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The High School Students' Perceptions and Attitudes Toward Bioenergy

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ABSTRACT

This research, which was tried with 217 high school students, was carried out to determine the perceptions and attitudes related to the usage of bioenergy. The research results showed that the students had the perception that there would be lack of food due to global warming, but bioenergy would prevent the world from global warming. Moreover, they also assumed that forests are not sustainable in terms of global and local context. However, this study revealed that they had a tendency to learn and use bioenergy. It was also observed that there were different views between the male and female participants about the usage of wood and cutting trees down to produce energy. Finally, stepwise regression results showed that social environment affects one's environmental intent related to bioenergy use.

KEYWORDS
Attitude, bioenergy, gender, high school students, perception

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Introduction

Energy is a vital issue in Cyprus (Jaramillo – Nieves & del Rio, 2019). The island of Cyprus is dependent on imported fossil fuel in terms of energy which is a crucial problem that needs to be solved urgently. The cost of imported fossil fuel is rather high, very harmful for the environment, and their need for energy increases day by day (Kassins, 2011, 2008). The energy problem has led South Cyprus to produce natural gas in Eastern Mediterranean and tend to renewal energy with the EU involment. Whereas, the energy problem is still an urgent issue. In the north of the island, electricity, heating and cooling, cooking and transportation is provided with high-cost imported fossil fuel. Therefore, it is an urgent necessity to reach to alternative sources to meet the increasing energy

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needs in North Cyprus (e.g. Omria & Kahouli, 2014; Pirlogea & Cicea, 2012; Stern, 2014).

The variety in energy and its production has an effect on the economy and social structure (Akella et al., 2009; Asafu-Adjaye, 2000; Ayres et al., 2013; Bergmann et al., 2007; IRENA, 2014; Reddy, 2000; Omer, 2009; Sten & Cleveland, 2004; Tsoutsos et al., 2005; WEF, 2012; Wall, 1997). For this reason, the world countries are becoming more interested in renewal energy with less costs and a great role in solving environmental problems. One of these resources is bioenergy (IEA,2007). The most widely known source of energy is wood, which is used in heating and cooking in cold days, but today there are different different types of bioenergy, such as biogas, geothermal energy and biofuel, used in transportation and for generating electricity which plays an important role on the sustainability of economy (WBA, 2014).

Bioenergy is obtained from biomass, which consists of carbon hydrates, components of industrial and household wastes, agriculture and forestry. These sources include organic materials (IEA, 2009). Bioenergy, an animal-plant origin, can be in the form of liquid, gas, and solid (WBA, 2014). It has a positive effect on natural environment, social economy and climate (Creutzig et al., 2014; Fritsche, 2010; Remedio & Domac, 2003; Popp et al., 2014). Bioenergy is of great significance for reducing global warming and fossil fuel dependency, reducing the CO^2 emission (Daynard & Daynard, 2011), creating jobs for the people in rural areas (UNESCO – SCOPE – UNEP, 2009), and reducing the volume of the wastes from occupying a space in the systems for waste disposal since there is a decrease in the volume and mass of the biomass (Cantrrel, 2008; IEA, 2005). Bioenergy also contributes to the waste recycling and allows disappear of disease factors originating from manure threatening human health and underground water resources. However, bioenergy has negative impact on the surroundings, seeds, and the food costs (Daynard & Daynard, 2011; UNESCO – SCOPE – UNEP, 2009; FAO, 2008). For example, unwanted effects of biofuel on agricultural protection and processing of flavour may emerge (FAO, 2008). Therefore, biofuel production, which is sustainable and efficient, must be supported (Peskett et al., 2007). Pro-environmental behavior has an important role on sustainable bioenergy.

Pro-environmental behavior is an important concept in psychology. It is a conscious behavior aiming at minimizing negative activities by individuals in our natural and artificial world. In other words, it includes the less harmful, even the most useful behaviors for the environment (Steg & Vlek, 2008). Pro-environmental behavior is based on environment/ecology knowledgement, environmental friendliness/unfriendliness and its judgment of its effects on the environment. For sustainable energy, the individuals' behavior and their decisions affecting their behavior (Müderrisoğlu & Altanlar, 2011). Pro-environmental behavior is affected by factors such as external 8culture, economy etc.), and internal (values, perception, attitude etc.) (e.g. Müderrisoğlu & Altanlar, 2011; Kollmuss & Agyeman, 2002). Among these, some studies demonstrate that demographic properties such as gender and age have an effect on pro-environmental behavior and attitude of the human (e.g. Boztepe, 2012; Karytsas & Theodoropoulou, 2014; Wright, 2011). Attitude and perception are two of the factors affecting an individual's daily life. Attitude helps us explain how we perceive an event and behave towards an object. Strictly speaking, positive or negative tendency of an individual against an object interests his/her attitude.

Attitude consists of three elements such as feeling, belief, and action (Pickens, 2011). Perception is also closely related with attitude. Perception is a fact that a person discusses or gives a meaning to the situation he/she meets himself/herself. Perception consists of three elements- selection, organization, and interpretation. During perception, awareness and acceptance towards stimuli play an important role (Pickens, 2011).

Social factors also have a great effect on perception and attitude to sustainability of renewable energy (Kollmuss & Agyeman, 2002). Schools contribute to awareness of the society towards renewable energy and pro-environmental behavior (Halder et al., 2011). Educating individuals on their views such as increasing social awareness, upgrading motivation, developing innovative solutions, and applying them for sustainability of bioenergy is of utmost importance (Michangel, et al., 2014).

When literature is overviewed, it is seen that a study on renewable energy has not been done yet in North Cyprus. So the aim of this study is to determine the attitudes and perceptions of the Turkish Cypriot high school students toward bioenergy.

The framework of this study included the following questions;

1. to investigate the perceptions and attitudes of high school students towards bioenergy in North Cyprus
2. to find out the predictors of perceptions and attitudes towards bioenergy in terms of pro-environmental intent, considering sustainability, social environment, critical environment, and learning.

This research will contribute to the matter-related courses in classes to find out Turkish Cypriot high school students' predictions about bioenergy. This research will also be useful for us to estimate the participating students possible decisions for the future.

Materials and Method

Sample

217 ninth class students ranging between the age of 14 to18 with an age average of 15 (sd.:1.19) taking bioenergy courses participated in this study. The samples, 47.5% (103) female and 52.5% (114) male, were randomly selected from 4 high schools [24.3% (55) from vocational, 24.9% (54) from private and 49.8% (108) from general high schools].

Questionnaire

The questionnaire included a personal information form with attitude and perception scales towards bioenergy. The scales were developed by Hadler et al., (2010). These scales were also used comparatively in Turkey, Slovakia, Finland, and Taiwan in 2011, 2012, and 2013. During the studies, these scales were translated into each of the above languages and were synchronized to ensure unity in the analysis among these countries. Bet to be the subject of these studies, articles 13 and 7 in scales belong to perception and attitude, respectively. The scales translated into Turkish were obtained from researchers in Turkey taking into account conditions in North Cyprus. The articles, "I want to visit the bioenergy plant" and "The establishment of tree plants for bioenergy" were not included in the study. As a result, 12 perception and 6 attitude items were dealt

with. According to the data obtained from Turkish Cypriots, confirmatory factor analysis (CFA) was applied to determine the perception towards bioenergy and the key dimensions of attitude scales. Exploratory factor analysis (EFA) was used to determine the key dimension factorial structure in scales since the expected results were not obtained from CFA. For the reliability of the key dimensions obtained from the attitude and perception scales, the item-total-correlation and distinctiveness was examined through Cronbach alpha.

The Validity and Reliability Analysis of Perception Scale towards Bioenergy

EFA with 12 items was carried out without determining a factor number to the perception scale towards bioenergy. It was observed that there were five factors greater than one of the eigenvalues. When the factor analysis was done the second time, the variance was 40% greater and the number of the factor was limited by three (Table 1).

Table 1. Principal Components Analysis (with Varimax Rotation) Loadings of Perception Items

	1.Trial (Limited by three factors) Varimax Rotated Factors			2. Trial (Limited by three factors) Varimax Rotated Factor		
	Factor1	Factor2	Factor3	Factor1	Factor2	Factor3
p02	**0.732**	0.080	-0.072	**0.713**	0.142	-0.059
p03	**0.643**	0.188	-0.039	**0.632**	0.112	0.212
p11	**0.625**	0.115	0.205	**0.622**	0.240	-0.032
p05	**0.525**	-0.179	-0.066	**0.568**	-0.213	-0.072
p04	**0.496**	-0.035	-0.358	**0.527**	-0.050	-0.358
p12	0.024	**0.777**	-0.028	-0.002	**0.759**	-0.014
p13	0.012	**0.743**	-0.050	-0.022	**0.742**	-0.028
p01	0.245	**0.516**	0.054	0.192	**0.575**	0.079
p10	-0.209	**0.322**	0.202	---	---	**---**
p08	-0.172	0.032	**0.716**	-0.178	0.000	**0.711**
p07	-0.076	-0.039	**0.630**	-0.087	-0.049	**0.626**
p09	0.274	0.071	**0.542**	0.251	0.093	**0.564**
Loadings greater or equal to an absolut evalue of 0.50						
The result of the Varimax Rotation						
Eigenvalues		2.213	1.646	1.270		
% of Variance		17.301	13.515	30.817		
Cumulative %		17.301	11.928	42.744		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy:0.592						
Bartlett test of sphericity chi-square value = 268.437, df= 66 p=0.000						

Kaiser – Meyer – Olkin statistics were found 0.592 and it is greater than 0.50. This result confirmed that the number of the samples was sufficient. Barlett global test results also approves that the data was suitable for the factor analysis ($p<0.05$) (Yange & Pearce, 2013). In Table 1, 43% of the variance is explained by 3 factor-structures of 12 item-scales.

According to the second factor analysis result, when the factor weights are examined, the 10th item has a 0.50 less factor weight and was extracted from the scale and replaced by the 3rd factor analysis. On the other hand, it was observed that the remaining 11 items were greater than 0.50. This showed that the weight values of the 2nd, 3rd, 4th, 5th, and 11th items range between 0.527 and 0.713. The weight values of the 1st, 12th, and 13th items range between 0.575 and 0.759. The weight values of the 7th, 8th, and 9th items range between 0.564 and 0.71.

When looked through the Cronbach Alpha value for the reliability of the fundamental dimensions of the bioenergy perception scale (Gliem & Gliem, 2013), it is seen that the co-efficiency varied between 0 and +1. When the co-efficiency is close to 1, it can be said that the reliability and the consistency between the items is high (Tavakol & Dennick, 2011). The Alpha co-efficiencies of the three factors perception scale is shown in Table 2 with the item-total correlations known as the item validity co-efficiency.

Table 2. Cronbach Alpha Value and Item-Total-Correlation for Perception Scale

	Corrected Item-Total Correlation	Alpha	Corrected Item-Total Correlation	Alpha if Item Deleted
p03	0.411	0.618	0.411	0.618
p02	0.477		0.477	
p04	0.336		0.336	
p05	0.303		0.303	
p11	0.332		0.332	
p01	0.252	0.522	0.252	0.522
p12	0.387		0.387	
p13	0.375		0.375	
p07	0.239	0.370	0.284	0.442
p08	0.306		0.284	
p09	0.113		---	

According to the results, the alpha reliability of the first factor with 5 items was found as 0.618 and the item-total correlation changes were in the range of 0.332 and 0.477. The alpha reliability of the second factor with 3 items was found as 0.522 and the item-total correlation changes were in the range of 0.252 and 0.387. As for the alpha reliability of the third factor with 5 items, it was found as 0.37o and the total-item correlation changes were in the range of 0.113 and 0.306. When the 9th item, with a total-item correlation lower than .020, was extracted, it was seen that the alpha reliability correlation of the third factor became 0.442.

The Validity and Reliability Analysis of Attitude Scale towards Bioenergy

Without determining the factor number for the attitude towards bioenergy with 6 items, EFA was performed and it was observed that there were two factors whose eigenvalues were greater than 1. The explained variance of the structure with 2 factors was %62. The results belonging to variance, eigenvalues and factor values obtained limiting the factor analysis with two factor numbers for two times and together with Varimax rotation process are shown in Table 3.

It can be assumed that the number of samples was sufficient for data when Kaiser – Meyer – Olkin statistics is 0.664 or in case this statistics is greater than 0.50. According to Bartlett's Test of Sphericity, it was observed that the data was suitable for factor analysis $p<0.05$. When the factor weights were examined, the 16th item factor weigh was less than 0.5 and was extracted and the factor analysis was tried for the third time. The results showed that the 17th, 18th, and 19th items were in the first factor and the factor weights changed in the range of 0.658 and 0.888. The 14th and 20th items were in the second factor and the factor weights were 0.827. All the factor weights were greater than 0.50.

Table 3. Principal Components Analysis (withVarimax Rotation) Loadings of Attitude Items

	1.Trial (Limited by two factors) Varimax rotated factors		2. Trial (Limited by two factors) Varimax rotated factor	
	Factor 1	Factor 2	Factor 1	Factor 2
a18	**0.869**	0.054	**0.888**	0.080
a19	**0.858**	-0.028	**0.885**	0.011
a17	**0.680**	0.299	**0.658**	0.258
a16	**0.467**	**0.379**	---	**---**
a14	0.082	**0.817**	0.120	**0.827**
a20	0.092	**0.790**	0.091	**0.827**
Loadings greater or equal to an absolut evalue of 0.50				
The result of the Varimax Rotation				
Eigenvalues	2.492	1.223		
% of Variance	36.428	36.428		
Cumulative %	25.483	61.911		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy:0.664				
Bartlett's Test of Sphericity: Approx. Chi-Square= 293.641 df= 15 p.=0.00				

The alpha coefficients of structure with two factors of the attitude scale together with item-total correlations of scale item are given in Table 4.

Table 4. Cronbach Alpha and Item-Total Correlation for Attitude Scale

	Corrected Item-Total Correlation	Alpha
a17	0.452	0.762
a18	0.688	
a19	0.655	
a14	0.410	0.582
a20	0.410	

The results showed that the alpha reliability of the first factor with 3 items was found as 0.762 and the item - total correlations changed in the range of 0.542 and 0.688. The alpha reliability of the first factor with 2 items was found as 0.582 and the item-total correlations were 0.410.

Because there were no values less than 0.20 for item-total correlations in attitudes and perceptions towards bioenergy and the number of items was small, the factors with low alpha co-efficient was taken into account in this study.

The obtained key dimensions by Halder et al., (2011, 2012, 2013) was referred to for the validity and reliability analysis done to determine the attitude and perception scale size towards bioenergy. In this research, the first factor of the perception scale was named as “considering sustainability” and the second and third factors were named as “social environment” and “critical environment” respectively. In the attitude scale, the first factor was named as “learning” and the second factor was named as “pro-environmental intention”.

Analysis

The data was analyzed by means of SPSS 22 program. After validity and reliability studies were carried out, descriptive statistical analysis, t test, and stepwise regression techniques were used for analysis. Before t test analysis, Skewness and Kurtosis values were controlled for the distribution of the data and

it was seen that the distribution was normal. During the stepwise tolerance, VIP values were controlled to evaluate the regression overlapping of the values.

Results and Discussion

Descriptive Analysis for Perception and Attitude toward Bioenergy

The descriptive analysis results of 11 items related to perception and 4 items related to attitudes towards bioenergy are shown in Table 5. In order to specify the differences among male and female students' attitudes and perceptions towards bioenergy, T test analysis was done and the results are shown in Table 5. When Table 5 is examined, it can be seen that more than half of the students supported the following opinions; "More use of bioenergy can mitigate the global warming problem (57%, item 1)", "Natural energy should not be used for bioenergy production (53%, item 7)", "Clear felling (cutting down all the trees in one area) for bioenergy production should not be promoted (54%, item 8)", "Politicians should support research and developmental work in bioenergy in the society (52%, item 10)". However, half of the students disapproved the following assumptions. "Production of energy from wood is environmentally friendly (59%, item2)", "Cutting down trees for energy production is justified (66%, item 3). These results show that 40% of the students in North Cyprus do not have a clear opinion about "Production of bioenergy from forests is sustainable in North Cyprus". While %38 of the students supported the idea, "Bioenergy production from forests is sustainable globally (item 5)", 40% are undecided about the same item. 42% accepted "Wood-based energy would be the major source of energy in the future (item 11)". Similarly, 47% confirmed the idea, "Usage of bioenergy instead of gasoline and diesel in the future". However, %41 of the students think that bioenergy will affect food production negatively (item 13)". 38% support the growing awareness of bioenergy in the society (item 9), but 41% are still undecided about the item.

As seen in Table 5, most of the students (75%) want to learn about bioenergy and half of them (50%) want to use it in their cars. 42% prefer to use bioenergy in their houses. %30 has demonstrated a clear idea on the usage of bioenergy in houses. Moreover, more than half of the students (59%) want to discuss the bioenergy subject with their teachers and nearly half of them (44%) want to discuss the same issue with their families. According to the T test results, there is a considerable gender effect only on the subject "Energy production from wood is environmentally friendly", "Cutting down trees for energy production is justified" and "Politicians should support research and development work in bioenergy in the society". This perception seemed to be higher with boys than girls.

The Results of Regression Analysis

The routine statuses of the pro-environmental intent, considering sustainability, social environment, critical environment, and learning of the students were tested by stepwise regression. The findings are as follows in Table 6.

Table 5. The Results of Descriptive Analysis and T Test About Bioenergy

İtems	Acceptance	DKn	Rejection		T test
Perception	% (n)	% (n)	% (n)	Mean	P
1. More use of bioenergy can mitigate the global warming problems	**57 (124)**	31 (68)	11 (23)	Girl=3.63 Boy=3.80	.26
2. Production of energy from wood is environmentally friendly	26 (56)	16 (34)	**59 (127)**	Girl=2.25 Boy=2.63	.03*
3. Cutting of trees for energy production is justified	24 (51)	9 (20)	**66 (144)**	Girl=2.03 Boy=2.41	.03*
4. Production of bioenergy from forests is sustainable in Northern Cyprus.	29 (63)	**42 (92)**	28 (60)	Girl=3.01 Boy=2.93	.59
5. Production of bioenergy from forests is sustainable globally	38 (83)	**40 (86)**	22 (47)	Girl=3.27 Boy=3.11	.25
7. Natural forests should not be used for bioenergy production.	**53 (114)**	18 (43)	28 (54)	Girl=3.46 Boy=3.31	. 42
8. Clear felling (cutting all the trees in an area) for producing bioenergy should not be promoted.	**54 (120)**	20 (43)	25 (54)	Girl=3.60 Boy=3.40	. 31
9. There is growing awareness of bioenergy in the society.	38 (82)	**41 (89)**	21 (46)	Girl=3.22 Boy=3.18	.78
10. Politicians should support research and developmental works in bioenergy in the society	**52 (112)**	31 (67)	13 (28)	Girl=3.38 Boy=3.68	.04*
11. Wood-based energy would be a major source of bioenergy in future	**42 (91)**	35 (77)	22 (48)	Girl=3.28 Boy=3.23	.75
12. Bioenergy can replace the use of oil and gas in future.	**47 (102)**	35 (76)	17 (37)	Girl=3.37 Boy=3.47	.49
13. Increasing bioenergy production will decrease food production.	**41 (89)**	38 (82)	21 (45)	Girl=3.21 Boy=3.32	.47
Attitude					
14. I would like to drive a car in future that runs on biofuel (such as ethanol).	**50 (109)**	26 (56)	24 (52)	Girl=3.24 Boy=3.49	.14
16. I would like to study more about bioenergy in future	**73 (158)**	12 (25)	16 (34)	Girl=4.00 Boy=3.76	.13
17. I would like to discuss more about bioenergy with my teachers.	**59 (128)**	18 (39)	23 (50)	Girl=3.69 Boy=3.40	.09
18. I would like to discuss more about bioenergy with my parents.	**43 (93)**	26 (56)	31 (58)	Girl=3.22 Boy=3.03	.25
19. I would like to discuss more about bioenergy with my classmates.	**44 (95)**	26 (56)	30 (66)	Girl=3.29 Boy=3.07	.19
20. I would like to use bioenergy at home in future.	**42 (90)**	33 (72)	25 (55)	Girl=3.07 Boy=3.35	.10

* P < 0.05

Table 6. Multiple Regression Analysis for Variables Predicting Pro-Environmental Intent (N = 217)

	B	SE B	*β*	Tol.	VIF	R^2	F for change in R^2	Durbin-Watson
Model 1								1.711
Constant								
Social environment	0.51	0.09	*0.37***	1.00	1.00	0.137	33.590**	
Model 2								
Constant								
Social environment	0.49	0.09	*0.36***	0.99	1.00	0.179	22.940**	
Learning	0.21	0.06	*0.21***	0.99	1.00			
Model 3								
Constant								
Social environment	0.49	0.09	*0.36***	0.99	1.00	0.199	17.425**	
Learning	0.19	0.06	*0.19***	0.98	1.02			
Critical environment	0.14	0.06	*0.15**	0.96	1.02			

*p < .05, **p < .001

According to the findings, three models were found suitable. Among these three models, the social environment point is the only independent factor affecting pro-environmental intent points. In the second model the social environment scale and the learning points are the two independent factors affecting pro-environmental intent points. In the third model, social environment, learning and critical environment points are the three independent factors affecting pro-environmental intent points. Here, it is suitable to consider the third model with three independent variables describing the dependent variable because the described variance in this model is much higher. The rate effect of considering sustainability, social environment, critical environment, and learning points of the students on the pro-environmental intent points is %19. When Durbin-Watson statistics is evaluated, the changes are in the range of 0-4 (Field, 2008). For the regression analysis it is required that there must not be auto correlation among independent variables. By Durbin-Watson value, the correlation is needed to be between 1.5 and 2.5. In this model, the correlation was 1.711, which is suitable for values for multiple regressions. Strictly speaking; the assumption is that there is no correlation among the independent variables. When the developed models were tested whether they were significant or not according to F results. The" p" value was set as 0.01, which is meaningful. This indicates that the developed regression models are valid. When Tolerance and VIF values were examined to see whether they had multiple directional connection (VIF<10 and Tolerance >0.10), it was observed that independent variables did not cause any multiple directional connection problems. From this, it is understood that social environment, critical environment, and learning points of the students have a considerable effect on the pro-environmental invent points ($p<0.05$). It was also observed that social environment – one of the three independent variables- is the one that affects the pro-environmental intent points. As a result, it is clear that the independent variables contribute positively on the pro-environmental intention variable.

Conclusion

The contribution of the renewable energy sources proposed for the solution of energy problems on islands cannot be denied for social and environmental sustainability. The expansion of renewable energy sources depends on local facilities, conditions, and stakeholders' acceptation and awareness (Jaramillo – Nieves & del Rio, 2010). On the other hand, contribution of the holders to renewable energy sources is related to their perception and attitude towards its benefits. In this study, the attitudes and perceptions of Turkish Cypriot high school students towards bioenergy were questioned and a positive result was reached. However, their attitudes towards the usage and learning about bioenergy are more positive compared to their perception. While this result seems parallel to the study by Halder et al. (2012, 2013), it is a contradiction to the study by Alemsyehu et al. (2015). When we examine the results in detail, we see that the students believe in the positive effects of bioenergy on global warming. Interestingly, this result is contradiction with the results of some studies in literature (Halder et al., 2011, 2012, 2013). For Daynard & Daynard (2011); IEA (2007); WBA (2014), bioenergy has a positive effect on global warming whereas the students believe in negative effects on food production. These studies revealed that the relationship between biofuel and food production is positive, but biofuel production has a negative effect on food costs and water usage leading to deforestation (Fargione et al. 2008; FAO, 2008). All these results are related to the students' awareness of the issue.

In another case it was noted that the students objected to deforestation on the whole. This can be because of their incorrect perceptions about the use of forests for various needs. They seem unsure that the sustainable bioenergy will be produced from the forest. When the opinions of the participants are considered, it can be assumed that their awareness and knowledge on bioenergy subjects affect their perceptions and attitudes (e.g. Halder et al., 2011; Kollmuss & Agyeman, 2002).

The ratio of the students who do not know clearly the relationship between bioenergy and community awareness is greater compared to the students who know the relationship. However, less number of students' reject community awareness of bioenergy. According to this result, the students are ambivalent about community awareness of bioenergy. This shows a parallelism with Halder et al. (2011, 2012). Studied done on defining the relationship between community awareness and energy revealed that community awareness of bioenergy is low (e.g. Adelle & Withana, 2008; Segon et al., 2004; Thornly & Prins, 2008). Awareness is important for social acceptance. Hence, the community's approval of widely used bioenergy on the world (IEA, 2005) will contribute to bioenergy to grow and be used sustainably. At the same time, more than half of the students insist and emphasize the importance of support by politicians on research-development studies on bioenergy.

This research revealed that tendencies towards bioenergy learning and willingness are positive. Similarly, Halder et al. (2011, 2012, 2013) and Hu (2014), in their studies, stated that tendencies of the participants towards bioenergy were positive. Contrary to this, Alemayehu et al. (2015) argue that the participants' tendencies towards renewable energy and bioenergy are uncertain. Attitudes of the students towards bioenergy use and learning do not differ between genders. This result has similarities with some other studies carried out between genders

on the subject matter (e.g. Saka & Şahintürk, 2013). Previous studies revealed the effect of gender on attitudes towards renewable energy subject (e.g. Karlstrom & Ryghaug, 2014).

Learning, social environment and critical environment affect the intention of the students towards bioenergy use. The most affective variable is social environment. Here, it can be seen that environmental perception affects one's environmental tendencies. The variable affecting intention towards bioenergy use is critical environment which may be result of perceptions on cutting down trees and use trees for bioenergy. After applying the stepwise regression, the size of difference between pro-environmental intention and attitude by the students become clearer.

This research showed the participants' attitudes in accepting that bioenergy will reduce global warming, but they object to local and global deforestation and the usage of forests. The basics of community awareness of sustainable energy and energy technologies are laid in schools (Halder et al., 2011). Educators will help students develop themselves on renewable energy, energy technologies, and sustainable energy use. They must write a curriculum related to sustainable energy and update technologies. Student awareness of energy and technology can be studied in the light of the curriculum. It should not be ignored that teachers' knowledge of the subject and their skills affect the teaching and learning process (e.g. Jadama, 2014). The findings in this research cannot be generalized to the whole community since the participants were limited to a specific number. Therefore, a wider range of participants can contribute to community awareness and acceptance in future studies related to bioenergy.

In conclusion, with this research we tried to put forth the beliefs and trends of Cypriot Turkish high school students about bioenergy. The students' learning bioenergy and use of energy technologies are at acceptable level. However, this acceptance cannot be applied to the use of forests for energy production. Moreover, the students' regional and global perspectives to do with forest use are not clear. This may help make new decisions and take steps towards bioenergy issue.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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