Uyanık, G. (2022). Examination of Pre-Service Primary Teachers' Sensitivity Towards Recycling: A Longitudinal Research, *International Journal of Eurasia Social Sciences (IJOESS)*, 13(49), 863-874.

DOI: http://dx.doi.org/10.35826/ijoess.3144

ISSN: 2146-1961 ***ArticleType:*** *Research Article*

EXAMINATION OF PRE-SERVICE PRIMARY TEACHERS' SENSITIVITY TOWARDS RECYCLING: A LONGITUDINAL RESEARCH

Gökhan UYANIK
Assoc. Prof. Dr., Kastamonu University, Kastamonu, Turkey, guyanik@kastamonu.edu.tr
ORCID: 0000-0002-5653-6475

Received: 05.04.2022 *Accepted: 16.07.2022* *Published: 01.09.2022*

ABSTRACT

The aim of this research is to examine the sensitivity of pre-service primary teachers towards recycling longitudinally. The study group of the research consists of 93 pre-service primary teachers. They started their education in the Kastamonu University Faculty of Education Classroom Education Undergraduate Program in September 2016 and graduated in June 2020. Longitudinal survey model was used in the study. The Recycling Sensitivity Scale developed was used as a data gathering tool. The data were analyzed in the SPSS statistical package program. In the analysis of the data, t-test for independent groups, one-way analysis of variance (ANOVA) and Scheffe test for multiple comparisons were used. When the research findings were examined, it was determined that there was no significant difference between the average scores of the pre-service primary teachers while they were studying in the first, second and third grades, according to the gender variable. However, it was determined that there was a significant difference in favor of female pre-service primary teachers according the gender variable in the fourth grade. In addition, when the mean scores of pre-service primary teachers at all grade levels were compared collectively, it was determined that there was a significant difference in favor of their grades in the fourth grade according to the grade level variable. In the light of this finding, it can be thought that the environmental education course, which was taken in the fourth grade, has been effective in increasing the sensitivity towards recycling scores of fourth graders. In addition, by looking at the scores of the sensitivity scale towards recycling, it can be said that female pre-service primary teachers are more sensitive to recycling than male pre-service primary teachers.

Keywords: Pre-service primary teachers, recycling, sensitivity.

INTRODUCTION

It is known that there was a balanced relationship between human beings and nature in pre-industrial times. However, especially with the industrial revolution, the damage caused by human beings to the environment has started to increase and the natural balance on earth has started to deteriorate. The fact that human beings are not satisfied with the resources they have obtained and constantly trying to get more from nature has begun to change the systemic functioning of nature. Although people did not care much about environmental problems in the early days, they started to become aware of environmental problems as environmental problems such as global diseases, nutrition problems, radiation affect people, and decrease in raw materials affect people (Çimen & Yılmaz, 2012).

One of the most important factors of environmental problems in the world is the problem of solid waste and garbage. It has emerged as an understanding that has been emphasized in recent decades that recycling activities are needed to solve the solid waste and garbage problem. The concepts of garbage and waste are often confused by individuals. Before informing about the concept of recycling, the concepts of garbage and waste should be clearly defined. Garbage; it can be defined as used waste materials that are useless after being used, are not expected to provide any benefit, and have no economic value. Waste, on the other hand, refers to substances that can be recycled and have an economic value after use. In fact, it can be said that the most distinctive feature that distinguishes the concept of waste and garbage is whether there is a possibility of recycling after use. The most important way to generate waste and reduce resource consumption is recycling and reuse. Wastes that will occur after production and consumption can be re-evaluated. Recycling is the process of converting the wastes that can be reused into raw materials or by-products by undergoing various processes and added to the production again. Due to recycling, wastes are separated from the garbage and included in the reproduction process using appropriate methods and can be used as secondary raw materials. Some of the materials that can be recycled are shown in Figure 1.

Figure 1. Some Recyclable Materials

As can be seen in Figure 1, some waste materials such as paper, glass, organic, plastic and metal are converted into reusable form by undergoing certain processes. Organic wastes can be recycled and used as biomass energy. Almost everything that is alive in nature has organic waste. Organic wastes can be used for both energy production and fertilizer purposes with the recycling process.

Solid wastes remain in nature for a long time without deterioration, as a result, they cause environmental pollution and may adversely affect human health. For example, when plastics, one of the solid wastes, are thrown away, they remain in nature for many years without rotting, rusting, dissolving and biologically deteriorating. Some plastics can remain intact in nature for even about 1000 years. Approximate time periods during which some waste materials can remain without being destroyed when thrown into the nature are shown in Figure 2.

Figure 2. Duration of Some Waste Materials without Decomposition in Nature

Looking at the images in Figure 2, it is understood that the destruction period of a discarded paper is 3-12 months, the destruction period of the discarded metal material is about 10-100 years, and the batteries thrown into the nature can remain without destruction for about 300 years. However, as stated before, plastic materials can remain in nature for about 1000 years without being destroyed. A waste glass, on the other hand, can stand for about 4000 years without disappearing. An important part of solid wastes are recyclable products. Every second that these waste materials stay in nature, they cause pollution of water and soil.

Negative effects of waste materials on the environment, health and economy are reduced, pollution and destruction of natural resources are eliminated by recycling waste products (Spiegelman & Sheehan, 2004). At the same time, recycling of products ensures that the amount of CO2 in nature is reduced and therefore the effects of global warming are eliminated. In addition, groundwater is protected from pollution by recycling, raw materials and by-products needed by the industry are obtained from recycled products without consuming natural resources. In this way, environmental pollution will be prevented. In order to prevent environmental

pollution, the recyclable packaging wastes that are thrown away at homes, workplaces and schools should be collected separately and the individuals forming the society should be willing to ensure their recycling.

The importance of recycling and other environmental protection behaviors in the process of eliminating environmental problems is increasing in the world (Schultz, 2002). In order to inherit a healthier and safer environment for future generations; In order to prevent the factors that cause environmental pollution, it is necessary to raise awareness of all people, especially students, on these issues with the help of environmental education (Uyanık, 2017). Environmental education enables the increase of social awareness and interest, the provision of information necessary for the protection of the environment, and the research of necessary methods for the solution of environmental problems (Dresner & Blatner, 2010). In order to solve environmental problems, it is necessary to create individual behavioral changes. The development of positive attitudes, beliefs, values and responsible behaviors towards the environment of individuals who are effective in the formation of environmental problems can only be achieved through environmental education (Erten, 2005; Strife, 2010). Considering the importance of teachers who will take an active role in qualified environmental education in the process of developing their sensitivity towards the protection of natural balance and experiencing positive behavioral changes in this regard, it is extremely important for teachers to have knowledge about the subject and to develop attitudes and behaviors (Kahyaoğlu & Kaya, 2012). It is emphasized that especially receiving training on recycling and knowing the benefits of recycling are the most important factors in showing positive attitudes and behaviors towards recycling and will lead to an increase in exhibiting positive behaviors (Flanagan, 2017).

Environmental education can contribute to the development of environmental awareness and the maintenance of a livable environment by raising environmentally literate individuals (Hsu, 2004; Moseley, Reinke, & Bookout, 2002). Environmental education of individuals who interact with their environment from birth to death should be started in pre-school periods and this process should continue throughout life in formal education institutions (Erten, 2005). In this sense, schools have a great importance in acquiring environmental protection behaviors such as the use of recycled products. Students gain the importance of recycling for the environment and the necessary environmental awareness through environmental education in schools. Schools have an important role to play so that recycling can be perceived by students (Connor, 1989). Teachers who will bring this to the students in schools. Teachers who have a high level of awareness about recycling and reflect this on their behavior will be a positive role model for their students.

In studies, it has been stated that individuals who observe positive behaviors towards the environment will also exhibit these behaviors over time, and it has been stated that observing behaviors related to recycling is more effective than their willingness to exhibit only positive behaviors (Barr, 2007; Huang & Waxmann, 2009; Schwab, Harton & Cullum, 2014). For this reason, it is important to determine the awareness of teacher candidates, who are the teachers of the future, about recycling, in order to develop positive attitudes and behaviors in this field. In addition, it is thought that it is important to determine the sensitivity of the classroom teacher candidates who will give environmental education in their professional life, considering the

contribution they will make to recycling in the social dimension by positively influencing the students they will teach.

When the relevant literature is examined, it has been determined that the researches on recycling are generally conducted with science teachers and pre-service science teachers. It has been determined that there were few studies conducted with pre-service primary teachers. In this sense, it is thought that this research will contribute to filling the gap in the related field. From this point of view, it was aimed to examine the sensitivity of pre-service primary teachers towards recycling during their four-year undergraduate education, longitudinally in this study. In order to achieve this aim, answers to the following sub-problems were sought:

1. What is the average score of the pre-service primary teachers from the sensitivity scale towards recycling at each grade level?
2. Is there a statistically significant difference between the average scores of pre-service primary teachers according to the gender variable?
3. Is there a statistically significant difference between the scores of the pre-service primary teachers according to the grade level variable?

METHOD

Research Model

This research was carried out in the longitudinal survey model. Longitudinal survey studies are used to identify trends, common in order to examine a group with special characteristics or to investigate the changes of the same people over time can be done (Fraenkel & Wallen, 2006).

Study Group

Study group of the research consists of 93 pre-service primary teachers who started their education in Kastamonu University Faculty of Education Classroom Education Undergraduate Program in the fall semester of 2016-2017 academic year and graduated in the 2019-2020 academic year. In order for the researcher to collect the data more easily, the easily accessible sampling method was preferred in the selection of the study group. The descriptive statistics of the study group of the research are given in Table 1.

Table 1. Descriptive Statistics of the Sample

Gender	N	%
Female	64	68,82
Male	29	31,18
Total	93	100

When Table 1 is examined, it is seen that 31.18% of the pre-service primary teachers constituting the study group of the research are male and 68.82% are female pre-service primary teachers.

Data Gathering Tool

The Recycling Sensitivity Scale developed by Aksakal (2013) was used as a data collection tool in the research. The scale is in 5-point Likert type. It consists of 34 items in total. The reliability coefficient value of the original version of the scale was determined as .72. The reliability coefficient value of the developed scale was recalculated within the scope of this research and a value of .71 was obtained for this research. Reliability coefficient calculated for a psychological test is .70 and higher, which is considered sufficient for the reliability of the test scores (Büyüköztürk, 2007). In this case, it was considered appropriate to use the scale for this study. The expressions in the 5-point Likert-type scale consist of "I don't agree at all", "I don't agree", "I am undecided", "I agree" and "I totally agree". While coding the SPSS application, expressions were coded by giving 1,2,3,4 and 5 points from negative to positive. In this case, the highest score that can be obtained from the scale consisting of 34 items was determined as 170, and the lowest possible score was determined as 34. Getting more points from the scale means that the sensitivity towards recycling is high. A low score means that there is less sensitivity towards recycling.

Data Analysis

SPSS statistical package program was used in the analysis of the data. In the analysis of the data, t-test was performed for independent groups in order to determine whether there was a statistically significant difference according to the gender variable. One-way analysis of variance (ANOVA) and Scheffe test were used to determine the statistically significance of the difference between the mean scores according to the grade level variable. Statistical analyzes were evaluated according to the p<,05 significance level.

FINDINGS

In this section, the findings obtained as a result of the research are given. Findings are presented in order of sub-problems.

Findings of the First Sub-problem

Within the scope of the first sub-problem of the research, the average scores of the pre-service primary teachers from the sensitivity scale towards recycling at each grade level were examined. Accordingly, the results obtained are shown in Table 2.

Table 2. Recycling Sensitivity Scale Scores of Pre-Service Primary Teachers at Each Grade Levels

Grade Level	N	X	Sd
First	93	96,97	9,34
Second	93	97,73	8,37
Third	93	99,76	9,05
Fourth	93	131,55	9,71

When Table 2 is examined, it is seen that the average score of the pre-service primary teachers from the sensitivity scale towards recycling while they were studying in the first grade was X= 96,97, the average score they got while they were in the second grade was X= 97,73, and the average score they got while they were in the third grade was X= 99,76, and the average score they got when they were in the fourth grade was X=131,55. The average scores of pre-service primary teachers' sensitivity scale towards recycling at all grade levels are shows in Figure 3.

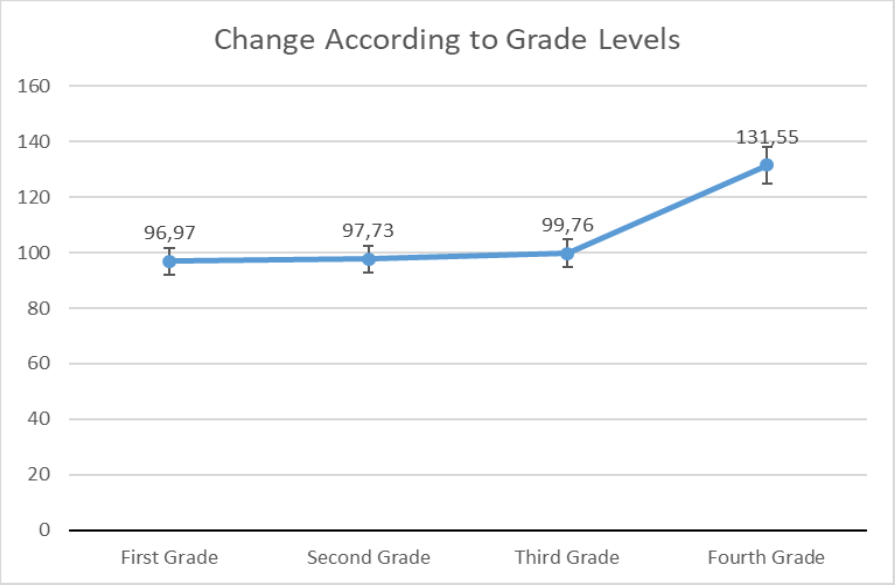

Figure 3. Change in the Scores of Pre-Service Primary Teachers' Sensitivity Scale towards Recycling Over the Years

When Figure 3 is examined, it is seen that the scores of pre-service primary teachers' sensitivity scale towards recycling are at a similar level in the first, second and third grades. However, it is seen that there is a large increase in the scores obtained from the scale, in fourth grade.

Findings of the Second Sub-problem

In order to determine whether there is a statistically significant difference between the mean scores obtained by pre-service primary teachers from the scale, according to the gender variable, t-test was applied for independent groups. The findings related to this analysis are given in Table 3.

Table 3. Independent t-test Results of Pre-service Primary Teachers' Sensitivity Scale Scores for Recycling According to Gender Variable

Grade	Gender	N	*X*	Sd	df	t	p
First	Female	64	96,81	9,68	91	-,253	,801
	Male	29	97,34	8,71			
Second	Female	64	97,62	8,72	91	-,181	,857
	Male	29	97,96	7,67			
Third	Female	64	99,93	9,23	91	,274	,785
	Male	29	99,37	8,78			
Fourth	Female	64	132,93	9,67	91	2,069	,041*
	Male	29	128,51	9,22			

*p<,05

When Table 3 is examined, it is seen that there is no significant difference between the scores of pre-service primary teachers from the scale when they were studying at the first, second and third grade levels, according to the gender variable. ($t_{(91)}$= -,253, p>,05; $t_{(91)}$= -,181, p>,05; $t_{(91)}$= ,274, p>,05). While pre-service teachers were studying in the fourth grade, it was determined that there was a statistically significant difference in favor of female pre-service teachers in terms of gender variable between scale scores ($t_{(91)}$= 2,069, *p<,05). When the mean scores of the sensitivity scale towards recycling are examined, it is seen that the mean score of female pre-service teachers (X=132,93) is higher than the male pre-service teachers' (X=128,51).

Findings of the Third Sub-problem

ANOVA test was used to determine whether the pre-service primary teachers' sensitivity towards recycling differed significantly according to the grade level variable. The findings of the ANOVA analysis are given in Table 4.

Table 4. ANOVA Results of Pre-Service Primary Teachers' Sensitivity Scale Scores Towards Recycling According to Grade Level Variable

Source of Variance	Sum of Squares	df	Mean Squares	F	p	Significant Difference
Between Groups	78203,019	3	26067,673	312,412	,000*	4-1, 4-2, 4-3
Within Groups	30705,957	368	83,440			
Total	108908,976	371				

*p<,05

Table 4 shows that there is a statistically significant difference between the scale scores of pre-service primary teachers according to the grade level variable F(3, 368)= 312,412, *p<,05. Scheffe test was used to determine between which groups this difference was determined. According to the Scheffe test analysis, it was concluded that the mean scores of pre-service teachers in the fourth grade were (X=131,55) significantly higher than the mean scores in the first grade (X=96,97), second grade (X=97,73) and third grades (X=99,76).

CONCLUSION and DISCUSSION

In this study, pre-service primary teachers' sensitivities towards recycling were examined longitudinally during their four-year undergraduate education. Within the scope of the research, the sensitivity of the pre-service primary teachers towards recycling was determined at each grade level by means of the sensitivity scale towards recycling. Accordingly, the mean score of pre-service primary teachers on the sensitivity scale towards recycling while they were studying in the first grade was X=96,97. The mean score they got from the scale while they were studying in the second year was X=97,73. The mean score they got from the scale while they were studying in the third grade was X=99,76. While they were studying in the fourth grade, the mean score they got from the scale was determined as X=131,55. According to this result, it can be said that the pre-service primary teachers' sensitivity towards recycling in the first three grades was at a similar level. On the other hand, in the fourth grade, it is seen that their sensitivity towards recycling has increased significantly. It can be thought that this result is due to the environmental education course taken in the fourth grade. Thanks to the

environmental education course, which has been taken in the fourth grade, it can be said that the pre-service primary teachers' sensitivity towards recycling has increased.

Harman & Çelikler (2016) concluded that second, third and fourth grade pre-service teachers have higher sensitivity and awareness towards recycling than first grade pre-service teachers in their study. Demircioğlu, Demircioğlu & Yadigaroğlu (2015) emphasized that teacher candidates' sensitivity towards recycling is not at a sufficient level. In their research, Erdaş-Kartal & Ada (2019) stated that teacher candidates' sensitivity towards recycling is at a sufficient level. Kaya & Uzoğlu (2019) stated that the information on recycling is sufficient, but sufficient responsibility is not taken in this regard.

In this study, it was determined that there was no statistically significant difference between the scores of the pre-service primary teachers in the first, second and third grades of the sensitivity scale towards recycling according to the gender variable ($t_{(91)}$= -,253, p>,05; $t_{(91)}$= - ,181, p>,05, $t_{(91)}$= ,274, p>,05). It was determined that there was a statistically significant difference in favor of female pre-service primary teachers according to the gender variable between the scores they got from the scale while they were in the fourth grade ($t_{(91)}$= 2.069, *p<,05). Reschovsky & Stone (1994) also stated in their research that women are more sensitive to recycling than men. There are also studies in the related literature that concluded that women are more willing to recycle than men (Darby & Obara, 2005; Saphores, Ogunseitan, & Shapiro, 2012; Sidique, Lupi, & Joshi, 2010). In this sense, it can be said that this study is similar to these studies in the related literature. On the other hand, in the study of Dinçol-Özgür (2020) examining the recycling behaviors of teacher candidates according to the gender variable, it was determined that the awareness scores of male teacher candidates were higher than the scores of female teacher candidates. In the study conducted by Aksakal (2013), it was determined that the sensitivity of pre-service teachers about recycling did not make a significant difference according to the gender variable. Schultz, Oskamp & Mainieri (1995) stated that there was no significant effect of the gender variable for recycling behavior. Similarly, Wang, Guo & Wang (2016) also stated that the gender variable had no effect on the recycling behaviors of individuals.

RECOMMENDATIONS

In order for the new generations, who are the elders of the future, to grow up as environmentally sensitive individuals, their teachers, who are role models for them, must show environmentally sensitive behaviors. In this sense, it is extremely important that pre-service teachers, who are the teachers of the future, are also environmentally sensitive individuals. Sensitivity towards recycling is one of the most important indicators of environmental sensitivity. In this study, the sensitivity of the pre-service primary teachers, who are the teachers of the future, towards recycling was examined longitudinally. It is thought that the Environmental Education course, which has been taken in the fourth grade in the classroom education undergraduate program, is effective in increasing the sensitivity of pre-service teachers towards recycling at this grade level. In this respect, it is thought that it would be beneficial to give the environmental education course, which is given in some undergraduate programs of universities, in all departments of universities. At the same time, the

reasons why female pre-service teachers are more sensitive to recycling than male pre-service teachers can be investigated. In this regard, various practices can be carried out to increase the recycling sensitivity of male pre-service teachers. This research was carried out with pre-service primary teachers. Similar studies can be carried out both in the faculty of education and in undergraduate programs in other faculties. Individuals' knowledge, awareness and sensitivity towards recycling can be examined by conducting similar studies.

ETHICAL TEXT

Journal writing rules, publication principles, research and publication ethics rules and journal ethics rules were followed in this article. Responsibility for any violations that may arise regarding the article belongs to the author. Since this study started in 2016, there is no ethics committee approval.

Author(s) Contribution Rate: The author's contribution rate in this study is 100%.

REFERENCES

Aksakal, Ş. (2013). *Determining the sensitivity of science and technology teacher candidates about environmental recycling.* [Unpublished Master Thesis]. Firat University.

Barr, S. (2007). Factors influencing environmental attitudes and behaviors: A U.K. case study of household waste management. *Environment and Behavior, 39*(4), 435-473.

Büyüköztürk, Ş. (2007). *Handbook of data analysis for social sciences*. Pegem Publishing

Connor, O. (1989). Uneven and combined development and ecologicalcrisis: A theoretical introduction. *Race and Class, 30*(3), 1-11.

Çimen, O. & Yılmaz, M. (2012). Recycling knowledge and recycling behaviors of primary school students. *Journal of Uludag University Faculty of Education, 25*(1), 63-74.

Darby, L. & Obara, L. (2005). Household recycling behaviour and attitudes towards the disposal of small electrical and electronic equipment. *Resources, Conservation and Recycling, 44*(1), 17-35.

Demircioğlu, G., Demircioğlu, H. & Yadigaroğlu, M. (2015). Evaluation of environmental awareness levels of physics, chemistry and biology teacher candidates. *Adıyaman University Journal of Social Sciences Institute, 8*(19): 167-193.

Dinçol-Özgür, S. (2020). Examining prospective teachers' awareness of recycling in terms of various variables. *Erzincan University Journal of Education Faculty, 22*(3), 837-856.

Dresner, M. & Blatner J. S. (2010). Approaching civic responsibility using guided controversies about enivorenmental issues. *College Teaching, 54*(2), 213-220.

Erdaş-Kartal, E. & Ada, E. (2019). Pre-school teacher candidates' views on environmental problems and recycling. *YYU Journal of Education Faculty, 16*(1), 818-847.

Erten, S. (2005). Investigation of environmentally friendly behaviors in pre-school teacher candidates. *Journal of Hacettepe University Faculty of Education, 28,* 91-100.

Flanagan, S. (2017). *How can education improve the recycling behaviors and attitudes of middle school students*. [Unpublished Master Thesis]. Hamline University.

Fraenkel, J. R. & Wallen, N. E. (2006). *How to design and evaluate research in education*. McGraw-Hill International Edition.

Harman, G. & Çelikler, D. (2016). Awareness of pre-service science teachers about the concept of recycling. *Journal of AIBU Social Sciences Institute, 16*(1), 331-353.

Hsu, S. J. (2004). The effects of an environmental education program on responsible environmental behavior and associated environmental literacy variable in Taiwanese college students. *Journal of Environmental Education, 35*(2), 37-48.

Huang, S. L. & Waxmann, H. C. (2009).The association of school environment to student teachers' satisfaction and teaching commitment. *Teaching and Teacher Education, 25*(2), 235–243.

Kahyaoğlu, M. & Kaya, M. F. (2012). Pre-service teachers' views on environmental pollution and environmental non-governmental organizations. *Journal of Educational Sciences Research*, *2*(1), 91-107.

Kaya, A. & Uzoğlu, M. (2019). Determining the views of science teachers about recycling. *The Journal of Academic Social Science Studies, 76*, 365-381.

Moseley, C., Reinke, K. & Bookout, V. (2002). The effect of teaching outdoor environmental education on preservice teachers' attitudes toward self-efficacy and outcome expectancy. *The Journal of Environmental Education, 34*(1), 9-15.

Reschovsky, J. D. & Stone, S. E. (1994). Market incentives to encourage household waste recycling: Paying for what you throw away. *Journal of Policy Analysis and Management, 13*(1), 120-139.

Saphores, J-D. M., Ogunseitan, O. A. & Shapiro, A. A., (2012). Willingness to engage in a proenvironmental behavior: An analysis of e-waste recycling based on a national survey of U.S. households. *Resources, Conservation and Recycling, 60*, 49-63.

Schultz, P. W., Oskamp, S. & Mainieri, T. (1995). Who recycles and when? A review of personal and situational factors. *Journal of Environmental Psychology, 15*(2), 105-121.

Schultz, P. W. (2002). *Knowledge, education and household recycling: examining the knowledge-deficit model of behavior change. New Tools for Environmental Protection: Education, Information and Voluntary Measures.* National Academy Press.

Schwab, N., Harton, H. C. & Cullum, J. G. (2014). The effects of emergent norms and attitudes on recycling behavior. *Environment and Behavior, 46*(4), 403-422.

Sidique, S. F., Lupi, F. & Joshi, S. V. (2010). The effects of behavior and attitudes on drop-off recycling activities. *Resources, Conservation and Recycling, 54*(3), 163-170.

Spiegelman, H. & Sheehan, B. (2004). The future of waste, *BioCycle 45(*1), 59.

Strife, S. (2010). Reflecting on environmental education: Where is our place in the green movement? *The Journal of Environmental Education, 41*(3), 179-191.

Uyanık, G. (2017). Opinions towards environmental pollution of primary school students. *YYU Journal of Education Faculty, 14*(1), 1574-1600.

Wang, Z., Guo, D. & Wang, X. (2016). Determinants of residents' e-waste recycling behaviour intentions: Evidence from China. *Journal of Cleaner Production, 137*, 850-860.

Online References

https://www.enerjiekonomisi.com/hangi-atik-hangi-geri-donusum-kutusuna-gitmeli/6967/ Access was provided on 02.04.2022