

Teacher Candidates' Views on the Zero Waste Project

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Abstract

This case study was carried out to determine the opinions of prospective science teachers about zero waste project. The study group of the research consists of 67 prospective teachers studying in the science education department at one university in Konya, Turkey. When the research results are examined, it is seen that the awareness of the science teacher candidates about the purpose and scope of the zero waste project is not sufficient. Most of the teacher candidates experience a lack of information about the zero waste project. The teacher candidates, who stated that they did not participate in any scientific activity related to the zero waste project, do not believe that this project has achieved its purpose. The results of the research show that informing about the zero waste project is not enough, many teacher candidates will graduate without having sufficient awareness. As researchers, we think that information about the scope, purpose and implementation steps of the zero waste project should be included more in education curricula, TV programs and scientific activities.

Keywords: Science Education, Prospective Teachers, Zero Waste Project

INTRODUCTION

Environment is the setting where living and non-living beings interact and live together in a balanced way (Erten, 2012). Since the earliest dates, human existence has always been in contact with the environment. This relationship has turned into a way that people harm the environment over time. Especially in recent years, natural disasters such as extreme drought, excessive rainfall, strong storms, extreme colds have occurred in different parts of the world. These are not unexpected natural phenomena. These natural disasters are the results of human beings' ruthless and unconscious use of the environment (Erten, 2015). Especially in the mechanization process that started with the industrial revolution, environmental damage has reached a high level due to wrong practices. Since then, the pollution levels in the atmosphere have reached the highest levels in their history (Uglietti, Gabrielli, Cooke, Vallenlonga & Thompson, 2015). With the increasing severity of environmental problems and the situations caused by these problems in our age, these problems have ceased to be regional and have started to be addressed on a global scale (Mensah & Casadevall, 2019; Atmaca, Kıray, & Pehlivan, 2019; Tekbiyik & Celik, 2019; Yeni, 2015).

Rapid population growth, economic developments, industrialization, urbanization, increase in living standards have brought along an increase in the rate of waste. Solid wastes, in particular, have begun to be the leading environmental problem (Guerrero, Maas & Hogland, 2013; Seng, Kaneko, Hirayama & Katayama-Hirayama, 2011). Waste is the symbol of unproductiveness of any society (Zaman & Lehmann, 2013). Around 130 billion tons of natural resources are consumed every year worldwide. With this consumption, approximately 4 billion tons of solid waste are produced. These numbers are very serious and worrying numbers. These figures in the amount of waste are alarming for the future of the planet. Every waste produced means using natural resources and energy, pollution of the environment, damage to the economy and pressure on the planet. One of the results of the steps taken to find solutions to these concerns in recent years is the zero waste philosophy. Zero waste is a trend that supports the redesign of the life cycles of natural resources based on the recyclability of products (Song, Li, & Zeng, 2015; Zaman, 2014).

Since the phenomenon of environmental education as a solution to environmental problems on a global scale, a number of objectives, goals and content for the protection of the

environment have begun to be included in education programs (Bakar, 2019; Frantz & Mayer, 2014). These efforts are used to raise awareness about the environment, to develop a positive attitude and to gain environmentally friendly behavior. Attention has been paid to providing environmental knowledge-themed courses and the relationship of these themes with other courses and disciplines at all levels of education from primary school to higher education (Derman & Gurbuz, 2018; Gunningham, Kagan & Thornton, 2004).

In addition to the lessons and the determined objectives, great efforts are made to ensure that societies become environment friendly societies with nationwide projects. Many societies are aiming to transform their current waste management practice into a more efficient and sustainable way, called zero waste practice (Zaman & Lehmann, 2011). One of the most concrete environment friendly efforts is the “Zero Waste” project that has been carried out nationwide as a state policy which has been maintained by the Republic of Turkey Ministry of Environment and Urbanism in the last two years. The Zero Waste project is a project that was started in 2017 with the aim of leaving a more livable planet to future generations by controlling waste (Sarı Çetin, 2020; URL 1).

As a philosophy, zero waste is a very important step specially to reach a sustainable waste management approach. The term zero waste was first used by Paul Palmer in 1973, with the aim of saving the natural resources of the earth from the chemicals that pollute them. The zero waste system, which is a system where the pressure and burden of industrialization on the natural resources of the planet is alleviated, has gained more importance since the 1990's (Zaman, 2015). Zero waste system can be expressed as an innovative, clean and sustainable system (Hannon & Zaman, 2018). In zero waste systems, material flows are designed in a circular manner, so it is essential to use the materials required for product production up to the optimum consumption level. This means that the materials are used over and over again. No material is wasted in zero waste systems (Murphy & Pincetl, 2013).

Zero waste maximizes recycling, minimizes waste, reduces consumption, and allows products to be reused, repaired or recycled to the nature or market (Matete & Trois, 2008). Zero waste is primarily based on cleaner production, waste management, the reduction of unnecessary consumption and the effective utilization of waste materials (Young, Ni & Fan, 2010). In this system where no material is wasted, the products are reused in a continuous

cycle (Greyson, 2007). Products that have reached the end of their useful life are included in the process as a resource if repair or reuse is not possible, thus reducing the use of natural resources. In other words, zero waste is the transition from the classical industrial understanding in which wastes are adopted as garbage, to modern integrated industrial systems that make use of everything (Curran & Williams, 2012; Matete & Trois, 2008).

The zero waste philosophy is primarily based on the environmental awareness and the 3R rule, also known as the basis of protecting and improving the ecological balance through conscious behavior. The 3R rule consists of "Reduce-Reuse-Recycling" steps (Vignesh, Rajadesingu & Arunachalam, 2021; Nizar, Munir, Munawar & Irvan, 2018). With the zero waste philosophy, which adopts the principles of reduce, reuse and recycle, it is thought that integrating the production of environment friendly materials into production systems and reusing these materials by reducing the amount of individuals' excessive consumption can be provided (Silva, Rosanno, Stocker & Gorissen, 2017). Eventually, by reducing the unnecessary consumption pressure on the planet through participation of these materials in the recycling process, the development of

environmentally friendly economies can be provided (Song, Li, & Zeng, 2015).

The Zero Waste Project that includes many goals such as providing clean environment and ensuring increase the performance of this environment and thus productivity, ensuring the reduction of risks for the squandering, costs and environmental health, ensuring that conscious consumers are raised was integrated into educational institutions. It's named "Zero Waste Education Project" by the Tema Foundation in collaboration with Ministry of Environment and Urbanization, Ministry of National Education and Tetra Pak Turkey (Önal, Kaya & Çalışkan, 2019; URL-2).

With all these developments, the importance given to waste reduction and recycling in educational institutions has increased considerably. Education is a lifelong process that starts in the family and continues in institutions. In order to gain a positive attitude towards the environment, students should be made aware of environmental problems from childhood to the end of university education (Artvinli & Demir, 2018; Uzun, Gilbertson, Keles, & Ratinen, 2019). If it is desired to give the society a certain quality in a certain subject, teachers have a great responsibility in that process. Teachers are among those who shape future generations.

Regardless of which profession students choose in the future, it is the biggest and most sacred duty of teachers to bring them into society as useful people. Considering that today's teacher candidates will be the teachers of tomorrow, it will be seen how serious a mission the education faculties actually have. In this context, if future generations and current students are to be raised with zero waste awareness, it should be ensured that teacher candidates in education faculties grow up with zero waste awareness and graduate (Bulut, 2020; Martínez-Borreguero, Maestre-Jiménez, Mateos-Núñez & Naranjo-Correa, 2019).

Science is one of the most important branches that include objectives and achievements regarding environment in its curriculum. In this context, it is very important for science teachers to follow environmental issues closely and to graduate with sufficient equipment. The aim of this study is to investigate the awareness and knowledge of science teacher candidates about the zero waste project. In this way, it will be determined whether the curriculum of education faculties, science education departments, gives importance to zero waste awareness or not. Revealing the current situation is important in terms of laying the groundwork for improvement

studies to be made on the subject (Harman & Yenikalaycı, 2020).

METHOD

The case study was used in this research to investigate the awareness of science teacher candidates about the zero waste project. The study was conducted in academic year 2019-2020. More details can be described in the following.

Participants

This study, which aims to investigate the awareness of the science teacher candidates about the zero waste project, was carried out with the teacher candidates studying at the Science Education Department of the Faculty of Education at a state university that provides education in Konya which is a city in Central Anatolian Region in Turkey. Convenience sampling method was used while creating the study group. Convenience sampling is the selection of the samples from easily accessible and applicable groups due to the limitations in terms of time, money and labor (Büyüköztürk, Çakmak, Akgün, Karadeniz, & Demirel, 2012).

The study group of the research consisted of 67 science teacher candidates. Ten (10) of the teacher candidates constituting the study group was male and fifty seven (57) of them are female. The science teacher candidates who participated in the study group study in the 4th grade. There is no homogeneity

in terms of gender since the number of female students in the science education department where the study was conducted is much higher than the number of male students. All teacher candidates participating in the study group stated that they have taken a lesson about environment during their undergraduate education. All the teacher candidates in the study group participated voluntarily.

Research Instrument

In this study, an interview form was used to determine the awareness of science teacher candidates about the zero waste project. The data collection tool of the research is an interview form which includes 8 open-ended questions. The interview form consists of two parts. The first part is the personal information form containing questions on the demographic variables of the teacher candidates, and the second part is the questions part with 8 open-ended questions. After the questions in the interview form were formed by the researchers, expert opinions were taken from different environmental scientists. Thus, the validity of the data collection tool was provided by expert opinion.

Data collection and analysis

The data of the research were collected by the researchers themselves. The researchers distributed the interview form they developed to the pre-service

teachers who made up the study group and asked them to answer them with their real feelings and thoughts without any time limit. While collecting the data, no time limit was given, and it was ensured that the teacher candidates sincerely convey all their thoughts. Researchers paid attention to the volunteering of the teacher candidates who made up the study group.

Content analysis and descriptive analysis methods were used in the analysis of the data obtained in line with the answers received from science teacher candidates. During the analysis of the data, the data set of the research was coded by more than one researcher. Thus, the reliability of the study was provided. Expert opinion was taken while creating the questions of the measurement tool, and while the research data were analyzed, the researchers transferred the data objectively. Thus, the validity of the research was ensured.

RESULTS AND DISCUSSION

In this section, the findings obtained as a result of the analysis of the research data will be presented.

Question 1. What comes to your mind when zero waste is mentioned?

The first question asked to science teacher candidates is “What comes to your mind when zero waste is mentioned?” The answers given by the teacher candidates and the frequencies

and percentages obtained from these answers are given in Table 1.

Table 1. What Comes to Your Mind When Zero Waste is Mentioned?

Zero Waste Codes	Frequency	Percentage
Recycling	47	70.1%
No Waste	16	23.8%
Clean Environment	14	20.8%
No Garbage	5	7.46%
Separate Collection of Garbage	3	4.47%
Renewable Energy	1	1.49%
Sustainable Development	1	1.49%

When Table 1 is examined, it is seen that when the concept "zero waste" is mentioned, most of the science teacher candidates think of recycling. Seventy percent (70%) of the teacher candidates answered this question as "Recycling". The answer with the highest frequency given after recycling is "No Waste." Approximately 21% of the teacher candidates stated that clean environment comes to mind when zero waste is mentioned, 7% of them said no garbage, and 4% answered this question as separate collection of garbage. Only one of the teacher candidates in the study group answered as "Renewable Energy" and again only one of them said "Sustainable Development" comes to mind when zero waste is mentioned.

Question 2. Do you have any knowledge about zero waste project?

The second question directed to science teacher candidates is "Do you have any knowledge about the zero waste project?" The answers given by the teacher candidates and the frequencies

and percentages obtained from these answers are given in Table 2.

Table 2. Do You Have Any Knowledge About the Zero Waste Project?

Zero Waste Codes	Frequency	Percentage
Yes	33	49.25%
No	34	50.75%

When Table 2 is examined, it is seen that more than half of the science teacher candidates do not have any knowledge about the zero waste project. Thirty-three (49.25%) of the teacher candidates stated that they had knowledge about the zero waste project, while 34 (50.75%) stated that they had no knowledge about the zero waste project.

Question 3. If you have knowledge about the zero waste project, what is the source of this knowledge (TV, scientific activity, school etc.)?

The third question asked to the science teacher candidates is "if you have knowledge about the zero waste project, what is the source of this knowledge (TV, scientific activity, school etc.)?" The answers given by the teacher candidates and the frequencies and percentages

obtained from these answers are given in

Table 3.

Table 3. If You Have Knowledge About the Zero Waste Project, what is the Source of This Knowledge (TV, Scientific Activity, School etc.)?

Zero Waste Codes	Frequency	Percentage
School	24	72.7%
TV	24	72.7%
Social Media (Internet)	9	27.2%
Physical Environment	5	15.5%
Scientific Activity	3	9.04%
Newspaper, Magazine (Printed Publications)	2	6.06%

In the previous question, teacher candidates who stated that they had knowledge about the zero waste project were asked to indicate the source of this knowledge this time. Approximately 73% of the 33 teacher candidates who stated that they had knowledge about the zero waste project stated that they obtained this knowledge from the school, while again approximately 73% indicated television broadcasts as another source of their knowledge. While 27.2% of the teacher candidates showed social media, that is the Internet, as the source of their knowledge; 15.5% showed the posters placed on garbage containers, garbage collection vehicles and recycling bins in the physical environment they lived in as the source of their knowledge about the zero waste project. 9.04% of the teacher candidates stated that they remembered their knowledge from scientific activities and 6.06% from the printed publications.

Question 4. Have you participated in any activity (project, seminar, conference etc.) related to the zero waste project?

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The fourth question asked to the science teacher candidates is “Have you participated in any activity (project, seminar, conference etc.) related to the zero waste project? If you attended, which institutions (Ministry of National Education, Non-governmental Organizations, Ministry of Urbanism and Environment, Council of Higher Education, Municipalities etc.) did host this activity?” The answers given by the teacher candidates and the frequencies and percentages obtained from these answers are given in Table 4.

Table 4 Have You Participated in Any Activity (Project, Seminar, Conference etc.) Related to the Zero Waste Project?

Zero Waste Codes	Frequency	Percentage
Participated	2	2.98%
Did not participate	65	97.02%

When asked whether science teacher candidates participated in any activity (project, seminar, conference, etc.) related to the zero waste project, 97% of the teacher candidates in the study group stated that they did not

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participate. Only 2 of the science teacher candidates, that is approximately 3%, stated that they participated in an activity. The teacher candidates who participated in the activity and stated that the activity they participated in was held by Ministry of Urbanism and Environment.

Question 5. What do you think the purpose of the zero waste project is?

The fifth question directed to science teacher candidates is “What do you think the purpose of the zero waste project?” The answers given by the teacher candidates and the frequencies and percentages numbers obtained from these answers are given in Table 5.

Table 5. What Do You Think is the Purpose of the Zero Waste Project?

Zero Waste Codes	Frequency	Percentage
Protecting Environment/Clean Environment	29	43.2%
Increasing the Recycling Rate	26	38.8%
Preventing Waste Generation	16	23.8%
Protecting Society and Environmental Health	6	8.95%
Contributing to the Economy	4	5.97%
Reducing the Use of Plastic	4	5.97%
Maintaining the Ecological Balance	3	4.47%
Saving Energy	3	4.47%
Directing to Renewable Energy Resources	2	2.98%
Preventing Squandering	2	2.98%
Slowing Down the Global Warming	1	1.49%
Promoting the Use of Recyclable Products	1	1.49%
Sustainable Development	1	1.49%
Informing the Society	1	1.49%

When the science teacher candidates were asked what the purpose of the zero waste project was, approximately 43% of the teacher candidates in the study group stated that the purpose of the zero waste project was to protect the environment. Approximately 39% of the teacher candidates stated that the purpose of the project was to increase the recycling rate, while approximately 24% of the teacher candidates stated that the purpose of the project was to prevent waste generation.

Approximately 9% of the science teacher candidates stated that the purpose of the project was to protect the society and environmental health, while approximately 6% stated that the purpose was to contribute to the economy. When the remaining answers are examined, it is seen that the teacher candidates think of reducing the use of plastic as the purpose of the zero waste project, maintaining the ecological balance, saving energy, directing people to renewable energy resources, preventing squandering,

slowing down the global warming, promoting the use of recyclable products, sustainable development and informing the society.

Question 6. When you look around, do you think the zero waste project has succeeded? If you think so, explain with the reasons.

Sixth and seventh questions asked to science teacher candidates are “When you look around, do you think the zero waste project has succeeded? If you think so, explain with the reasons. If you do not think, explain with the reasons.” The answers given by the teacher candidates and the frequencies and percentages obtained from these answers are given in Table 6 and Table 7.

Table 6. When You Look Around, Do You Think the Zero Waste Project Has Succeeded? If You Think So, Explain with the Reasons.

Zero Waste Codes	Frequency	Percentage
Yes	8	11.94%
No	55	82.08%
Partially	4	5.97%

During the analysis of the research data, each teacher candidate was coded with numbers. For example; Like teacher candidate 1. During the transfer of the data, the abbreviation "T.C." was used instead of "teacher candidate".

Approximately 12% of the pre-service teachers who participated in the study stated that when they looked around, they saw that the zero waste project achieved its purpose. When asked about

the reasons, the teacher candidates (T.C.) provided answers in the form of;

T.C. 36

“I think it generally succeeded because wastes are recycled to the environment in a healthy way thanks to recycling.”

T.C. 45

“Yes. For example, the use of plastic bags has decreased by 80%. Generally, the use of cloth bags has become widespread.”

T.C. 52

“Yes, I think. Because with recycling, wastes have entered our lives in a form that can be used. Many substances are recycled today.”

Question 7. When you look around, do you think the zero waste project has succeeded? If you do not think, explain with the reasons.

When asked if the science teacher candidates see whether the zero waste project has been successful when you look around, about 82% of the candidates answered no (Table 7). When asked about the reasons for the teacher candidates why they answered as “No”, the answers they gave are presented in the Table 7.

Table 7. When You Look Around, Do You Think the Zero Waste Project Has Succeeded? If You Do Not Think, Explain with the Reasons

Zero Waste Codes	Frequency	Percentage
Unconscious Society	24	35.8%
Insensitive Society	24	35.8%
An Environment Full of Waste	23	34.3%
Inadequate Informing	11	16.4%
Excessive Use of Plastic	6	8.95%
Not Collecting the Waste Regularly	5	7.46%
Inadequate Physical Conditions (Containers)	3	4.47%
Consumer Society	3	4.47%
Excessive Squandering	3	4.47%
No Awareness	2	2.98%
Short Term Solutions	2	2.98%

When the answers of the teacher candidates who gave the answer “No” are examined, it is seen that the teacher candidates think that the society do not have zero waste awareness, the society is not sensitive about this issue, and the environment is still full of waste; so they think that the zero waste project has not been successful. When the answers are examined, besides these three reasons, it emerges that they think the information provided about the zero waste project is insufficient, there is still too much plastic use in the society, waste is not collected with the same care in all regions, and waste collection containers are insufficient in some regions that lowers the motivation for the collection of waste separately in the society. In addition to these, teacher candidates state that the society is a consumer society, splurge is at a high rate, the necessary awareness for zero waste is not raised, and the solutions found are short-term.

T.C. 29

“I don't think so. When I look around, I still see a dirty environment. Wastes are collected indiscriminately and taken to garbage dumps. People are after consumption; they buy things they do not need. Instead of giving old or unused items to someone else, they throw them away.”

T.C. 43

“I don't think so. Because people are not conscious, they throw waste into places instead of recycling.”

T.C. 57

“I don't think. When I go to any picnic area, the environment is full of plastic waste.”

T.C. 34

“I do not see. Because most people do not know about this project. People should be made aware of this.”

T.C. 40

“I think that there isn't necessary infrastructure for collected garbage to actualize the zero waste project, so it has not been successful.”

T.C. 37

"No, I do not think. Adequate information is not provided. When I look around, it is still very dirty and unhealthy."

T.C. 33

"No, because it is not applied everywhere regularly."

T.C. 31

"No, because people are not conscious enough. Nobody takes responsibility for this."

T.C. 16

"I don't think because people are still insensitive and insist on littering the environment."

Approximately 6% of the teacher candidates who participated in the study gave the answer "Partially". When the answers of the teacher candidates are examined, it is seen that they think there is an improvement compared to the previous situation.

T.C. 47

"I think it is partially. But I think this awareness should be given to children by focusing more on this project."

T.C. 48

"Partially. In schools, importance is given, though not much. "

T.C. 58

"I don't know if it has succeeded completely, but compared to before, I see an increase in efforts to increase the recycling of waste materials."

Question 8. When you are asked to carry out the "zero waste" project in your schools when you become a teacher, what would you do about this project?

The eighth question directed to science teacher candidates is "When you are asked to carry out the "zero waste" project in your schools when you become a teacher, what would you do about this project?" The answers given by the teacher candidates and the frequencies and percentages obtained from these answers are given in Table 8.

Table 8. When You Are Asked to Carry Out the "Zero Waste" Project in Your Schools When You Become A Teacher, What Would You Do About This Project?

Zero Waste Codes	Frequency	Percentage
Providing recycling bins	31	46.2%
Informing about project, aim and scope (Seminar, conference, meeting organization)	31	46.2%
Organizing waste collection campaigns	19	28.3%
Making material from waste	8	11.9%
Detecting pollution and finding solution	6	8.95%
Sharing used items campaigns	5	7.46%
Determining consumption amount	4	5.97%
Controlling individual expenditure	4	5.97%
Publishing newspaper and magazine and printing poster	3	4.47%

Zero Waste Codes	Frequency	Percentage
Collecting waste battery	3	4.47%
Avoiding the use of plastic	2	2.98%
Drawing attention to squandering	2	2.98%
Collecting waste oil	2	2.98%

As the last question of the research, “when you are asked to carry out the “zero waste” project in your schools when you become a teacher, what would you do about this project?” was asked. When the answers given by the teacher candidates were examined, it was found that most of the efforts to be made on the zero waste project were about informing about the project purpose and scope (46.2%) and providing recycling bins (46.2%). In addition to these, organizing waste collection campaigns (28.3%), using waste materials as a resource and converting them into new materials (11.9%), detecting pollution and finding solution (8.95%), delivering unused or old items to the needy campaigns (7.46%), determining consumption amount (5.97%), controlling individual expenditure (5.97%), publishing newspaper and magazine and printing poster (4.47%), collecting waste battery (% 4.47), avoiding the use of plastic (2.98%), drawing attention to squandering (2.98%), collecting waste oil (2.98%) are stated as the efforts that teacher candidates plan to carry out in their schools.

This research was carried out with the aim of investigating the awareness of
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science teacher candidates about the zero waste project.

According to the results of the research, when teacher candidates are told about zero waste, they first think of “recycling”; and then, no waste, clean environment, no garbage, separate collection of garbage, renewable energy and sustainable development. However, considering the purpose and objectives of the zero waste project, it is seen that the first principle is to prevent waste generation. The most basic way to prevent waste generation is to prevent squandering, that is, to prevent more consumption than necessary. None of the teacher candidates participating in the study gave the answer preventing wastage when asked what comes to your mind when zero waste is mentioned. Similarly, Harman and Yenikalaycı (2020) stated in their study that only 2 of the 29 teacher candidates mentioned about the preventing squandering. However, the first step to be taken for zero waste is not to generate waste. In other words, individuals should minimize the amount of waste and garbage they create personally. This is only possible by consuming less.

Therefore, individuals should internalize
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environment friendly behaviors that will reduce the amount of waste and garbage, and behave environment friendly throughout their lives (Erten, 2003). Only in this way can the goals and principles of the zero waste philosophy be realized. The first thing that comes to mind of the teacher candidates was not to generate waste and prevent squandering, which can be interpreted as the purpose and scope of the zero waste project was not well understood.

When the teacher candidates participating in the study were asked if you have any knowledge about the zero waste project, the number of teacher candidates who answered no is almost the same as the number of teacher candidates who answered yes. In other words, about half of the study group stated that they did not have any knowledge about zero waste. When asked about the source of their knowledge, it is seen that most of the teacher candidates who have knowledge received this knowledge from the institutions they studied in and television programs. When the teacher candidates were asked whether they participated in an activity related to this project, 97% of them stated that they did not participate in any scientific activity. Most of the teacher candidates stated that they learned their knowledge about the zero waste project from the lessons they took

during their education and from television programs, especially from news. When the answers received from the teacher candidates are examined, it is seen that they have obtained their knowledge about the zero waste project, apart from school and TV programs, from social media, from the bulletin boards in their physical environment, from the articles on the container cladding and municipal vehicles, from the scientific events they attended (seminars, conferences) and from the print media such as newspapers and magazines. In their study, Harman and Çelikler (2018) stated that science teacher candidates' knowledge about solid wastes is mostly obtained from school and that the sources of knowledge that come after school are television, family and newspaper, respectively. The emphasis on the recycling of the wastes revealed in this research supports aforementioned research.

As can be seen, the course contents in the teaching curriculum are seen as a first-degree knowledge source for teacher candidates. For this reason, if the aim of the zero waste project is to be achieved, the first step on this subject should be to enrich the course contents and tools in terms of what is zero waste. Then, the relationship between zero waste and environmental problems and the solutions for the disposal of waste

should be emphasized. It also should be to make course content richer in terms of environmental problems and solutions. Education is a process that should be given at an early age, so environmental education, which will be given for environmental problems such as zero waste that is the purpose of many projects, should be handled sensitively starting from primary school books (Pimpuang & Kessomboon, 2018). Önal, Kaya and Çalışkan (2019) examined the appearance of the zero waste policy in environmental education in existing textbooks. The researchers, who chose the social studies textbook of the 2nd grade as the book to be examined, stated that while they came across direct and indirect texts and visuals related to recycling, they did not find enough texts and images about the zero waste project.

Another research question of the study is to determine the purpose of the zero waste project according to the teacher candidates. When the answers given by the teacher candidates are examined, it is seen that they mostly think that the purpose of the zero waste project is “protecting the environment”. The second purpose most considered after clean environment is to increase the recycling rate. Other purposes that teacher candidates considered as the purpose of the zero waste project are to prevent waste generation, protect society

and environmental health, contribute to the economy, reduce the use of plastic, protect the ecological balance, save energy, direct people to the renewable energy sources, prevent squandering, slow down the global warming, encourage to use recyclable products, sustainable development and inform the society. When the goals of the zero waste project are examined according to the education levels, it is seen that the objectives were “think, do not consume if not necessary”, “consume less”, “recycle and reuse”, “change use for different purposes” and “transform, let nature win.” The main purpose of the project is to prevent unnecessary consumption (URL-3). When examined within the scope and purpose, it is seen that the main purpose of the project is to prevent squandering and to ensure more efficient use of natural resources. However, when the answers given by the teacher candidates are examined, it is seen that the prevention of waste generation is seen as a purpose only by 23% of the teacher candidates and only 3% of them stated that the purpose is to prevent squandering. When these answers are analyzed, it is seen that most of the teacher candidates interpreted the purpose of the project as encouraging recycling or increasing the amount of recycling. However, the main purpose should be to avoid being a consumer

society and to use natural resources sparingly. Students' understanding of zero waste is that eat, drink and throw away and recycle. It is inevitable to convey the information that will raise the students' awareness for that recycling of waste also means consuming natural resources. It should also be addressed in lessons where the first priority is to prevent unnecessary consumption and squandering.

When the teacher candidates who participated in the study were asked about their opinions about whether the zero waste project was successful or not, the majority of them stated that they thought it was not successful. While only about 12% of the teacher candidates thought that the project succeeded, 6% of them gave the answer partially. When the reasons were questioned, the teacher candidates who gave the answer partially and answered yes stated that they gave this answer because they thought the situation was good compared to the past, while the teacher candidates who answered no stated that the society was unconscious and insensitive, the environment was still full of waste, informing people was insufficient, plastic was still used excessively. They stated that wastes are not collected regularly, the waste separation and collection containers are insufficient, the society has the characteristics of the

consumer society, the waste is high, there is no awareness of zero waste in the society. They think that the solutions offered are short-term rather than radical.

When the teacher candidates were asked what they would do regarding the zero waste project in their institutions where they worked, almost half of the teacher candidates stated that they would provide recycling bins to their institutions and carry out information activities. From this result, it can be said that according to the teacher candidates, the number of recycling bins in the institutions is insufficient and they think that the information about this project is not provided enough. Less often, the answers are collecting waste and reusing, detecting pollution, sharing and re-use of used items, determining consumption amount and controlling individual expenditure, publishing newspapers and magazines, collecting waste battery, avoiding the use of plastic, drawing attention to squandering and collecting waste oil. When the answers are examined in detail, it is seen that the teacher candidates are disturbed by the unnecessary consumption that exists in the society in general, and they want to work on this, as well as preventing environmental pollution. If waste is not generated, natural resources will be used more economically and thus many problems, especially environmental

pollution, will be solved and our planet will become more livable.

Ersoy (2019) studied teachers candidates' perception of squandering in his study. In the research, teacher candidates defined squandering as "excessive consumption" and "unnecessary". In the study, teacher candidates stated that the reasons under which individuals tend to squander are various such as popular culture, social media, mass media, capitalism. In the study, educational activities were emphasized as one of the factors to keep away from squandering. İbret, Avcı, and Receptoğlu (2019) stated in their study that teacher candidates see education and environmental pollution as the biggest social problem. The society's unconsciousness and insensitivity about environmental pollution may be due to the deficiencies in the education system. It seems unlikely that a project like zero waste will achieve 100% success in a society where individuals who are not sufficiently conscious and do not show sensitivity and awareness. Individuals will not be able to act properly unless they are conscious about this issue.

Education is very important in raising individuals' awareness of zero waste. When the foreign literature is examined, it is seen that the fact of less consumption lies at the basis of the zero waste philosophy. Less consumption

means an integration of the principles of consuming as much as you need and not squandering. It will be possible to prevent squandering and consequently protect the environment with the education given from the early ages. In this context, placing recycling bins in institutions and neighborhoods and organizing waste collection campaigns may be good steps, but the main issue here is to reduce the amount of waste generated. The zero waste philosophy is based on less consumption and thus minimum waste. The basis of zero waste awareness is that individuals consume as much as they need, reuse items and try not to create waste by including these items in the recycling process (Mason, Brooking, Oberender, Harford & Horsley, 2003; Erten, 2003).

After raising individuals' awareness of zero waste, of course, supporting them with recycling bins and waste collection campaigns will be very effective in the success of the zero waste project. In this context, it is necessary to raise the awareness of zero waste, otherwise behaviors expected from individuals such as disposing of wastes separately and collecting wastes such as oil and batteries and conveying these wastes to the institutions that collect them in order not to harm the environment will not be permanent. The main point here is to ensure the

continuity of these behaviors, that is, to raise zero waste awareness in individuals. To put the subject further, if the municipalities stop collecting waste oils and batteries as a society, will we, as individuals, collect such waste separately and take them to collection centers? Or will our students classify their wastes separately and take them to recycling centers when the recycling bins in schools are damaged or removed for some reason? The only way these behaviors become permanent in individuals is through effective and efficient environmental education.

CONCLUSION

This research helped us learn the opinions and awareness of the science teacher candidates, who formed the study group, about the zero waste project. According to the results of the research, the majority of the science teacher candidates do not have knowledge about the zero waste project and they mostly associate the term zero waste with recycling. For this reason, they stated that when they become a science teacher, the action they will do with the project is to provide a recycling bin. Most of the teacher candidates do not associate very serious environmental issues such as renewable energy and sustainable development with zero waste. As another result of the study, the majority of the pre-service teachers stated that they did not

participate in a scientific activity related to the subject. While most of the teacher candidates think that the aim of the project is a clean environment, they do not believe the project is successful.

Environmental problems are global problems, not local, regional or social problems. Therefore, solutions for the protection of the environment must be well-established, long-term and truly applicable. Only in this way can these problems be solved by acting on a global scale. In this context, by examining educational programs all over the world, environmental issues such as zero waste, which are closely related to the future of the planet, should be seriously integrated into all education programs in all areas and levels of education.

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