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# Renewable energy awareness in vocational and technical education

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ABSTRACT

The vocational-technical education (V-TE) system has started a restructuring process recently especially in developing countries. In this study, the awareness level for renewable energy sources of individuals related with V-TE is investigated. Awareness survey for renewable energy sources is applied among the participants who are subdivided to different groups with respect to their gender, role in V-TE system and educational-social status. There is no statistically significant difference observed with respect to gender according to the results; ($t_{(138)} = 0.027$, $p = 0.978 > 0.05$). The participants are investigated in 5 different groups as "students in the Department of Electric and Energy (DEE) in Vocational School (VS)", "graduates from DEE in VS", "students in VS", "graduates from VS" and "parents of the students in VS". According to the One-Way ANNOVA test results ($F_{(4,135)}$=4.402, $p = 0.002 < 0.05$), meaningful difference is observed between the groups for awareness level of renewable energy sources. Analysis that are based on the participants' role in V-TE presented meaningful differences, upon comparing "students in the (DEE) in (VS)" with "students in VS" ($p = 0.049 < 0.05$) and "parents of the students" with "students in VS" ($p = 0.006 < 0.05$). As a result, creating an "Alternative Energy Sources Technology Programme" under DEE is suggested in order to increase the awareness level of potential labor-force for local industry.


## 1. Introduction

Rapid advances in the base of science and technology; change and develop the life-style of human being and social structures of the community. The most affected areas in related communities are education systems; especially vocational-technical education which has an important role in the whole education system in developing countries.

Alkan et al. [1] defined vocational-technical education (V-TE) as "a set of planning, investigation, development, organization, management activities in all kind of services in V-TE with industrial, agricultural and service sectors within the integrity of national education system."

Öcal [2] expressed that "V-TE is defined as an occupational course that aims to make a carrier via handicraft and/or practical activities in developed-western countries."

Eşme [3] presented the aim of V-TE in the International Conference of V-T Education which is conducted by Council of Higher Education. According to this study the basic aim of V-TE is to train and educate the individuals as a skilled labor to be employed in industry, commercial and service sectors and to provide primary education which is necessary for transition to higher education institutions as a continuation of their profession.

It can be proved that V-TE is depended to the industrial and economic trends of each country. In other words, it is impossible to mention about one-best template for the V-TE in general. The primary targets of every society should be considered by creating such a template which is opened to the developments and changings in the life-style of the community.

This fact is emerged a classification as developing and developed countries in the studies that are related with vocational-technical education and especially renewable energy education (REE). Turkey, counted as a developing country, focused on the importance of employment the qualified people in the related sectors by the help of studies which are done by business community and Council of Higher Education. Şimşek [4] prepared a comprehensive report on behalf of Turkish Industry and Business Association (TUSIAD) about the restructuring process of V-TE in higher education system of Turkey. Also some international projects (named as ISCED-International Standard Classification of Education- and IKMEP –Improvement of Human Resources via Vocational Education Project-e.t.c) are conducted to help this restructuring process. ISCED which classifies the education levels in four major groups is renewed, tertiary levels are diversified and a

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new subcategory related to ISCED level completion is introduced in 2011. Also modernization of vocational education via IKMEP is expanded in developing locations of Turkey.

The Turkish Ministry of Development constructed "The action plan" by addressing the issue with all stakeholders in the 8th, 9th and 10th 5-years development plans [5].

Turkish Higher Education especially V-TE system is adapted to the higher education system in Europe by "Bologna Process" which is carried out by The Council of Higher Education [6]. In the context of this process, educational departments of universities which give vocational and technical education are renewed and educational content is revised by considering the requirements of modern era. For instance, Department of Electric and Energy is established in vocational schools and Alternative Energy Sources Technology Programme is located under this department.

It is well known that such studies and efforts should be defined as an "empty frame" unless the participants and stakeholders of these studies reach to the meaningful awareness level about the aims of these studies. It is essential to build awareness on the users of V-TE in order to gain positive results from these initiatives.

Therewithal, V-TE system should find solutions for industrial and relatively economic problems in each country. One of the most important problems for developing countries is energy supply and demand balance. Kacan and Ulgen [7] presented that the growth-rate of energy demand has increased from 5.5–6%–8% in recent years and energy import ratio has observed as 73% in Turkey.

Kacan et al. [8] published the primary energy generation value as 106.4 million tons of oil equivalents according to the data's disclosed in 2008 and this can only supply the 27% of energy demand. The rest are covered by energy imports. In the light of these data Turkey can be defined as an energy importer country. Being an energy importer country plays very important role in international economic and political arena. Fig. 1 shows the total import, energy import and current account deficit values of Turkey. As it is seen in the figure energy import ratio of Turkey is between 20 and 25 percent. In order to decrease the energy import ratio, the use of local energy sources should be extended however energy consumption value is foreseen to be increased because of the industrial developments.

Fig. 2 shows the change of energy based education programmes in V-TE annually. There are three different energy-based education programmes as "Alternative Energy Sources Technology", "Electric Energy Generation-Transmission-Distribution" and "Management of Energy Facilities" however "Nuclear Technology and Radiation Security" Programme is energy-based but not related with renewable energy sources. According to the figure, student and programme numbers are increasing day by day that helps to improve the awareness of technicians about renewable energy

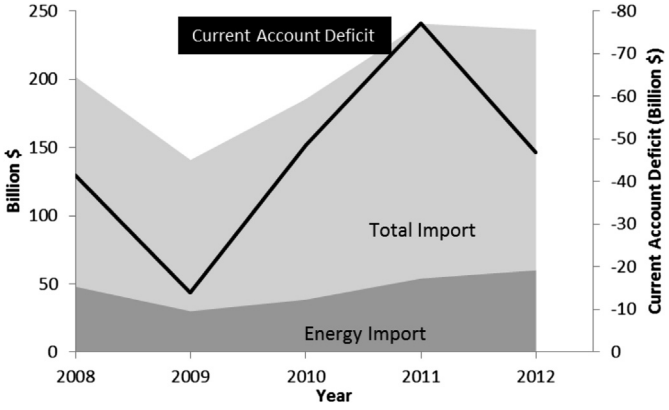


**Fig. 1.** Energy & total import values and current account deficit of Turkey.

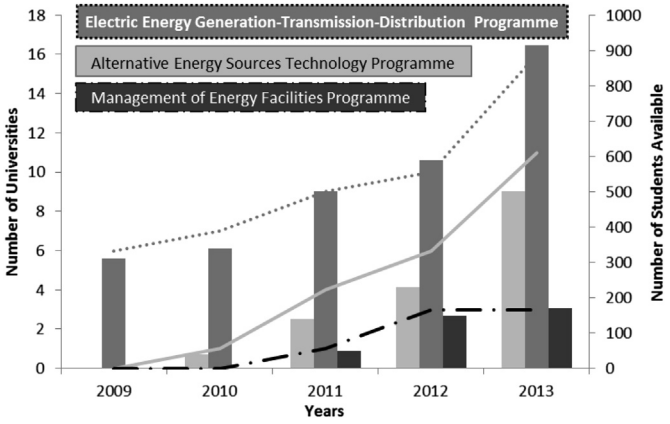


**Fig. 2.** Energy based education programmes in V-TE system in Turkey.

sources. It is expected that increasing energy-based programmes in V-TE will be effective in the development of awareness of social community's energy usage.

Benke and Börsen [9] presented a report about the energy efficiency requirements of Turkey and mentioned that using renewable energy sources has a great importance on economic and environmental aspects. Providing the "energy demand" of Turkey by energy importation which is the most important input for Turkish economy, causes and increases the effect of energy costs on products, environmental pollution and economic fragility.

Jennings [10] prepared and published a study about the changing directions in renewable energy education (REE). According to the study, renewable energy is seen by many as part of the appropriate response to climate change and some National Governments have put programmes in place to support the wider use of sustainable energy systems. This has led to a rapid increase in demand for renewable energy specialists who are able to design, install and maintain such systems. Most engineers are not trained to use these renewable energy technologies and most are not aware of the principles of sustainability. Therefore, there is an urgent need to develop and implement new courses that prepare engineers, scientists and energy planners to work with renewables, to produce sustainable energy generation systems.

In light of this important fact, studies about energy education which is a part of V-TE system are increasing day by day.

Hasnain et al. [11], Kandpal and Garg [12–14], Benchikh [15], Jain et al. [16], Keser et al. [17]and Açıkgöz [18], created a renewable energy education programme in their formal education system and presented a relation between the energy-environment-education and the policies of the developing countries.

Bhattacharya [19], Bojic [20], Karabulut et al. [21], and Chen et al. [22], focused on the renewable energy education potential of their educational system in different levels and identified the education level by using different questionnaire and statistical models.

Lund and Jennings [23] determined the range of participation to undergraduate and postgraduate university courses about renewable energy via World Wide Web.

Dias et al. [24] discussed barriers that are presented in the projects applied to energy conservation, by making clear that education is one of the best way to transform the human behavior for the rational use of energy. According to the study, despite the existence of some programmes that focus on energy conservation, the populations, in its majority, are not conscientious about the strategic importance that represents the national development. Thus energy education programme must be developed and took place in all level of education system.