the technical spectrum. First engineering technology program was accredited at Purdue University in 1946. Over the last 70 years, engineering technology education in the United States has distinguished itself by a history of evolution, development and continuous improvement. Stakeholders include not only students and faculty but also various groups in both the public and private sectors including industry, professional organizations, funding agencies, state government and the university system (Rennels, 2002). Danielson and Georgeou (2007) studied the expectations of the industry from the training system, and concluded that a more practice-oriented curriculum is necessary. Dyrud (2004), in his bibliographical study sponsored by American Society for Engineering Education (ASEE), underlined the complexity of engineering education and concluded with the requirement of detailed curriculum development studies.

Salinger (2005) states that the engineering education studies are thought studies more than vocational ones and adds that the resis-

tance to change, present in the human nature, is facing us again in this situation. But his hopes about change go on. The present situation is actually not a problem of the universities, but of the industry; the employer unaware of his future employee's capabilities may even change their investment plans.

According to Aytekin (2006), the industry's expectations from engineering education can be expressed in two groups; one helping to the production and the other is research and development. The former, which is actually the highest need of the industry, constitutes the big group. Very few numbers of the engineers work in R&D (National Research Council, 1985). Alberto (1999) expresses the aim of technology faculties as the training of engineers with practical skills but a little less science. The graduates are intended to work in the production directly. Applied engineers (Craft and Mack, 2001) are needed more and more as the nature of production changes. Technology engineering, or applied engineering, is like an unborn baby in our country, of which we expect with great hope (Uysal, Altıparmak, Gülesin and Nursoy, 2008).

The fundamental of competitive strength of an industrial company is the production quality which is a result of productive and enterprising human resources. The evaluation of vocational and technical high schools and universities depends on how effective their outputs act in the business and industry (ASO, 2008). In the business world where the competencies are certified by not only with diplomas conferred by institutions but also with actual measures like certificates given by an independent institution, the graduates with distinguished abilities will be preferred.

The objective of this study is to determine the profile of engineering staff needed by the industrialists for planning the vocational and technical training system at high school and college level. Because of the lack of satisfactory relations between training institutions and the industry, problems arouse at training the engineers with required skills suitable for the industry. Adaptation of the graduates of these institutions to the industry can be facilitated by rearranging the training system according to the current trends of global market.

Methodology

A survey was hand-filled by face-to-face interviews at 64 companies which employ more than 30 employees in Ankara. Of these companies, 21 were small enterprises (50 employees), 28 were medium-size enterprises (51 – 250 employees), and 15 were large enterprises (251 employees). The majority of the enterprises were from machine and metal manufacturing, automotive, electrical and electronic industry, food, and furniture sectors.

Prior to the administration of the survey, the interviewees were trained by SASTEK Conformity Assessment Services. The survey was administered to the executive managers of the companies, among whom are the owners, human resource managers, production managers, and etc. The data were processed by a computer.

Results

Research and development (R&D) is the key factor for the future of an organization and the quality of product. The small and medium sized enterprises (SMEs) in our working group are seen not have given necessary importance to the R&D activities, while almost all large organizations have R&D or product development departments. This is possible because SMEs are generally producing by products for larger companies, but large companies are in a fierce competition in global market and they have to develop their products and processes to survive and get a bit of market share.

All companies employ technical persons at all levels. The satisfaction rates of the executive officers from these persons change from one company to another. Generally, they have complaints about the quality of technicians (people graduated from technical high school, EML, and vocational higher school, MYO). It is thought that the decrease in the demand rate of these schools because of the university entrance system is affecting the incoming students' quality and the quality of graduates. The most conspicuous insufficiencies from the technicians are the ability to analyze and solve problems, communication skills, and manual skills in descending order. In service education programs are the most common means for personnel development.

Engineers are expected to conform to the system of the company in a very short time. Engineering education has two aims: production and R&D. The engineering colleges aim both of these, while about 90 % of the engineers in the industry work in the manufacturing side. The conventional engineering education in Turkey is generally science-oriented, theoretically based, and less practice-oriented. But the demand from the industry is different. They want engineers mostly to run a manufacturing system or carry out some manufacturing practices. Many engineers have to work in a team, and they are required to be active in social life. Very few numbers of the engineers work in R&D departments.

As a result of the developments in business environment and technological needs, two types of engineering education generated in developed countries: theoretical or scientifically based general engineering and practice-oriented technology engineering. These programs are complementary of each other. As we look over the demands of the industry, technology departments seem to be crucial to be put into action. These programs are necessary for the industry and they can contribute the adaptation of the EC education system. Our working group stated the demand for technology engineers by replying the question for the requirement of this type of engineers positively at a rate of 95 %.

Another problem in our university-level vocational technical education is the faculty originally established for training technical teachers for vocational high schools, Faculty of Technical Education. As scientifically studied, these institutions have completed their mission and only 3 % of their graduates are demanded by the Ministry of National Education lately. The graduates are generally employed by manufacturing industry, but the indefiniteness of their status may cause some problems in industry since they have no defined role for the industry. The infrastructure and faculty of these institution can be considered as a base for the technology engineering programs; and they can be converted Technology Faculty by a basic conversion process.

In the study, the majority (68.8 %) of the working group have announced the necessity or different types of engineers. They also agreed that both types of engineers are needed in an engineering team. Technology engineering programs can also be scheduled in a different manner, special areas with a narrower target like automotive engineering, manufacturing engineering, welding engineering etc.

Discussion

The competencies of the graduates of present vocational and technical training system are the discussion subject of today and future. The solution techniques put into the action in the US and EC countries couldn't be transferred to Turkey for unexplainable reasons. The training system has put itself outside from the revolutions around the world, except some minor revisions on curricula. The titles obtained by the engineering training at the university were considered to be holy titles; a standard accreditation system couldn't be applied.

This study shows the needs and expectations of the industry from the universities; and offers a way solution to the problem. It also presents a way to use the potential of some kind of out-of-date training institutions.

Among the outcomes of the study, an up-to-date view of the industry was taken. Both SMEs and large enterprises need to invest for R&D activities. It is hard for small companies to share a budget for R&D, but they can benefit from incentives of The Scientific and Technological Research Council of Turkey (TUBİTAK).

Technology engineering is a new path for Turkish engineering education system, although it dates back to the 50s in the USA and EC countries. The establishment of this system is not very complicated. It can be overcome by slight modification of some institutions, which is now used for training technical teachers. The proposed scheme suggests a system similar to developed countries; it is adapted to Turkey's conditions. The training of technicians is also very important; the current system is carrying the problems from high school level technical education. When the interest is created for vocational education, the better training conditions will be formed. The transition from Vocational Higher Schools (MYO) to faculties must be more effective to promote these institutions.

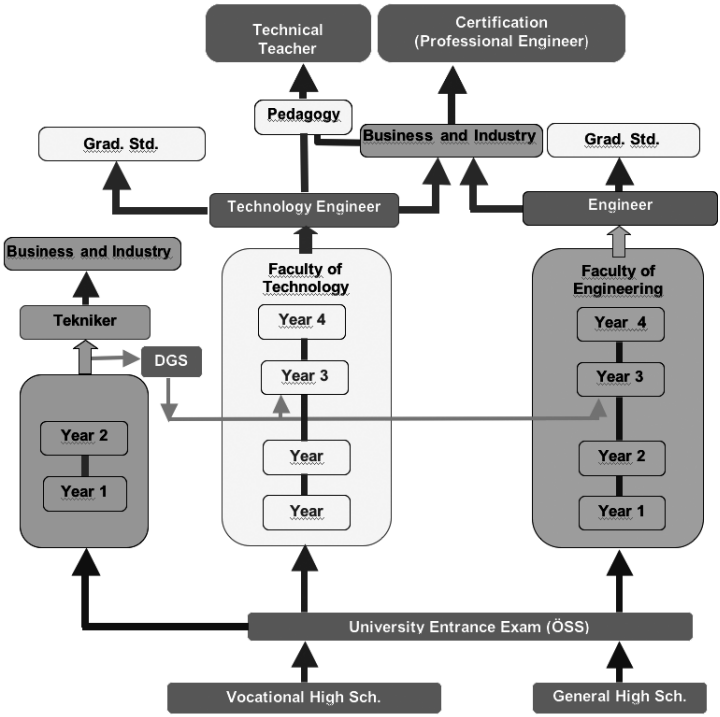

Fig 1

The Proposed Model for University-Level Vocational and Technical Education System

The system in figure 1 is an adaptation of developed countries' system to Turkey's conditions. The "engineering" and "technology" departments can be in the same college or at different colleges. Technical teachers can be trained after the graduation from either faculty. The experience can be a prerequisite for teacher assignments. This enhances the quality of teachers and so vocational education. "Professional engineering" must be a title given by independent boards.

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