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Developing the Zero Waste Awareness Scale and determining the zero waste awareness levels of the pre-service science teacher

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ABSTRACT

The main purpose of this research is to develop a Zero Waste Awareness Scale (ZWAS) with appropriate psychometric properties. Another aim of the study is to reveal the zero waste awareness levels of pre-service science teacher. The study was designed according to the survey method. The study group for this research was determined by a convenient sampling method. The study group in the scale development phase of the research consisted of 203 teacher candidates. In the phase of determining the zero waste awareness levels of the pre-service science teachers, the research study group consisted of 40 pre-service science teachers. With this research, a 3-dimensional, 27-item ZWAS was developed. During the scale development process, the draft scale was applied to 203 pre-service teachers, and the obtained data were subjected to validity and reliability analysis. According to the explanatory factor analysis, the scale explains 42% of the total variance. When the results of the explanatory factor analysis are examined, it is seen that the factor loads of the 27 items in the scale vary between.33 and.80. The internal consistency coefficient of the scale was found to be Cronbach Alpha .86. The developed scale was applied to pre-service science teachers in the next stage. As a result of the study, it was found that when the maximum score that can be obtained from the scale (54 points) is taken into account, it is noteworthy that the pre-service science teachers' average scores from the scale are low. As a result of this study, a valid and reliable Zero Waste Awareness Scale has been brought to the relevant literature.

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1. INTRODUCTION

In the course of its 4.5-billion-year existence, Earth has seen the appearance of modern humans anywhere between 149,000 and 280,000 years ago (Aydin & Erdal, 2010). The wheel, weapons of war, fire, flame, and the first innovation of humans can all figure into the discussion of the oldest invention of mankind, but so can waste and the problems it causes. This waste problem is becoming more pressing as the world's population and technology both rise. That is to say, the gap between man and nature widens a bit more each day as a result of the phenomenon we call civilization.

Wasted energy and materials, polluted groundwater and surface water, air pollution that spreads disease, and wastes that pile up on the ground make profitable agricultural land unusable are all examples of environmental concerns that demand immediate attention (Erten, 2020). According to the Living Planet Report, population sizes of vertebrate animals have decreased by 52% in less than two human generations (WWF, 2014). Rapid population growth and sedentary activities on our planet bring along many problems such as environmental pollution, extinction of species, ecosystem destruction, climate change, and ozone layer depletion (Guven & Aydogdu, 2012; Kislalioglu & Berkes, 2007). The mucilage problem in the Sea of Marmara, the garbage mountains seen as the 7th continent, the loss of fertile lands, and the presence of microplastics on the Antarctic continent are just a few of the environmental problems we face. Human beings take pollution with them wherever they go, and even space gets its share of this pollution. Therefore, it is thought that it is extremely important to first be aware of all these problems and then seek solutions to them.

The energy resources and raw materials in our world are not unlimited. As Gandhi stated, the world provides enough for everyone's needs but not enough to satisfy everyone's greed. In this respect, in order to ensure the continuation of life on our planet, it is necessary to not consume raw materials and energy if they are not necessary, or to consume less, and to reuse and transform these raw materials and energy. From this point of view, the world adopts a new approach: zero waste. Zero Waste means designing and managing products and processes to systematically prevent and eliminate the volume and toxicity of waste and materials, conserve and recover all resources (ZWIA, 2018). The principle of "zero waste" focuses on raising consumer awareness, preventing waste, separating waste at the source, and recycling recyclable waste (Akin, 2020). In this respect, "zero waste" aims to prevent waste and use resources efficiently by revealing the causes of waste. It is also explained as a waste management process that expresses the collection and recycling of wastes by sorting at the place where they are generated (Caliskan, 2020).

As of the year 2021, the member states of the European Union have decided to prohibit the use of plastic straws, as well as all non-biodegradable bags and a large number of objects made of plastic, such as forks, knives, and glasses (Congar, 2021). For the sake of a more sustainable way of life, a great number of internationally known corporations have begun creating goods that are harmless to the environment and have instituted a "zero waste" policy. In Turkey, the zero waste project was initiated in 2017. Following its introduction in 2017, the Zero Waste Regulation was published in the Official Gazette on July 12, 2019 with the number 30829. Zero-waste systems are being established within the scope of the project. It is the purpose of this project to make effective use of the available resources, to generate cost savings and economic benefit, to educate customers about environmental issues, and to spread information about waste-free solutions. Thanks to these systems, the wastes generated are recycled in the most efficient way possible, and the reuse of the wastes is ensured (Guven Yildirim & Onder, 2021; T.C. Cevre ve Sehircilik Bakanligi, 2019). As a result of the implementation of this approach, it is aimed to benefit the economy by reusing the resources in the country, to reduce the need for raw materials, to reduce environmental pollution, to reduce greenhouse gas emissions, and to save energy (T.C. Cevre ve Sehircilik Bakanligi, 2019). At this point, the zero-waste approach should be adopted not only by states but also by individuals as a philosophy of life, and education should be given to the entire society on the subject. The key to increasing the current performance in education or achieving superior performance is the training of teachers with appropriate competencies (Yildiz & Yildiz, 2018). In a similar vein, it is of the utmost significance for pre-service educators, who are tasked with the responsibility of bringing up persons who will influence the future, to develop an understanding of the zero-waste approach. Because the education system is considered an ecosystem, teacher candidates are the producers of this system. Pre-service teachers, whose level of zero waste awareness was determined during their education and who gained awareness about the concept of "zero waste", will first apply this approach to their own lives, and then, with their role model identity, they will set an example for both society and their students.

There are few research on the zero-waste approach in our country, based on a review of the relevant literature. Sonmez (2020) examined the zero-waste-related drawings of first-grade students. Harman and Yenikalayci (2020) examined the zero waste awareness of pre-service science teachers. Haksevenler, Kavak, and Akpinar (2021) sought an answer to the topic of how far the Zero Waste Management approach is accomplished on university campuses. However, no measurement tool has been found in the literature that aims to reveal the awareness levels of individuals on the subject of zero waste. Therefore, with this study, it is primarily aimed to introduce a valid and reliable Zero Waste Awareness Scale to the related literature. Another aim of the study is to reveal the zero waste awareness levels of pre-service science teacher.

2. METHOD

2.1. Research design

This study, which was carried out by developing the Zero Waste Awareness Scale and determining the Zero Waste awareness levels of pre-service science teacher, was carried out in two stages. In the first stage of the study, a scale with psychometric properties was developed to measure the level of awareness of Zero Waste in individuals. In the other phase of the study, Zero Waste awareness levels of pre-service science teacher were investigated. For this reason, the study was designed according to the survey model, which is one of the descriptive research types. Descriptive research aims to find "what is", and therefore, observation and survey methods are generally used to collect data in descriptive research (Borg & Gall, 1989). Descriptive studies are described as studies in which the current situation of the subject is investigated and the possible relationships between the variables are revealed without intervention (Buyukozturk, Akgun, Karadeniz, Demirel & Kilic, 2016; Yildirim & Simsek, 2018). Survey models, on the other hand, are studies in which research data are collected from a sample group representing the universe, rather than the whole universe, in order to reveal the views or characteristics accepted by large groups (Fraenkel & Wallen, 2009).

2.2. Working group and sample

This research's study group was determined through a convenient sampling technique (Cohen, Manion, & Morrison, 2007). In the scale development phase of the research, the study group comprised of 203 teacher candidates attending a public university in Ankara during the fall semester of 2021-2022. In the phase of determining the zero waste awareness levels of pre-service science teachers, the study group consisted of 40 pre-service science teachers enrolled in the fall semester of 2021-2022 at a public university in Ankara.

2.3. Instrument design & data collection process

In accordance with the goal of this study, it was important to assess pre-service science teachers' awareness of zero waste. Due to this, the literature on the topic of zero waste has been reviewed, but no adequate measurement tool for the study has been identified. In this study, a Likert-type scale was constructed to assess the Zero Waste awareness of pre-service teachers, and the Zero Waste Awareness Scale developed by the researchers served as the instrument for data collection.

As the first stage of the scale development process, resources for the Zero Waste approach were determined and related resources were examined (Guven Yildirim & Onder, 2021; T.C. Cevre ve Sehircilik Bakanligi, 2019; Ozzaglı, Buro, & Kiraz, 2022; ZWIA, 2018). As a result of these examinations, the topics related to the Zero Waste approach were determined and items were prepared to determine the awareness levels of the pre-service science teacher about the Zero Waste approach. An item pool of 57-items, which is thought to provide content validity, was created. While preparing the items, attention was paid to ensure that all items contain only one situation, and that they are clear and understandable at the same time. The scale was prepared in 3-point Likert type as "agree" "disagree" and "No idea". Hart (1996) states that participants cannot perceive the difference between the options equally in Likert-type questions, and this causes a change in the number of participation levels and thus affects the validity and reliability of the scale (Ozkan & Bindak, 2021). For this reason, the Likert number of the scale was determined as three.

After this stage, the validity and reliability analyzes of the scale were started. Expert opinions were sought in order to ensure the content validity of the 57-item 3-point Likert scale. The Zero Waste Awareness Scale was examined in terms of content validity by two faculty members working in the department of science education and a faculty member working in the department of biology education. The scale was evaluated by an expert in accordance with the measurement and evaluation criteria. Finally, the scale was examined by an expert in terms of compliance with grammar rules, clarity and intelligibility. The experts decided that two items were not suitable in terms of grammar and two items were not suitable in terms of assessment and evaluation criteria. In line with the feedback received from the experts, four items were removed from the draft pool and a 53-item draft scale was obtained.

At another stage, the draft scale was applied as a pilot study to 20 pre-service science teachers in the 3rd year of undergraduate education. After the feedback received from the re-service science teachers, it was decided that there was no problem in the draft scale and the application time of the scale was determined as 15 minutes.

The draft scale, which was prepared in line with the opinions of the experts and teacher candidates, was applied to a total of 203 teacher candidates studying in various departments at the education faculty of a state university in Ankara. SPSS 25 package program was used in the analysis of the data obtained from the application.

The Kaiser-Meyer-Olkin (KMO) value of the scale was calculated as .84. In addition, a significant difference was found in the Bartlett Sphericity test result of the scale ($p < .05$). As the KMO value was greater than .70 and there was a significant difference in the Bartlett Sphericity test, it was concluded that the data were suitable for factor analysis (Leech, Barrett, & Morgan, 2005; Tavsancil, 2010).

Factors with eigenvalues greater than 1.00 emerged as a result of the analysis of the main components of the scale and the scaling of items with factor loadings suitable for the desired level. The eigenvalues of the first three factors were found to be significantly higher than the eigenvalues of the other factors. In the scree plot, the eigenvalues of the factors other than these three factors were close to each other and did not show sharp decreases. Sharp decline points in the graph determine the factor number of the scale (Singh, 2007). For this purpose, Cattel's "scree" test was performed (Kline, 1994) and a graph as below was obtained (Figure 1)

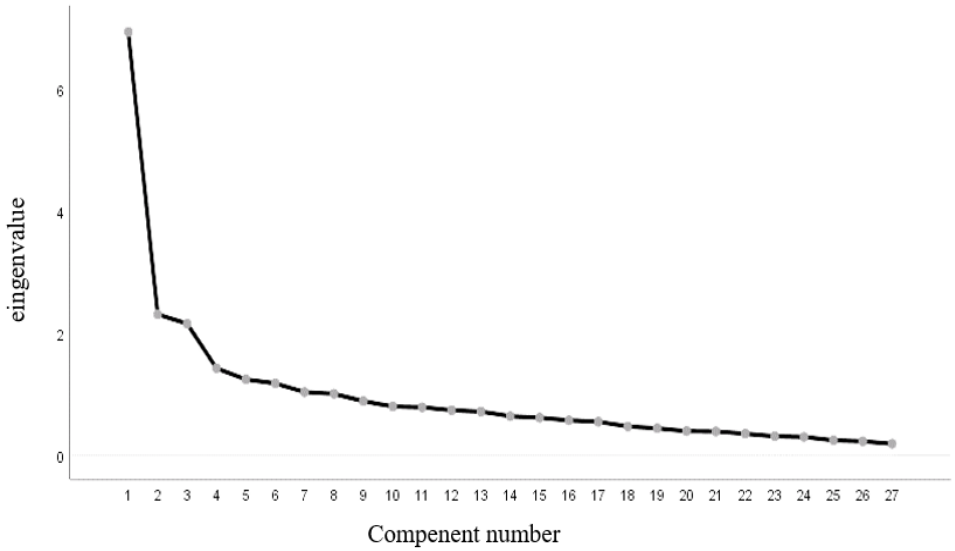

Figure 1. Zero Waste Awareness Scale line chart

The points where the graph curve shows a rapid decline were determined and the number of factors in the scale was determined as three. The results of these three factors are given in the table below (Table 1).

Table 1: *Findings from factor analysis*

Factor	Eigenvalue	Percentage of Variance	Percentage of Total Variance
1	6.95	25.74	25.74
2	2.31	8.57	34.31
3	2.16	8.00	42.31

As seen in Table 1, the eigenvalues of the three factors in the scale were found to be 6.95, 2.31, 2.16, and the total variance percentages were found to be 25.74, 34.31 and 42.31, respectively. These three factors explain 42% of the total variance. According to Kline (1994), the acceptable rate should be above 41%. This allows the scale to be used as a scale consisting of three factors. In the next step, the factor analysis application, which reveals the structures measured by the scale items and called factors, was started. It is stated that the data obtained from 200 participants is sufficient for factor analysis (Tabachnick & Fidell, 1989). For this reason, it is thought that 203 teacher candidates provided sufficient number of people for factor analysis. The fact that the factor load values of the items in the scale are above .30 indicates that the items are suitable for use in the scale (Bryman & Cramer, 2001). In this respect, as a result of factor analysis, items with a factor load of less than .30 and under more than one factor at the same time (I1, I5, I6, I7, I11, I13, I15, I16, I20, I21, I22, I23, I24, I25, I26, I27, I31, I33, I34, I38, I44, I45, I47, I48, I50, I53) were excluded from the scale. After the items were removed from the scale, factor analysis was applied to the scale items again. As a result of the analysis, 27 items remained in the scale. Load values for the remaining items are given in Table 2. In the final case, the factor load values of the items in the Zero Waste Awareness Scale were found to be between .33 and .80. As a result of the factor analysis, 12 of the awareness scale items were collected in the 1st factor, 8 in the 2nd factor

and 7 in the 3rd factor. The distribution of items related to the sub-factors of the scale and their Cronbach Alpha values are given in the table below (Table 2).

Table 2: *Distribution of the items in the scale by factors and load values*

Item number	Factor 1	Item number	Factor 2	Item number	Factor 3
I 18	.72	I 41	.79	I 37	.80
I 8	.69	I 51	.71	I 35	.76
I 14	.68	I 40	.65	I 36	.69
I 4	.62	I 32	.62	I 42	.57
I 12	.61	I 19	.56	I 46	.57
I 10	.60	I 49	.53	I 43	.55
I 17	.60	I 52	.51	I 28	.33
I 9	.55	I 39	.46		
I 2	.47				
I 3	.45				
I 29	.35				
I 30	.34				

The scale consists of three factors. The naming of the factors has been determined as "Waste Reduction", "Reuse", "Recycling". The distribution of item numbers by factors is 12 for Waste Reduction sub-dimension, 8 for Reuse, and 7 for Recycling. In addition, the items numbered I1, I5, I7, I81, I10, I11, I13, I18, I26, I27 in the scale were identified as reverse items. The distribution of 27 items in the scale in its final form is given in the table below (Table 3).

Table 3: *Distribution of scale items to sub-dimensions*

Sub-Dimensions	Items
Waste Reduction	1,4,7,9,12,13,15,17,20,21,23,26
Reuse	2,5,8,10,16,18,24,25
Recycle	3,6,11,14,19,22,27

The internal consistency coefficient (Cronbach Alpha) was calculated to determine the reliability of the scale. The internal consistency coefficient of the first sub-dimension of the scale was .83, the internal consistency coefficient of the second sub-dimension was .77, the internal consistency coefficient of the third sub-dimension was .76 and the general internal consistency coefficient of the scale was .86.

After the validity and reliability analyzes were completed, 27 items and a three-dimensional scale were obtained. The answers given by the teacher candidates to the positive items in the scale as "agree" were given 2 points, the answers as "disagree" were given 0 points, and the answers as "no idea" were given 1 point. For negative items, this scoring was performed in reverse. So, the lowest total score that can be obtained from the scale is 0 and the highest total score is 54. The scale is presented in the appendix. The developed scale was applied to 40 pre-service science teachers at the last stage and the data regarding the Zero Waste awareness levels of the pre-service teachers were included in the findings.

2.4. Data analysis

Microsoft Excel spreadsheet program and SPSS 25 statistical analysis program were used in the analysis of the data of the research. Descriptive statistics techniques were used to determine the general distribution of the answers given by the pre-service teachers regarding the developed scale. In addition, central tendency and central distribution values of the scale scores were reported. Frequency and percentage distributions were used in the analysis of pre-service science teachers' responses to the scale.

3. FINDINGS AND DISCUSSION

After confirming the validity and reliability of the Zero Waste Awareness Scale (ZWAS), the scale was applied to the pre-service science teachers, and the results for the responses of the pre-service teachers to the items in the scale are given in Table 4 and Table 5.

Table 4: *Descriptive results of teacher candidates' Zero Waste Awareness Scale scores*

Test	N	M	Sd.	Mod	Median	Kurtosis	Skewness
ZWAS	40	17.72	1.13	17	17.50	-.32	.57

Table 5: *Percentage-frequency distribution of the responses of the teacher candidates to the items in the Zero Waste Awareness Scale*

Scale items	I agree		No idea		I do not agree	
	%	f	%	f	%	f
Item1	15	6	17.5	7	67.5	27
Item2	55	22	7.5	3	37.5	15
Item3	30	12	15	6	55	22
Item4	22.5	9	17.5	7	60	24
Item5	27.5	11	15	6	57.5	23
Item6	40	16	12.5	5	47.5	19
Item7	17.5	7	12.5	5	70	28
Item8	32.5	13	10	4	57.5	23
Item9	27.5	11	10	4	62.5	25
Item10	30	12	17.5	7	52.5	21
Item11	22.5	9	10	4	67.5	27
Item12	32.5	13	20	8	47.5	19
Item13	32.5	13	7.5	3	60	24
Item14	20	8	15	6	65	26
Item15	15	6	12.5	5	72.5	29
Item16	22.5	9	17.5	7	60	24
Item17	30	12	12.5	5	57.5	23
Item18	20	8	27.5	11	52.5	21
Item19	22.5	9	7.5	3	70	28
Item20	27.5	11	17.5	7	55	22
Item21	25	10	12.5	5	62.5	25
Item22	27.5	11	15	6	57.5	23
Item23	27.5	11	12.5	5	60	24
Item24	17.5	7	7.5	3	75	30
Item25	12.5	5	20	8	67.5	27
Item26	20	8	17.5	7	62.5	25
Item27	20	8	20	8	60	24

When Table 4 is examined, it is seen that the pre-service teachers' scale score averages, mode and median values are quiet close to each other. The fact that these data are close to each other is accepted as an indicator

of the normal distribution of the data (Koklu, Buyukozturk, & Cokluk Bökeoglu, 2006). In addition, the fact that the kurtosis skewness values in the table are between +1 and -1 shows that the data are normally distributed (Hair, Black, Babin, Anderson & Tatham, 2013).

In determining the cut-off points, the mean value ± 1 Standard deviation statistical approach, which was used by Tabacchi et al (2020) in the food literacy scale was used to determine the breakpoint for categorizing individuals based on low, medium and high literacy for renewable energy sources. When the maximum score that can be obtained from the scale (54 points) is taken into account, it is noteworthy that the pre-service science teachers' average scores from the scale are low. Information on the percentage-frequency distribution of the answers given by the pre-service teachers to the items in the scale is given in Table 5.

When Table 5 is examined, it is seen that the Zero Waste awareness levels of science teacher candidates vary according to the items in the scale. For example, it was observed that 15% of the pre-service teachers answered "I agree", 17.5% "I have no idea", and 67.5% "I do not agree" to item 1. When the 5th item was examined, it was seen that 27.5% of the pre-service teachers answered "I agree", 15% "I have no idea", and 57.5% "I do not agree". Again, when the answers of the pre-service teachers regarding the 17th item were examined, it was seen that 30% "agree", 12.5% "I have no idea", 57.5% "I do not agree". When the 27th item was examined, it was determined that 20% "agree", 20% "I have no idea", and 60% "I do not agree".

4. CONCLUSION AND SUGGESTIONS

In this research, first of all, a valid and reliable scale was developed to reveal the level of awareness of zero waste among teacher candidates. When the literature is examined, there are various measurement tools for environmental behaviour (Guven & Aydogdu, 2012; Goldman, Yavetz, & Pe'er, 2006) and recycling (Aksan & Celiker, 2017; Arslan, 2019). However, no measurement tool has been found that aims to reveal the awareness levels of individuals towards the zero waste approach. As a result of this study, a valid and reliable Zero Waste Awareness Scale with 27 items consisting of 3 factors, item factor loads varying between.33 and.80, and a reliability value of Cronbach Alpha .86, was developed. The quantitative data of the study were collected on this scale.

Later, the developed awareness scale was applied to science teacher candidates in order to reveal their Zero Waste awareness levels. Although the answers given by the pre-service science teachers to the items on the scale differ according to the items, it was observed that the mean of the pre-service teachers' awareness of zero waste was M = 17.72. When the maximum score that can be obtained from the scale (54 points) is taken into account, the zero waste awareness levels of the science teacher candidates were found to be low. It is thought that the reason for this situation is that teacher candidates have not taken any courses on zero waste, and this subject is not included in their curriculum. In addition, the prospective teachers who participated in the study could not find the opportunity to participate in any application or training within the scope of the Zero Waste Project carried out in Turkey. Therefore, there are no learning environments where pre-service teachers will gain awareness about the zero-waste approach. In this respect, it is expected that the level of awareness of teacher candidates towards the zero-waste approach is low. However, it is stated that the awareness of the individuals studying at the university about waste management is directly reflected in their waste reduction, reuse, and recycling behaviours (Paghasian, 2017). It is also emphasised by the researchers that the Zero Waste approach gives young people experience and skills; the teachings of this approach are reflected in their behaviours (Choiriyah, 2017); and the information given to university students about the collection of recyclable waste increases the efficiency of waste collection (Tufaner, 2019). When the literature is examined, it is noteworthy that there is an extremely limited study investigating the level of awareness of zero waste among science teachers and pre-service teachers. The findings obtained from these studies are in direct parallel with the results of this study. For example, in the study conducted by Yildar (2022), it was aimed to have information about how much knowledge teachers have about the Zero Waste project, their thoughts on this subject, and how much of the activities and practices that can be carried out within the scope of this project. As a result of the analysis of the data obtained from the study, it was found that the science teachers did not have sufficient knowledge about zero waste. In addition, it was concluded that the teachers were insufficient to implement zero-waste activities in their schools and confused the concepts of zero-waste and recycling. In another study conducted by Harman and Yenikalayci (2020), it was concluded that the awareness of the science teacher candidates towards the Zero Waste approach was not sufficient, that the candidates discussed Zero Waste mostly about waste management and recycling, and did not mention the concept of reuse much. From the study, it was seen that the statements of the teacher candidates regarding the zero-waste approach were structured on the basis of waste management and recycling, environmental effects, savings, economy, and raising society's awareness. Similarly, in another study, it was found that the majority of science teacher

candidates stated that recycling, which is an important component of the Zero Waste approach, is necessary to prevent the damage and environmental pollution of wastes, to reuse waste materials, and to prevent the depletion of raw material resources (Harman & Celik, 2016). In another study conducted by Dal and Okur Akcay (2021), it was aimed to determine the views of science teachers on sustainable development and Zero Waste. As a result of the research, it has been determined that science teachers have very general knowledge about sustainable development and zero-waste concepts, but their knowledge is insufficient in some subjects.

When the literature on the subject was scanned, a few more studies were found in which the opinions of teachers and prospective teachers regarding the Zero Waste project, which came into effect in 2017, were investigated. The results of these studies also reveal that the level of knowledge of the teachers or pre-service teachers about the zero-waste approach or project is low. For example, in the study conducted by Yuzuak and Erten (2022), it was aimed to determine teachers' views on Turkey's Zero Waste Project (TZWP). As a result of the study, it was revealed that most of the teachers were not aware of the Zero Waste project implemented in our country for four years and that the teachers were not very knowledgeable about Zero Waste. In another study conducted by Erten and Atmaca (2021), the views of prospective science teachers about the Zero Waste Project were examined. As a result of the study, it was seen that the awareness of the pre-service science teachers about the purpose and scope of the Zero Waste project was not sufficient, that most of the pre-service teachers had a lack of knowledge about the project, that the pre-service teachers did not participate in any scientific activity related to the Zero Waste project, and that the pre-service teachers did not believe that this project had achieved its purpose.

It is known that universities are considered "small cities" due to their high population of students and their carrying out urban and scientific activities on different scales. In this context, of course, all kinds of educational institutions, especially higher education institutions, should play an important leadership role in the environmental protection movement (Adeniran, Nubi, & Adelopo, 2017). It should be taken into account that individuals who are trained in universities will be the guides and managers of the institutions of the future, and that the teacher candidates who study at universities will be the trainers of new generations. Considering the existing levels of awareness about zero waste among teacher candidates, it is important to include this subject extensively, especially in undergraduate education programs. Because the barrier to Zero Waste programs is the lack of awareness of individuals to protect their environment (Choiriyah, 2017). In this respect, it is an important necessity to determine and increase the Zero Waste awareness level of teachers, who are the implementers of curriculum at all grade levels, while they are still studying. With future research, activities and applications that will increase the zero-waste awareness level of teachers and pre-service teachers can be designed. Zero Waste awareness levels of students at different education levels and individuals carrying out different tasks can be determined. More activities, trainings, and campaigns can be organised to raise public awareness on the subject. Thus, it can be ensured that the Zero Waste approach, which is of vital importance in eliminating the waste problem and environmental problems, is noticed by all individuals.

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Notes

Scientific ethics declaration:

The purposes and procedures of the current study were granted approval from the ethical committee of the Gazi University (19.10.2021 / E-77082166-302.08.01- 253769).

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Appendix

Zero Waste Awareness Scale (Turkish version)

SIFIR ATIK FARKINDALIK ÖLÇEĞİ

Değerli öğretmen adayları,

Bu ölçek sizlerin Sıfır Atık farkındalığınızı belirlemek amacıyla hazırlanmıştır. Lütfen ölçekte bulunan her bir maddeyi okuduktan sonra doğru olduğunu düşündüğünüz yalnızca bir cevabı işaretleyiniz. Ölçekte bulunan maddeleri cevaplandırdığınız ve cevaplarınızda dürüst ve samimi olduğunuz için teşekkür ederim.

İFADELER	Katılıyorum	Fikrim Yok	Katılmıyorum
Günlük hayatta yeniden kullanılabilen eşyalar tercih edilmesi atık oluşumunun azaltılmasında fayda sağlamaz.			
Satın alınan ürünler uzun ömürlü, yeniden kullanılabilir ve doğa dostu olmalıdır.			
Sıfır Atık sistemlerinin kurulması geri dönüşüme fayda sağlar.			
Elektronik maddelerin doğaya atılması sonucu bozunan metaller besin zinciri yoluyla insana ulaşarak insan sağlığını tehdit eder.			
İhtiyaç olmasa bile indirimli ürünler gelecekte kullanılmak üzere satın alınmalıdır.			
Atıkların doğru bir şekilde ayrıştırılması geri dönüşüm ve ham madde tasarrufu için gereklidir.			
Dünya kaynakları ve ham maddeler sınırsızdır.			
Alışveriş yapılırken istekler ihtiyaçlardan önde tutulmalıdır.			
Sıfır Atık ile israfın önlenmesi amaçlanır.			
Bilgisayar, telefon, tablet gibi elektronik ürünler bozulduğunda çöpe atılmalıdır.			
Aldığımız ürünlerin üzerindeki işaretler ve şekiller herhangi bir anlam ifade etmez.			
Doğa için zararlı ambalaj ve ürünler üreten şirketlerin ürünleri tüketilmemelidir.			

Ülkelerin Sıfır Atık yaklaşımını benimsemesi ülkelere bir fayda sağlamaz.			
Sıfır Atık yaklaşımı oluşan atık miktarının azaltılması hedefler.			
Ham maddelerin hızlıca tüketilmesi gelecekte ham madde ihtiyacının artmasına neden olacaktır.			
İleri dönüşüm yapılarak atıkların azaltılması sağlanmalıdır.			
Yiyecek israfı olmaması için öğünler planlanmalıdır.			
Elektronik eşyalar sürekli yenileri ile değiştirilmeli, çağa uygun, güncel ürünler kullanılmalıdır.			
Sürdürebilirliği sağlamak amacıyla bez torba, file ve cam kaplar kullanılmalıdır.			
Sıfır Atık yaklaşımının benimsenmesi ekolojik denge için bir anlam ifade etmez.			
Plastikler, kağıt maddeler ve enerji kullanımının artması, ekosistemdeki diğer canlıları olumsuz etkiler.			
Ömrünü tamamlayan geri dönüştürülebilir atıklar geri dönüşüme ulaştırılmalıdır.			
Ülkelerin Sıfır Atık yaklaşımını benimsemesi ülkelere hem enerji hem de maliyet açısından fayda sağlar.			
Eski veya kullanışsız bir nesneyi yararlı ve yeni hale getirmek için bir tür yeniden tasarım yapılmalıdır.			
Bir ürün satın alınırken, ürünün ne kadar uzun ömürlü olduğu ve ne kadar atık çıkaracağı iyi düşünülmelidir.			
Elektronik aletler çevreye atıldığında kolay kolay bozunmaya uğramadığı için çevre kirliliğine neden olmaz.			
Yiyecek atığı, plastik ve kağıt aynı yerde biriktirilmelidir.			

Zero Waste Awareness Scale (English version)

ZERO WASTE AWARENESS SCALE

Dear pre-service teachers,

This scale has been prepared to determine your Zero Waste awareness. Please tick only one answer that you think is correct after reading each item on the scale. Thank you for answering the items in the scale and being honest and sincere in your answers.

ITEMS	Agree	No idea	Disagree
Preferring reusable items in daily life does not help in reducing waste generation.			
The products purchased must be durable, reusable and environmentally friendly.			
Installing Zero Waste systems benefits recycling.			
Metals, which decompose as a result of throwing electronic materials into nature, reach people through the food chain and threaten human health.			
Discounted products should be purchased for future use, even if they are not needed.			

It is necessary to separate the wastes correctly in order to be able to recycle the wastes and save raw materials.			
World resources and raw materials are unlimited.			
While shopping, wants should be prioritized over needs.			
Zero Waste ensures that waste is avoided.			
Electronic products such as computers, phones, tablets should be thrown away when they break down.			
The signs and figures on the products do not make any sense.			
The products of companies that produce harmful packaging and products for nature should not be consumed.			
Adopting the Zero Waste approach does not benefit countries.			
The Zero Waste approach aims to reduce the amount of waste generated.			
The rapid consumption of raw materials will lead to an increase in the need for raw materials in the future.			
Waste should be reduced by upcycling.			
Meals should be planned to avoid food wastage.			
Electronic items should be constantly replaced with new ones and up-to-date products should be used.			
To ensure sustainability, cloth bags, mesh bags and glassware should be used.			
Adopting the Zero Waste approach does not make sense for ecological balance.			
The increase in the use of plastics, paper materials and energy adversely affects other living things in the ecosystem.			
Recyclable wastes that have reached the end of their life should be recycled.			
Adopting the Zero Waste approach benefits countries both in terms of energy and costs.			
To make an old or useless object useful and new, some kind of redesign has to be done.			
When purchasing a product, it should be well thought how long the product will last and how much waste it will generate.			
When electronic devices are thrown into the environment, they do not cause environmental pollution because they do not decompose easily.			
Food waste, plastic and paper should be deposited in the same place.			