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Teaching the Unit 6 in Academic Program of Science and Technology on 8th Grade "Matter Cycles, Recycle and Energy Sources" and Their Effect on Students' Environmental Consciousness (An Izmir City Case Study)

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Abstract: In this study, the impact of the particular subject, which is covered as the sixth chapter in Science and Technology course of the eighth grade, "Matter Cycles, Recycle and Energy Resources" on students' environmental awareness was investigated. At the same time, the effectiveness of the studies which are practiced in the schools in line with the relevant achievements determined by the Ministry of National Education is examined. The survey method was used. The sample contains eight grade students (n=1600) from eighteen schools in Izmir. The data were collected by applying the "Environmental Consciousness Scale" developed by the researcher. Data analysis is made by using SPSS 15:00 Data Analysis Package Programme. According to the results, the environmental consciousness state of the students is turned out to be close to high. It is found that the students are successful in recycling and water saving, but they are dubious about how economical biofuels, acid rains, sun and wind energy are. It is found that female students' environmental consciousness is more than male students' and the awareness level has been different as their schools change. It is understood that the children of high-income level families have a higher level of environmental consciousness than the others. It is found that the education levels of the parents are significantly affecting the level of environmental awareness of the students. Finally, it has been concluded that when the students' academic success level goes up, their environmental consciousness level goes up.

Keywords: Environmental consciousness, Matter cycles, Recycle, Energy resources, Primary education

Introduction

The Environment consists of living and non-living elements. The non-living elements of the environment are humans, plants, microorganisms; non-living elements consist of air, water, geographical formations, buildings and bridges which are both natural and also manmade objects.

Albert Einstein, by describing the environment as "everything outside of me"; emphasizes that the concept of the environment actually has a very broad meaning. (Miller and Spoolman,2010)

As the living elements of the environment; we can mention plants, animals, and people. Non-living elements, on the other hand, are anything but living things, such as water, earth, air, underground sources, and climate. The living and non-living things that make up the environment must be in harmony with each other. According to the natural selection principle of Charles Darwin, those who cannot adapt to environmental conditions cannot continue their lives, they are eliminated from nature.

In terms of cognitive advantages, the human is different from other elements in the environment. From time to time, he may feel himself superior to other things and he can consume other elements unconsciously for their own interests or occupy the living space of other creatures. This wrong attitude and behavior cause environmental problems. It is human to love and protect the environment as well as to harm the environment.

Raising people who have awareness about the environment and who are sensitive to environmental problems is possible with education.

Method

1. Purpose

The purpose of this study is to investigate the impact of the students' environmental consciousness on the topics of "Cycles of Materials, Recycling and Energy Sources" in the 6th Unit of the 8th Grade Science and Technology Curriculum. Additionally, internalization levels of the students the educational attainments, which are determined by the Ministry of Education at the beginning of the semesters, are examined.

Problem

Will the students' consciousness level of environmental issues and their interests to environment increase; when the learning process of the topics "Cycles of Materials, recycling, and energy sources" which are in the 6th Unit of 8th grade Science and Technology curriculum is completed?

Sub Problems

1. Is there any significant difference between students' environmental consciousness and
    a. Gender
    b. The education level of the parents
    c. Socioeconomic situation of the parents
    d. Schools' TEOG Exam success rating?
2. Is there any meaningful correlation between students' environmental consciousness and students' TEOG Exam success ratings?

2. Research Model

In this study, "survey" which is among descriptive research method, is used. In the study, the environmental consciousness levels of the students were assessed before and after the "Living and Energy Relations" unit of the 8th grade Science and Technology lesson focusing on the environmental topics. Therefore, the field survey method was used, the sample was enlarged and the study aimed to represent the Izmir province.

Sample

The target population of the study is limited to 8th-grade students of public schools affiliated to 9 metropolitan provinces, namely Balçova, Bayraklı, Bornova, Buca, Gaziemir, Karabağlar, Karşıyaka, Konak, and Narlıdere. Taking into account the results of the 2015 TEOG (January) examinations, two schools were selected from each of the provinces mentioned above, with high and low success rankings. These eighteen state schools, selected for the sample of the study, constitute 8th-grade students in the 2015-2016 school year (n = 1600).

Instrument and Data Analysis

The "Environmental Consciousness Scale" to be used for data acquisition was developed by the researcher.
The scale was applied to 9th-grade students of İzmir Girls High School in order to measure the degree of reliability of their materials (n = 230). As a result of the analyses made, five items with low-reliability coefficient were removed from the test. Thus, the reliability coefficient of the scale increased from 84 to 86. The items extracted from the scale do not distort the content validity.

The prepared scale was applied twice, before and after the "Life and Energy Relations" unit of Science and Technology Course to the 8th-grade students who constituted the study group.

Analysis of the obtained data was done with SPSS 15.00 Data Analysis Package Program.
Students' personalities and environmental consciousness are compared. While comparing, independent t-test, variation analysis, and simple correlation were used.

1. An independent t-test was used to determine whether the students' scores on the "Environmental Consciousness Scale" differed significantly by sex.
2. Whether the scores that students get from "Environmental Consciousness Scale" show significant difference according to followings:
2.1. Mother and father's education level
2.2. Mother and father's socioeconomic conditions
2.3. School's success rankings in TEOG was determined by using One Way Anova analysis.
3. Whether or not there is a relationship between the TEOG test success of schools and environmental consciousness of students, is determined by simple correlation technique.

Results

1. Overall Performance in the Applied Scale

In the "Environmental Consciousness Scale" that is applied to the students and prepared based on five point Likert scale, there are 17 positive, 14 negative statements. For the statements: " strongly disagree", " undecided", "agree", " strongly agree", students mark one of them, thus indicating their agreement-disagreement degree to the attitude object covered by each statement in the scale.
The score a student gets from the scale is the sum of the scores he/she receives from the items on the scale.

Table 1. Rating key of the ıtems in a likert type scale

Option	Positive Statement Point	Negative Statement Point
Strongly Disagree	1	5
Disagree	2	4
Undecided	3	3
Agree	4	2
Strongly Agree	5	1

According to the scoring system described in table 1, a student can be interpreted as successful on the items she/he gets "5 points", unsuccessful on the items she/ he gets "1". This is valid for all positive and negative statements. A student with a high environmental consciousness is expected to score "5" on given statements.
When the frequency table of each item is analyzed separately in data analysis, the highest frequency for the items; "5" is given for twenty seven items, "4" is given for one item and "3" is given for three items. According to this finding, it can be said that the students are successful in the applied scale.
Two of the three items that students "are undecided" with the highest frequency, relate to renewable energy sources (items 25, 30 and 31).
Item 25 states that "forest resources do not develop parallel with the production of paper in our country." Table 2 gives the distribution of the answers students have given to this item.

Table 2. The distribution of the answers that students have given to item 25

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	1,00	128	8,0	8,0	8,0
	2,00	122	7,6	7,6	15,6
	3,00	480	30,0	30,0	45,7
	4,00	414	25,9	25,9	71,5
	5,00	455	28,4	28,5	100,0
	Total	1599	99,9	100,0	
Missing	System	1	,1		
Total		1600	100,0		

According to Table 2, 480 out of 1600 students, that is 30% of the students, answered the 25th item as "undecided". These students had difficulty in establishing a relationship between paper production and forest resources.

Item 30 "The widespread use of biofuels (organic fuels) derived from seed, sugar and vegetable oil or their mixture can prevent the environmental problems." The distribution of responses of the students to this item is given in Table 3.

Table 3. The distribution of the answers that students have given to item 30

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	1,00	90	5,6	5,6	5,6
	2,00	89	5,6	5,6	11,2
	3,00	500	31,3	31,3	42,4
	4,00	445	27,8	27,8	70,3
	5,00	476	29,8	29,8	100,0
	Total	1600	100,0	100,0	

According to Table 3, 500 out of 1600 students, that is 31.3% of the students, answered the item 30 as "undecided". This suggests that students do not have enough information about organic fuels.
Item 31 states that "I do not find wind turbines and energy production economical because there will not be enough winds in all seasons." The distribution of students' responses to this item is given in Table 4.

Table 4. The distribution of the answers students have given to item 31

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	1,00	207	12,9	12,9	12,9
	2,00	182	11,4	11,4	24,3
	3,00	473	29,6	29,6	53,9
	4,00	339	21,2	21,2	75,1
	5,00	399	24,9	24,9	100,0
	Total	1600	100,0	100,0	

According to Table 4, 473 out of 1600 students (29.6% of the students) answered the item 31 as "undecided". This finding can be interpreted as students need more information about the cost of wind turbines, wind energy and the frequency of use of this energy on Earth.

Table 5. The distribution of the ıtems students have been the most successful

Item no	**Items**	**Points taken from this item**	**Frequency**	**Percent**
1	I can identify recycling logo (icon)	5,00	1230	76,9
4	Pouring the waste oils to the sink is not harmful.	5,00	1073	67,1
13	I pay attention to closing the taps remained open	5,00	942	58,9
17	I am friendly to plants and animals.	5,00	941	58,8
28	While brushing my teeth the tap remains open till I finish brushing my teeth.	5,00	896	56,0
15	It is better to collect the recyclable waste like glass, plastic bottle, and paper separately.	5,00	890	55,6

19	There is no human influence on global warming.	5,00	865	54,1
6	By reducing the paper consumption, cutting off the tress can be prevented.	5,00	863	53,9

Table 5 gives the numerical values of the eight most successful students by taking "5" points with the highest frequency. When the values are examined, students are knowledgeable about the recycling icon and recycled products, and they have awareness about the importance of recycling.

"I pay attention to closing the taps remained open" and "While brushing my teeth, the tap remains open till I finish brushing my teeth." are two statements that assessing the students' attitude towards saving water resource; previous one is positive the latter is negative.

According to table 5, 941 students out of 1600 that is 58.8% of the students state that they are friendly to plants and animals, additionally, 54.1% of the students are in the opinion that humans have the influence on global warming.

2. Environmental Consciousness by Gender

Table 6: Environmental Consciousness Scales' scores results according to Independent T-Test by Gender

Gender	**N**	$\bar{X}$	**S**	**sd**	**t**	**p**
Female	843	123,28	17,03	1492,37	7,44	,000
Male	757	116,32	20,01			

According to table 6, students' "Environmental Consciousness Scale" scores show significant difference by gender. t(1492,37)= 7,44 ve p< ,05.

When the scores that students have taken from the scale are compared, female students' average score ($\bar{X}$=123,28) is more than male students' average score ($\bar{X}$=116,32). This finding shows that female students have more environmental awareness than male students. The eta-square (η2) value for the unrelated group's T-test was 03. Accordingly, it can be stated that about 3% of the variance observed in the scale scores is sexually related. On the other hand, the calculated Cohen d value is 37. The result shows that the difference between the average scores of male and female students in "Environmental Consciousness Scale" is, 37 standard deviation.

3. Environmental Consciousness by Mother's Educational Status

Table7. Results of variance analysis of environmental consciousness scale scores by mother's educational status

Mother Educational Status	**N**	**Mean**
1- Non-Literate	57	111,2632
2- Primary School	247	119,0810
3- Secondary School	286	119,0874
4- High School	572	120,1206
5- Undergraduate	385	122,9065
6- Graduate	53	116,0000
Total	1600	119,9938

Source of the Variation	**Sum of Squares**	**sd**	**Mean Square**	**F**	**Significant Difference (p)**
Between Groups	8906,379	5	1781,276	5,091	,000
Within Groups	557751,558	1594	349,907		

Total	566657,938	1599

According to table 7, students' scores which are taken from the "Environmental Consciousness Scale" show a significant difference by mother's educational status. Tamhane test was selected from multiple comparison tests to compare the mean scores of the students by their mothers' education status and to find the source of the difference.

Table 8. Results of tamhane test by mother's educational status

(I)Mother's Educational Status	(J) Mother's Educational Status	Average Score difference (I-J)	Standard Error	Sig.
Illiterate	Primary School	-7,81781	2,84360	,107
	Secondary School	-7,82425	2,86560	,112
	High School	**-8,85747***	2,76189	**,031**
	Under Graduate	**-11,64334***	2,83914	**,002**
	Graduate	-4,73684	4,42944	,994

According to Table 8, Scale scores of the students whose mothers are illiterate are lower than scores of the students whose mothers have high school or undergraduate educational status and the difference between them are found to be significant. ($p<0,05$). In terms of scale scores, no significant difference is found between students whose mothers are illiterate and other students. ($p>0,05$).

4. Environmental Consciousness by Father's Educational Status

Table 9. Results of variance analysis of environmental consciousness scale scores by father's educational status

Father Educational Status	**N**	**Mean**
1- Illiterate	22	108,0455
2- Primary School	187	118,6952
3- Secondary School	280	117,1000
4- High School	531	119,5273
5- Undergraduate	498	124,0522
6- Graduate	82	114,4146
Total	1600	119,9938

Source of the variance	**Sum of Squares**	**sd**	**Mean Square**	**F**	**Significant Difference (p)**
Between Groups	16671,258	5	3334,252	9,664	,000
Within Groups	549986,679	1594	S345,036		
Total	566657,938	1599			

According to Table 9, the scores of the students from the scale vary significantly depending on the educational status of their fathers ($p <0,05$). Results of Tamhane Test, which was used in order to find out in which groups the difference between students' father education status exist, are in below.

Table 10. Tamhane test results by father's educational status

(I) Father's Educational Status	**(J) Father's Educational Status**	**Average Score Difference (I-J)**	**Standard Error**	**Sig.**
Under graduate	Illiterate	**16,00675***	3,77888	**,005**
	Primary School	**5,35702***	1,48731	**,005**
	Secondary School	**6,95221***	1,41581	**,000**
	High School	**4,52490***	1,15137	**,001**
	Graduate	**9,63757***	2,71212	**,009**

According to Table 10, the scale scores of the students whose parents have undergraduate educational status; are higher than the scale scores of the other students and the difference between them is significant (p <0.05). There is no significant difference between the groups except for the students whose fathers have undergraduate educational status (p> 0,05). This finding can be interpreted as the fact that students whose fathers have undergraduate educational status have more environmental consciousness.

5. Environmental Consciousness by Family Income Level

Table 11. Scale scores' variance analysis results by family ıncome level

Family Income per Month		**N**		**Mean**	
Low income		261		117,5211	
Middle income		918		119,7843	
High income		421		121,9834	
Total		1600		119,9938	
Source of the variance	**Sum of Squares**	**sd**	**Mean Square**	**F**	**Significant Difference (p)**
Between Groups	3302,626	2	1651,313	4,681	,009
Within Groups	563355,312	1597	352,758		
Total	566657,937	1599			

According to Table 11, students' scores on the scale change significantly according to the monthly income levels of their families (p <0,05). Results of Tamhane Test, which is used in order to find out in which groups identified significant difference exists, are shown in the table below. (Table 12)

Table 12. Results of tamhane test by family ıncome level

(I) Monthly Family Income	**(J) Monthly Family Income**	**Average Score Difference (I-J)**	**Standard Error**	**Sig.**
Low Income	Middle Income	-2,26324	1,31447	,236
	High Income	**-4,46230***	1,51091	**,010**
High Income	Low Income	**4,46230***	1,51091	**,010**
	Middle Income	2,19906	1,13445	,151

According to Table 12, there was no significant difference in the scale scores of the students whose family monthly income was moderate among the other students (p> 0,05).

In the families with high monthly income level, the scale score of the students; were higher than the families with low monthly income and the difference between them was significant (p <0,05).

6. Environmental Consciousness by Schools

Codes given to Schools

When school codes were given, the schools' success rankings in the April 2016 TEOG exam were taken into account, and coding was made from the most successful school to the most unsuccessful school. According to this, Eren Şahin Eronat, in TEOG Exam had the highest average score among 18 schools participating in the study with an average score of 80.47; this school had been given the code "1". In the April 2016 TEOG Exam, the "18" code was given to the Lion Secondary School, which is the most unsuccessful school with an average score of 43.45.

Table 13. Variance analysis results of the students' scale scores by schools

School Code	**School Name/ County Name**	**N**	**Avarage Score**
1	Eren Şahin Eronat Secondary School/ Karşıyaka	106	116,7547
2	Yavuz Selim Secondary School/ Bornova	114	125,6491
3	Nevvar Salih İşgören Secondary School/ Gaziemir	142	122,4577
4	Kaymakam Özgür Azer Kurak Secondary School/ Bayraklı	109	120,2385
5	Güzelyalı Secondary School/ Konak	209	118,6172
6	Asil Nadir Secondary School/ Balçova	33	121,8788
7	Hasan Ali Yücel Secondary School/ Buca	81	114,1111
8	Cemil Midilli Secondary School/ Karabağlar	55	120,7636
9	12 Eylül Secondary School/ Narlıdere	117	118,2393
10	Suphi Koyuncuoglu Secondary School/ Bornova	92	123,5978
11	Başögretmen Atatürk Secondary School/ Balçova	40	122,8500
12	Piyale Secondary School/ Bayraklı	63	118,6349
13	Oguzhan Secondary School/ Narlıdere	44	125,9773
14	Akıncılar Secondary School/ Buca	102	117,2353
15	Kazım Karabekir Secondary School/ Karabaglar	185	123,5297
16	Karşıyaka Yamac Secondary School/ Karşıyaka	26	112,0769
17	Kemal Atatürk Secondary School/ Konak	42	115,4762
18	Aslanlar Secondary School/ Gaziemir	40	109,6500
Total		1600	119,9938

Source of the Variation	**Sum of Squares**	**sd**	**Average of Squares**	**F**	**Significant difference (p)**
Intergroup	22404,524	17	1317,913	3,831	,000
Intragroup	544253,414	1582	344,029		
Total	566657,937	1599			

According to the Anova table given in Table 13, there is a significant difference between the scores of the students in the schools (p <0,05). The Tamhane Tests showing the differences between these schools are as follows.

Table 14. Tamhane test results by schools

(I) School code	**(J) School code**	**Average score difference (I-J)**	**Standard Error**	**Sig.**
2,00	7,00	**11,53801***	3,02752	**,030**
18,00	2,00	**-15,99912***	3,77702	**,011**
13,00		**-16,32727***	4,26952	**,040**
15,00		**-13,87973***	3,46764	**,033**

According to table 14, "2" coded Yavuz Sultan Selim Secondary School students' scale scores are higher than "7" coded Hasan Ali Yücel Secondary Schools and significant difference between them is found. (p<0,05).

Additionally, "18" coded Aslanlar Secondary School's scale score is lower than "2" coded Yavuz Sultan Selim Secondary School, "13" coded Oguzhan Secondary school and "15" coded Kazım Karabekir Secondary School and significant difference between them is found. (p<0,05).

7. Correlation Between Applied Scale and TEOG Exam Success Rankings

Table 15. Correlation between environmental consciousness scale and TEOG success rankings

		CBFO Average Score	TEOG Exam Average Score
CBFO Average Score	**Pearson Correlation**	1	**,492***
	Sig. (2-tailed)		,038
	N	18	18
TEOG Exam Average Score	**Pearson Correlation**	**,492***	1
	Sig. (2-tailed)	,038	
	N	18	18

According to Table 15, there is a moderate, positive and significant relationship between the TEOG Exam averages and the Environmental Consciousness Scale scores of the students in the schools. (Pearson correlation coefficient: r = 0,492 and p <0,05). Accordingly, it can be said that as the success of the schools in the TEOG Exam increases, the scores of the students in the Environmental Consciousness Scale (EBFÖ) increase. When the coefficient of determination (r2 = 0.24) is taken into consideration, it can be said that 24% of the total variance in the CBFRS scores is due to the success of the TEOG Exam.

Conclusion

The average score of the 1600 students who participated in the study is 119,9938. Taking into consideration that, the range of scores that can be taken from the scale is between 0 and 155, the average success of the students in the scale can be expressed as 77,415 points over 100 points. From this, it can be concluded that most of the students are successful in the applied scale that is the environmental consciousness is close to high.

When the frequency table of the students' answers is examined; if the percentage of answers given to any of the items on the scale is higher than the 15% threshold, we think that the answers given to the item have a significant share in the group. The frequency percentage of the answers given to 23 items on the scale we applied was determined as "undecided" above 15%. This finding suggests that although the students are successful on the scale, the number of topics they are unstable is high.

One of the most undecided topics among students has been biofuels. Students have had difficulty in linking the use of biofuels with prevention of environmental problems. This situation suggests that students do not have enough knowledge about biofuels. "Forest resources do not develop in parallel with paper production in our country" and "I do not find wind turbines and energy production economical because there will not be enough winds in all seasons." Expressions are other issues that students are unstable with high frequency.

Recognizing the recycling icon and recycled products, students have come to realize that recycling is important in terms of conserving natural resources.

According to responses that students have given to expressions "I pay attention to closing the taps remained open." and "While brushing my teeth the tap remains open till I finish brushing my teeth" it is understood that students have a sense of saving the water resources and they try to save water.

81% of the students state that they are friendly to plants and animals.

1303 students out of 1600 that is 81,5% of the students who participated in the study aware ıf-of the fact that it is harmful to pouring the waste oil to sink.

While 68,4% of the students who participated in the study state that human influences on global warming, 15,4% of them remained unstable and 16,2% state that there is no human influence on global warming.

When the scores that students have taken from "Environmental Consciousness Scale" are compared, the fact that female students average score ($\overline{X}$ =123,28), is higher than the average score of male students ($\overline{X}$ =116,32) shows that female students have more environmental consciousness than male students.

When the scores that students have taken from the scale by the educational status of the mothers' are examined, it is found that average score of the students whose mothers are illiterate is lower than the students whose mothers have undergraduate educational level.

When the scores that students have taken from the scale by the educational status of the fathers' are examined, it is found that there is a significant difference between the scores of the students whose fathers have undergraduate education level and the other students. This difference is in favor of the students whose fathers have undergraduate educational status.

In terms of "Environmental Awareness Scale" scores; a significant difference is found among the students whose families have high monthly incomes and the students whose families have low monthly incomes, this difference is in favor of the students whose families have high-income levels.

The scores that students have taken from the scale vary according to their schools. There is a significant difference in the schools stated below among the 18 schools participated in the study.

i. The average score that Yavuz Sultan Selim Secondary School from Bornova has taken from the scale is higher than the average score of Hasan Ali Yücel Secondary School from Buca.

ii. The average score that Aslanlar Secondary School from Gaziemir ($\overline{X}$=109,6500) is lower than Yavuz Sultan Selim Secondary School ($\overline{X}$=125,6491), from Bornova, Oğuzhan Secondary School from Nazlıdere ($\overline{X}$=125,9773) and Kazım Karabekir Secondary School from Karabağlar ($\overline{X}$=123,5297) 's average scores.

iii. There is not any significant difference is found between other schools.

It is found that there is a moderate positive and significant relationship between the average scores of the schools' TEOG exam scores in April 2016, and the "Environmental Consciousness Scale" (Pearson correlation coefficient: r: 0,492 and p <0,05). According to this result, as the academic success of the students increases, the environmental consciousness level of the students increases.

Discussion

As a result of the study, it is concluded that female students have higher environmental consciousness than male students. Similar comments supporting this result are as follows:

- Gür (2009) In her study with elementary school 8th-grade students, she made a conclusion that female students have more environmental consciousness than male students.
- Varlı (2014) stated that female students 'attitudes towards the environment are higher than the male students' attitudes toward the environment, explaining that this difference is in favor of females in terms of the social role and emotional intensity of the females.
- Derman (2013) stated that girls' awareness of sustainable environment was higher than that of male students.
- Atasoy and Ertürk (2008) observed that female students are more successful than male students in terms of environmental knowledge and environmental attitude.

The study conducted by Teyfur (2008) in İzmir Bornova with 300 students in 4 elementary schools shows that there is no significant difference between the students' attitudes towards the environment in terms of their sex.
In the 15th item on the scale, 80% of students stated that they agree that it is better to collect recyclable waste such as glass, PET bottle, paper separately. However, it is seen that in the 2nd and 21st items which measure the same attainment, students are undecided about putting this idea into practice. 19,9% of the students answered the expression "I throw paper waste into recyclable boxes" and 22,52% of the students answered, "I throw the used batteries with other wastes" as "Undecided". Based on these findings, it has become clear that students have an understanding of recycling and that they have to be more attentive to put this awareness into their lives as a conscious behavior. This finding is consistent with Albaş's (2011) statement that students do not put the information they acquire or possess into the problematic situations they encounter. Additionally this finding shows similarity with the Tanrıverdi's statement which suggests that the educational attainments in the elementary school curriculum mostly aimed at gaining information and behavior but not skill awareness value,

and Erten's statement (2003) indicating that there is an inconsistency between students' information about the environment and their attitudes towards the environment. In another study, Akbay (2012) concludes that with the "Don't Trifle away Your Energy Activities" which is applied to 6,7,8 grade students, students' level of environmental information increases but they cannot develop attitudes and behaviors on environmental issues. This conclusion shows that information that students gained about the environment cannot always be used in real life situations and became behaviors.

There is a difference among the results of the study which takes Izmir Province as a sample and determining the environmental consciousness level of the 8th grade students 77 out of 100, Güney's (2011) conclusion that in Elementary School System there is not enough environmental consciousness arises among the students, and Atasoy and Ertürk's (2008) observation that 6th, 7th 8th graders are not adequate in terms of environmental attitude and environmental knowledge.

It is concluded that students will be able to identify recycling symbol and recyclable products and they are aware of the fact that recycling is crucial in terms of saving natural resources. Additionally, it is stated that students pay attention to saving water resources. This result is supported by findings that Akbay (2012) found that 6th, 7th and 8th-grade students of the primary school have an idea about energy saving behaviors and they know that throwing paper waste into recycling boxes is beneficial to the environment. Similarly, Çimen and Yılmaz (2012) stated that a significant proportion (60%) of the students have knowledge about the concept of recycling, some of their students (33.33%) know recyclable products with samples of these products. Supporting the Varlı's (2014) findings which suggest that academically successful students in comparison to academically unsuccessful students have more positive attitudes toward the environment, in this study, it is found that as the TEOG Exam success rankings increase the environmental consciousness of the students increase as well.

The finding stating that students have lack of information about acid rain formation and they have difficulty in constructing the relationship between the fossil fuel consumption and acid rain show similarity with the Demirtaş and Pektaş's ideas (2009) stating that students haven't adequate information about acid rain.

Seçgin et al. (2010) Despite the fact that there are many correct concepts about environmental issues in students' minds, it is emphasized that the most important problem is that students think of environmental problems independently and they cannot construct the relationship between them, for instance, although air pollution is directly related to forest destruction, global warming, and ozone layer spoil, none of the students managed to explain this relationship, similarly to this findings, It was found that students cannot construct a relationship between:

- environmental pollution and climate change
- fossil fuel usage and acid raid formations
- waste garbage or used oils and energy production
- global warming and human's acts harming the environment
- paper production and forest resources
- bio-fuel usage and environmental problems. The lack of transitions between concepts will prevent the realization of permanent learning. Certain steps should be taken to make students understand the topics and strengthen cause and effect relationship.

Recommendations

Starting with the parents, in schools, and near neighborhood, environmental love should be gained.However, it has been understood that collecting recyclable waste separately is not enough. This may be because students may not be able to find recycling boxes that are actively used in their immediate surroundings. Some steps should be taken that help students turn their information into practice. The number of recycling boxes can be increased, students who collect the most recycled waste can be awarded and students can be encouraged to develop these behaviors.

Students can be provided with information on the cost of installation and benefits of using wind and solar energy from renewable energy sources and making comparisons may be encouraged. Students should be taught that non-ecological energy resources are also not economically viable. Energy production in the countries which are providing all of their energy needs from renewable energy sources, such as Denmark, Sweden and Germany should be explained by exemplifying the relationship with the environment.

It is uncertain that why a student saying “Undecided” in the “Environmental Consciousness Scale” which is prepared by the researcher and have items aiming at environmental attainments existing in 8^{TH} grade 6 unit, and in which negative or positive extremity the student remained undecided. In the results section, the percentages of the items that students are undecided are listed in table 32. The percentages of students' indecision about the items vary between 15% and 30%. Findings can be more clearly interpreted if these students’ closeness to “agree” and “not agree” edges is known. As the percentage of students who are undecided increases, the uncertainty arising from undecided students will also increase. While the mean score of the group decreases with the negative direction of these students' expressions, the average score of the group may increase in the case of positive expression development. This can affect the result of the study. If the "Environmental Consciousness Scale" is to be used in subsequent studies, it may be suggested to rearrange the grading part of the scale. This is valid for all Likert type scales that include "undecided" or "I'm not sure" choices. Anderson (1981) emphasizes the fact that when the "I'm not sure" option is among the choices, test takers avoid expressing their real answers, therefore it is necessary to use an even number of options. Thus, respondents are compelled to choose to be party or not to be a party towards an attitude object. (Köklü, 1995).

In addition to using even number of options, it can be more effective for students to determine their two-way proximity by themselves, by dividing the distance between the positive and negative options into equal intervals. For example, by dividing "agree" "not agree"options into 10 equal parts, if the students are asked to answer the question by writing a number between 1 and 10 according to the expression status, the students will be able to specify the edge they are close to. (Table 16)

Table16. A rating example that can be recommended on Likert type scales

Item no	**Item**	**Strongly Disagree**		**Disagree**		**Undecided**		**Agree**		**Strongly Agree**		**Student Response**
1	I can identify recycling logo (icon)	1	2	3	4	5	6	7	8	9	10	
2	I put the papers that won’t be used in the recycling box.	1	2	3	4	5	6	7	8	9	10	

The use of a large number of response options aims to increase the internal consistency of a scale by increasing the number of total response opportunities given to respondents. Increasing the number of response options on Likert scales is similar to increasing the number of items in cognitive tests. The use of fewer options, on the other hand, reflects the belief that it will create a suitable scale for less educated or younger respondents (Köklü, 1995).

By arranging the scale as in Table 16, it is thought that the uncertainty that may occur in the findings is reduced. In this way, even the answers of students who say "undecided" can give an idea about students’ thinking.It can be interpreted that the students' indecisiveness means that they do not have sufficient knowledge about the subject. It is recommended that by drawing the attention of the students to the issues like Biofuels, usage of fossil resources or solutions to environmental problems, students’ lack of knowledge can be decreased. For this ambition, Television and the Internet can be used. It is thought that public service adds in the television have an impact on students.

Derman (2013) states that 9^{th} and 12^{th}-grade students gain permanent environmental conscious behaviors mostly from TV, biology lesson, family and internet, and least from other lessons, friends, and scientific magazines. Similarly, Çimen and Yılmaz (2012) found that the internet, which is widely used today, is widely used by elementary school students as well and it is among the sources that students use about recycling. On the same topic, Erman (2013) observed that the "MEDIA (TV, Internet, Newspaper, etc.)" factor increased it impacts on people’s level of consciousness.

For this reason, short films or public spots can be prepared that briefly introduce bio-fuel vehicles and explaining how it would be beneficial to the environment, increasing its usage. According to the findings of the study, students stated that the pouring of waste oils into the sink is detrimental. By associating biofuels with the recycling of waste oils, in the light of students’ other information, students can develop solutions and they can develop associations between information thus learning process becomes permanent.

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