

## THE OPINIONS OF HIGH SCHOOL STUDENTS REGARDING ENERGY AND ITS PROBLEMS

Esra ÇAKIRLAR

Hacettepe University, SSSM Education Department, Biology Education, 06800 Beytepe, Ankara, Turkey  
ckrlr@hotmail.com

Salih Levent TURAN

Hacettepe University, SSSM Education Department, Biology Education, 06800 Beytepe, Ankara, Turkey  
letur@hacettepe.edu.tr

**Abstract:** Energy is an element that we need in every aspect of our lives. Especially because of reasons such as growth of population and increase of life standards, technological advances, industrialization need for energy has increased very much. The necessity of considering energy supplement safety, providing source variety as well as environmental effects in choice of energy sources comes forth.

In this study, by using qualitative research techniques, it is aimed to determine the opinions of the secondary school students, being the adults of the future, about energy issues as the energy is indispensable part of our lives. In line with this purpose, as a tool of data collection, a semi-structured interview form, developed by researchers by taking into consideration the secondary education curricula, is used and it took its final shape in accordance with expert opinions. The semi-structured interview form is applied to 32 students who take education at different Anatolian High Schools. By the analysis we did in light of this study some advices about energy and environmental education have been pointed out.

### 1. Introduction

Energy is our one of the most important requirements whose consumption increases today and will continue to increase constantly in the future. Although energy is not one of the basic requirement of people, it is located in the center of economic, social and environmental dimensions of sustainable development thanks to technological advances (Ediger, 2009).

The energy which finds area of utilization at every stage of daily life may be presented in various forms like chemical, nuclear, mechanic (potential and kinetic) thermal geothermal, hydraulic, solar, wind, electricity, and they can be converted to each other by appropriate methods (Koç & Şenel, 2013).

Sources from which energy is obtained by different methods are defined as energy sources in economic terms and they are classified in different ways. While the energy sources are divided into two according to their usage as renewable and non-renewable, they are classified as primary and secondary energy sources according to their convertibility. While non-renewable energy sources are defined as the energy sources are foreseen to be run out in the near future, the renewable energy sources are defined as that they can renew themselves in the equal amount to the energy obtained from the energy sources or in a more rapid way than the depletion rate of those sources (Kılıçarslan, Peker & Gün, 2011). The form of energy which has not undergone any change or any transformation like petrol, coal, natural gas, nuclear, hydraulic, biomass, tidal wave, solar, and wind is called as primary energy. The energy obtained through the conversion of the primary energy, like electricity, gasoline, diesel, is called as secondary energy.

According to the data of 2014, from non-renewable energy sources mainly petrol (32.6%), coal (30%) and natural gas (23.7%) are used in order to meet the energy requirements of the world (BP, 2015).

That the result of insufficiency of the produced energy to meet the increasing energy demand, resulted from the economic growth and socio-economic changes of countries, reveals the

energy problem due to energy consumption based on fossil fuels; the situation is partially depending on external sources for energy and obtaining the energy at the high prices. In addition, it is known that the energy reveals negative effects forth environment in the course of both its obtainment and consumption. The energy problem is regarded as a global issue facing the entire world with political, economic and ecological dimensions.

Environmental problems caused by energy bring up the idea of raising the given importance to energy-environment relationship in world-wide. Association of these two areas is based on producing energy for prosperity of mankind and at the same time that is based on environmental sustainability. Sustainable environment is defined as the process of reformation, protection and improvement of all the values which constitute the environment of both today's and future's generations by not jeopardising existence and quality of sources required by the future generations, existence and quality (Erkul, 2012).

Energy and activities related to energy cause air pollution directly or indirectly. The most important problems reveal as a result of air pollution are acid rain, thinning of the ozone layer and greenhouse effect. The main known effects of acid rains can be listed as the destruction of life of creatures and fishes because of acidification of lakes and groundwater and the destruction of forests, agricultural products, buildings and metal structures (Selici, Utlu & İlten, 2015). Acid rains come with the water and soil pollution, moreover; thermal power plants, in which coal is used for fossil fuels, causes radioactive contamination like nuclear power plants and that is an another pollution occurs during the energy production (Anonim, 2015).

Although there is no energy which has no negative properties, by the conscious use of renewable energy sources, it is possible to minimize the pollution. In this term; the concept of sustainable energy is; the obtainment of the energy from all of the primary energy sources with high-efficiency and clear technologies, utilization of the fossil fuels with environment friendly new technologies, utilization of as much as renewable energy sources instead of fossil fuels, utilization of the output energy as an input in another process and combining them with economic development (Mazlum, 1999).

The diversity and sustainability of living creatures in nature are possible with healthy environment. There are many great responsibilities for individuals in the case of constructing and protecting a healthy environment. Supplying the information related to sustainable energy, which will decrease environmental effects occurring more rapidly after the anthropogenic activities resulted from the industrial revolution, in schools is a requirement.

In the study by Ünal and Dımişkı (1998), it is indicated that it is the secondary school where individuals can be taught about environment most effectively. The concept of sustainability is defined in secondary school biology lesson 9th grade textbooks. Economic, social and environmental dimensions of sustainable development are discussed and its economic and social dimensions are mentioned under the title of sustainability of natural sources (Meb, 2014).

## 2. Method

In this study, by using qualitative research techniques, it is aimed to determine the opinions of the secondary school students, being the adults of the future, about energy which is indispensable part of our lives and energy issues. Qualitative research is defined as a research technique which uses qualitative data collection methods like observation, interview and document analysis, and follows qualitative process in order to put forward perceptions and cases in the subject matter natural environment in a realistic and holistic way (Yıldırım & Şimşek, 2011).

In this study, as a tool of data collection, a semi-structured interview form, developed by researchers by taking into consideration the secondary education curricula, is used and it took

its' final shape in accordance with expert opinions. The semi-structured interview form, including 8 open-ended question, is applied with 20 minutes interviews to 32 students who take education in an official teaching institution located in the province of Ankara.

**Table 1: Class Level Of The Students In The Study**

Class Level	f	%
9	6	18.7
10	11	34.4
11	10	31.3
12	5	15.6

During the interviews; sound recording device was used and interviewed students' verbal permission was taken before the recording, moreover; students were informed about that their identities will be kept completely secret and the things spoken during the interview will not be used for an another purpose excluding this research. Necessary precautions were taken in order to prevent participants' being directed. Following interview; the data are transferred to the electronic media.

The descriptive statistics method is used in the analysis process of the data obtained from interviews. For each question, categories were identified by examination of the obtained data, then the data are classified within the framework of these categories and results are defined.

### 3. Findings

According to the findings of this study; it was identified that firstly, secondary school students' level of knowledge about energy and energy issues were quite inadequate, in addition; the economic dimension was thought when the energy issue was the subject matter, next they could not configure energy and environment in their mind as a whole, and lastly the consciousness of sustainable environment in had not arisen in students' mind.

As a first question, "How can you define the concept of sustainable environment?" is asked to secondary school students participating to research. While 68.7% of students could not express opinion about this concept, 31.3% of them tried to define it. Some students' opinions about the sustainable environment notion are below:

**S4:** *It is continuation of natural life without losing its continuum. It is the continuation of every animate and inanimate factor, which constitutes the environment.*

**S16:** *Sustainable environment , keeping natural balance without disrupting.*

**S27:** *Environment in which natural resources are not exhausted.*

The second question asked to students is; "What does sustainable energy source mean to you?" answers given to this question were gathered under the two categories.

40.6% of students defined sustainable energy as the energy always exists using the word "sustainable" as a base. 59.4% of the students expressed this concept as renewable energy.

Third question asked to students is "What does the energy problem issue reminds you?". Answers given by students were gathered under four different categories.

**Table 2: Categories of Third Question.**

Categories	%
Remaining incapable of meeting to requirement of energy	34.4
Obtaining the energy with high-prices	43.7
Unconsciously consumption of energy	12.5
No idea	9.4

The fourth question asked is “*How can you associate energy and environment notions?*” Answers given to this question are examined in 3 categories and are shown in Table 3.

**Table 3: Categories of Forth Question.**

Categories	%
Utilized energy sources cause to environment pollution.	43.7
Environment serves energy sources.	21.9
There is no relationship between energy and environment.	34.4

“*In your opinion, what is the one of the most important environmental issue caused by energy?*” was asked as fifth question and categories were identified according to the students’ answers. Table 5 which is created in accordance with the categories is as below.

**Table 4: Categories of Fifth Question**

Categories	%
Declination of bio-diversity	28.1
Increment of air pollution	28.1
Increment soil pollution	3.1
Increment water pollution	3.1
Increment radioactive pollution	15.6
Declination of natural sources because of unconscious consumption	22

As the sixth question; “*How do you evaluate the environmental damages of energy obtainment from renewable and non-renewable energy sources?*” question was asked to the students. The question was answered by all the participant students as “Non-renewable energy sources have bad effects for environment, but renewable energy sources do not have such effects”.

**S21:** *The use of fossil fuels damages the environment. Especially thermal power plants triggers environmental problems more, but renewable energy sources do not pollute environment.*

**S23:** *Environmental dimensions of renewable and non-renewable energy sources are different. For example; coal damages people and it will run out soon, but renewable energy sources is not like them, so they will exist constantly.*

**S32:** *Renewable energy sources take part in the nature’s cycle. But non-renewable energy sources affect the environments in a negative way.*

As seventh the question; “How can be raised consciousness of our people about energy and its issues” question were asked. The categories of the questionnaire as below on Table 5.

**Table 5: Categories of Sixth Question**

Categories	%
School	28.1
Family	9.4
Internet	15.6
TV- Radio	31.2
Newspaper – magazine	9.4
Volunteer people or organizations	6.3

**S1:** *School , internet , TV and radio. Because internet is used so much in our country. When there are lessons about this issue in our schools and students are educated, their family also will be informed. TV and radio are for old people.*

**S23:** *Raising public awareness should start from families, then; it should continue in school. If family teach their kids not to turn-on the light when it is not necessary, the kids already acquire this behaviour.*

As a last question; “In your opinion what can be the most effective solution for energy problem?” is asked to students. The categories identified according to answers as below on Table 6.

**Table 6: Categories of Seventh Question**

Categories	%
Increasing the usage of renewable energy sources	37.5
Raising awareness of community about consumption of energy	18.7
Diversifying energy sources	37.5
Buying energy or its source from abroad	6.3

#### 4. Conclusion and Discussion

The importance of issues about environmental protection is increasing continuously around the world. When environmental pollutants are observed from a general point of view, environmental pollution resulting from the use of energy sources constitutes the most important part of energy-environment relationship.

Because environment – energy, which is in the scope of this study, mainly takes place in 9th grade biology textbooks, it was considered that the knowledge level about energy,

sustainability and energy issues of the student studying in secondary education in 9th grade and next grades is high. Actually; in the light of the study results, it is determined that the knowledge of secondary school students about energy and energy issues are inadequate, nonetheless, they could not figure the energy and environment issues as a whole and awareness of the students about sustainable environment and sustainable energy has not occurred yet.

Determined situation reflects that the reason behind this situation can be the subject matter units' not being permanently learned as a result of its not being included in accordance with the principles of spiral program in the biology textbooks except 9th grades. Studies in the literature clearly indicate the role of spiral programme approach in increasing knowledge level of students (Eisen & Stavy, 1988; Tekkaya & Balcı, 2003; Arslan, Ercan & Tekbıyık, 2015; Kozikoğlu, 2015). In spiral approach previously learned certain subjects are presented again and again in a broader and deeper scope (Demirel, 2012). Spirality enables students to have adequate opportunities to be able to repeat important concepts (Goodlad & Su, 1992).

There is not any question related to natural environment in the context of the study, because it is assumed that the secondary school students have basic ecological knowledge given in primary school; however, it is determined that students in all grade levels could not express even the concept of environment exactly. It is seen that the results of our study consistent with the results of the other studies in the literature (Yürümezoğlu, Ayaz ve Çökelez, 2009; Oğuz, Çakçı & Kavas, 2011).

In our study; it was determined with interviews that students, arguing that the most effective solution to eliminate the energy-induced environmental problems is renewable energy sources, actually have very little knowledge about the advantages and possible disadvantages of renewable energy sources. Also; the studies in literature about renewable energy sources indicate that individuals have not enough knowledge with regard to renewable energy (Yılmaz et.al., 2010; Karabulut, Keçebaş, Gedik & Alkan 2011; Tobin et. al., 2012; Bilen, Özel & Sürücü, 2013).

In consequence of various reasons such as increasing welfare level and developing technology, increments on the production, transmission and consumption of energy are observed, and the environment is affected in a negative way in all those cases. It is thought that educating today's youth about environment plays an important role for bringing up adults who will fulfil the conscious energy production, transmission and consumption. With environmental education; making individuals aware about environment and objectives related with protecting the environment are aimed (Özoğlu, 1993). In the context of environmental education; it is expected from individual that s/he should be aware of why s/he needs to learn information about environment, besides where and how s/he will use this information, and what will bring this knowledge to him/herself and to future generations (Nazlıoğlu, 1991). Giving environmental education in the context of formal education is quite important for younger generations' being able to grow with environmental awareness. Educating conscious youth about environment means guaranteeing both the future of society and environment. It should be noted that the developed societies are the societies that are able to minimize the environmental problems.

In the light of these findings; it is considered that reviewing the activities of lessons on issues related to the environment is necessary. In order to bring up more sensitive generations towards damaged environment as a resulted of anthropogenic reasons, it is recommended that sustainability – environment and natural resources subjects, included in 9th grade biology textbook, be broadened and be included regarding the principle of spirality, nevertheless, in addition to formal education, informal education be extended by the trips organized to energy production sites, besides considering the close relationship between media and

communication devices and today's youth, especially energy saving and various dimensions of the subject be brought forward thanks to those devices.

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