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Original article

The 4th Grade Students of Primary School Opinions on Recycling and Reuse

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Abstract

This study delves into the critical role of waste management, recycling, and reuse in forging a path toward environmental sustainability, economic efficiency, and social well-being. Conducted with 15 volunteer fourth-grade students in Istanbul's Seyrantepe district, it employs a case study and convenience sampling to explore students' perceptions and attitudes towards waste management practices. Findings reveal a profound understanding among the youth of the multifaceted benefits of recycling and reuse, not only in environmental terms but also in contributing to economic savings and enhancing societal consciousness. By analyzing student perspectives on waste management strategies and the significance of recycling symbols, the study highlights the importance of integrating these practices into everyday life as a means to achieve a sustainable future. The insights gained underscore a generational shift towards sustainability and the necessity of embedding recycling and reuse at the heart of waste management policies. This research advocates for the reinforcement of recycling and reuse as societal norms, driven by the innovative and environmentally conscious viewpoints of the younger generation, marking a hopeful step towards addressing the challenges of achieving a sustainable world.

Keywords: Recycling, Reuse, Sustainability, Environmental Education.

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INTRODUCTION

In the modern era, the swiftly expanding global population, coupled with increasing demands, the desire to enhance living standards, rising consumption habits, industrialization, irregular urbanization, and the reckless destruction of nature are leading to a decrease in natural resources and the disruption of ecological balance. This scenario is particularly problematic in densely populated cities, where waste management and environmental issues become more pronounced. The inability to control waste not only brings a myriad of problems related to economy, urban life, energy loss, and human health but also causes significant environmental issues. Waste materials mix with the ecosystem to the extent of their decomposability. However, as the quantity of waste that cannot decompose or integrate with nature increases, it starts to disrupt the natural balance, causing severe harm to the environment. Therefore, reducing and recycling the amount of waste generated is crucial for the preservation of the environment and nature (Akçay Han, 2008; Doğan, 2020). Moreover, recycling the irreducible waste is also significant for reducing countries' economic burdens and health issues (Cansaran & Yıldırım, 2014; Larney & van Aardt, 2009).

To prevent environmental pollution, it's imperative to raise awareness among individuals, ensure the segregation of recyclable waste at homes, workplaces, and schools, and facilitate municipalities in collecting and recycling these materials (Aydın, 2019; Bakar, 2013). The literature offers several definitions of recycling, with one by Salustri et al. (2005) describing it as the process of turning used products or parts back into new products. Schultz and colleagues (1995) define it as a process that allows used or processed materials to be reused.

The 3R approach, which stands for Reuse, Recovery, and Recycling, emerges in the context of waste recovery from residential areas. This approach aims to minimize waste production (Yaman, 2007). In waste management, the concepts of "Reuse," "Recovery," and "Recycling" are crucial. "Reuse" refers to the repeated use of waste without any processing until its economic life ends. "Recovery" involves converting waste into secondary raw materials through physical and chemical processes. "Recycling" encompasses both concepts, where waste is subjected to physical, chemical, and biochemical methods for reuse, either as primary or secondary raw materials or converted into energy. This process aims to reduce waste, extend the lifespan of landfill sites, conserve raw materials and energy, protect natural resources, and increase environmental awareness among individuals (MEB, 2009). Recycling is vital for leaving a livable world for future generations and necessitates proper waste management by societies (Aksan, 2016).

Recycling waste products holds significant potential benefits for the environment, health, and economy. It helps reduce environmental pollution and the destruction of natural resources (Spiegelman & Sheehan, 2004). Environmental problems can be considered a series of interrelated events. Therefore,

recycling, reuse, and recovery significantly contribute to preventing or mitigating numerous global environmental issues.

Conscious and sustainable use of environmental and natural resources, and adopting sustainability, are crucial in the educational process. Teachers knowledgeable about sustainability and able to pass this awareness on to students from primary education onwards play a role in fostering environmental consciousness and a sense of responsibility (Lord, 1999; Moseley, Reinke, & Bootout, 2002; Slingsby & Baker, 2003).

The Ministry of Environment and Forestry defines waste management as activities related to preventing waste generation, reducing it at the source, reusing, segregating waste according to its type and characteristics, collecting, temporary storing, transporting, intermediate storing, recycling, including energy recovery, disposal, and monitoring and control after disposal processes (ÇŞB, 2015). Lack of importance given to waste management leads to numerous problems, threatening living beings and environmental health if waste is not regularly collected, transported, stored, and safely disposed of. Human-generated wastes cause various issues, such as water pollution, pest proliferation, bad odors, and soil contamination with carcinogenic substances (Keleş, 2007). Sustainable development, which forms the core of significant global policies, aims to prevent the depletion of natural resources and allow them to transform into economic value (BSTB, 2014).

Sustainable development aims for the conscious and careful use of natural resources to meet today's needs without compromising the ability of future generations (Bruntland Report, 1987). In this context, environmental education aims to raise awareness about environmental issues and spread recycling consciousness. The solution to environmental problems is only possible with the existence of sensitive and informed societies. Today, environmental education seeks to make people aware of environmental issues and turn them into sensitive and informed participants in environmental management (Peyton et al., 1995). Thus, focusing on recycling topics during the educational process and teaching through educators aware of recycling are crucial for training individuals conscious of sustainable development and incorporating this awareness into their standard of living, thereby ensuring its transmission to future generations. Focusing on recycling topics during the educational process and transferring this consciousness to future generations is essential (Hayta, 2009).

Sustainable environmental education, aimed at developing the knowledge and skills for a sustainable future and preserving the natural balance, seeks to change individuals' perspectives, making the world a safer and healthier place. Hence, it's important to encourage individuals at all educational levels to recognize environmental problems and develop sensitive solutions (Kaya, Akıllı, & Sezek, 2009). This education is crucial for improving individuals' quality of life (Karakaş, Taş Divrik & Divrik, 2018; Keleş, 2007). Children who receive effective primary education, capable of applying a sustainable worldview, will grow up to be adults who love nature, value the environment, and practice recycling

both at home and at work throughout their lives. However, institutions providing this education must prepare their curricula based on scientific studies, and teachers should be capable of effectively conveying recycling education and developing programs for a sustainable world.

It is important for every member of the society to be active and conscious in the fight against environmental pollution in order to leave a cleaner environment in the future. In this context, reinforcing environmental awareness and sensitivity through education from an early age should be adopted as a national policy (Bakar, 2013). As a matter of fact, MoNE (2018) aims to provide students with the subjects related to the environment and environmental awareness within the social studies and science curricula.

Giving environmental awareness to children, especially from an early age, allows future generations to live in a more livable environment. Recycling has an important place in environmental education given to protect the environment and raise environmental awareness. Teaching children the importance and necessity of recycling, especially from an early age, makes them more sensitive to the environment (Doğan, 2020). These trainings, given from an early age, play a vital role in increasing future environmental awareness (Dewey, 1996). In addition, recycling is thought to be of great importance in the use of limited resources, as resources become depletable over time (Akçay Han, 2008).

The Ministry of National Education includes environmental issues in the primary school science curriculum. It is aimed to provide students with environmental sensitivity and environmental awareness regarding the economical use of resources, waste materials, recycling and reuse issues included in the primary school 4th grade science course curriculum. In primary education, subjects such as waste management, recycling and sustainable development, which are important concepts in terms of preventing the rapid consumption of natural resources, preventing the resulting waste from becoming a threat to both human health and the environment, and supporting the country's economy as an economic input, are taught in primary education. It is thought that it is important for the future to try to bring environmental awareness to students within the curriculum. In addition, it becomes easier for societies with a high level of awareness about recycling and waste to develop by using natural resources in a sustainable manner. Likewise, this situation also allows the reduction of environmental problems that may occur (Yoldaş, 2019). It is taken into consideration that increasing the society's awareness about recycling and waste will be achieved through training given from an early age.

When the related literature is examined, it is seen that the studies on recycling are generally within the scope of attitude scale development and implementation (Karatekin 2013; Karatekin & Merey, 2015; Kışoğlu, & Yıldırım, 2015; Timur, 2011; Timur, Yılmaz & Timur 2013). It was determined that the studies aiming to determine knowledge and awareness were generally aimed at teachers, prospective teachers, high school students and secondary school students from different branches (Aksan, Çelikler & Yenikalaycı, 2019; Cici et al. 2005; Cinquetti, & Carvalho, 2007; Çimen & Yılmaz, 2012; Dinçol

Özgür, 2020; Dinler, Simsar & Doğan, 2020; Erdaş Kartal & Ada, 2019; Harman et al, 2015; Harman & Çelikler, 2016; Karatekin 2014; Taştepe, 2017;Taştepe & Aydos, 2020; Tekkaya et al. 2011; Yoldaş, 2019).

In addition, there are many postgraduate theses and local and foreign articles on environmental education in primary education. Although it is seen that there are determinations regarding recycling in some of the studies conducted on environmental education for primary school students (Çelik, 2011; Keleş and Keleş, 2018; Sönmez, 2020), these studies are few in number and the studies are mostly carried out at the secondary school level and are aimed at environmental education. (Aşılıoğlu, 2004; Çetiner, 2017; Mremma, 2008; Mutlu, 2013; Şimşekli, 2001; Şimşekli, 2004; Öner-Armağan, 2006; Tanrıverdi, 2009; Yüksel, 2009). Due to the limited number of studies conducted at the primary school level, it is anticipated that this study will contribute to the gap in the relevant literature.

In this regard, in the study; "It was aimed to determine the opinions of 4th grade primary school students regarding waste materials, recycling and reuse. In this context, answers were sought to the following research problems:

(1) What are the opinions of 4th grade primary school students regarding waste materials?

(2) What are the opinions of 4th grade primary school students about recycling?

(3) What are the opinions of 4th grade primary school students regarding reuse?

METHOD

Research Model

In this research, case study, one of the qualitative research methods, was used. In a case study, events are observed and interpreted as they occur. In this study, data was collected by observing the events in the field and using the survey method. Case studies are the analysis of dense explanations, limited systems and units (Smith, 1978 cited in Law and Yuen, 2011).

Population

This study was conducted among fourth-grade students attending a public school in the Seyrantepe district of Istanbul. 15 volunteer students participated in the research. In order to determine students' views on recycling and reuse, students studying in the 4th grade of primary school were selected. The reason for choosing this grade level is that it is aimed for 4th grade students to gain knowledge and skills regarding the conscious consumption of resources in the human and environment unit in the science course.

Data Collection Process

The opinions of 4th grade primary school students about recycling and reuse were collected with a survey consisting of 13 open ended questions. These questions are related to what is waste material, what is recycling, what is the purpose of recycling, what are recyclable materials, what is reuse, what is the purpose of reuse, which materials can be reused, what is the contribution of recycling to our country and what is the contribution of reuse to our country.

The survey consisting of 13 open-ended questions used for data collection was developed by the researchers. Before preparing the survey questions, preliminary interviews were held with 2 primary teachers about recycling and reuse issues. Questionnaire questions were created using the content obtained from the interviews, literature and the 4th grade primary school science curriculum. The questionnaire questions were examined by two science educators in terms of validity. The questions were arranged according to the feedback of the experts as indicated in the Appendix. It was applied to 5 students to test the readability and understandability of the questions arranged according to expert opinions. The questionnaire was given its final form according to the feedback of the students. Students were given 40 minutes to answer the questionnaire.

Data Analysis

The data of this study consist of the answers/statements given by the students to the open-ended questions in their own handwriting. In the data analysis process of the study, firstly, the interview data obtained from the students were read twice independently by two authors of the study. The results obtained were then compared in terms of common and distinct categories (Creswell, 2012). Following the interviews, the raw data were subjected to a coding process. The codes generated were made meaningful through a review of the literature by the researchers. Codes that were not relevant to the researcher's objectives were eliminated, and categories capable of encompassing certain codes were created. Finally, themes were developed from the categories using artificial intelligence tools such as GPT-4 and Claude-3.

The analysis of the data utilized content analysis methodology. The primary goal of content analysis is to reach concepts and relations that can explain the collected data. For this purpose, it is necessary to first conceptualize the collected data, then organize it logically according to the emerged concepts, and subsequently identify themes that explain the data (Yıldırım & Şimşek, 2011). Firstly, all of the answers given by the students were read, then similar answers given to the same questions were grouped and read again. After these readings, categories were determined. These categories are based on the answers of the students. After that, the categories were finalised. In cases where the answers of the pre-service teachers could be included in more than one category, the answers were hierarchically included in the higher category. The answers of the students were categorised together by two

researchers within the framework of these concepts, and then the themes were formed by bringing the categories together.

The use of artificial intelligence tools like GPT-4 and Claude-3 in the final stage to generate themes represents an innovative approach, potentially streamlining the thematic analysis process and enhancing the depth and breadth of the analysis. This methodological framework ensures a thorough and detailed analysis of the qualitative data, contributing to a richer understanding of the research topic. Finally, the findings were organised and interpreted using descriptive tables. While analyzing the interviews, students were coded as S1, S2, S3….S15.

Validty and Reliability

Validty and reliability of this study was ensured by following procedures:

-The survey questions were reviewed by two science educators for their validity, ensuring that the questions effectively capture the necessary information to meet the study's objectives.

-The responses were independently read and analyzed by two authors, comparing results for common and distinct categories. This method of independent analysis by multiple researchers helps to reduce bias and increase the reliability of the thematic analysis.

-The study incorporated artificial intelligence tools like GPT-4 and Claude-3 for developing themes from the categorized data, which likely increased the efficiency and potentially the depth of the analysis.

-Some direct quotations from the participants of the study, which provide insights into the perspectives of 4th-grade students on waste materials, recycling, and reuse were given.

FINDINGS

Primary School Students' Views about Waste Materials

The responses to the question "What is waste material?" provide a valuable insight into students' perceptions of the concept of waste material. The answers of the students were analyzed and it can be said that their perceptions of waste materials are at an adequate level.

8 (% 53.3) of the students defined waste materials as "materials that can be recycled", 5 (%33.3) as "materials thrown into garbage bins" and 1 (%6.6) as "expired materials". Sample sentences of the students regarding these definitions are as follows:

“Waste material is stuff that thrown into recycling bins and trash cans (S2).”

“These are the materials that are thrown in the garbage bins after they have been used (S14).”

“These are substances that need to be removed from the environment we live in and that have expired (S4).”

Primary School Students' Views about Recycling

Students' answers to the question "What is recycling?" were analyzed and it was determined that students' perceptions about recycling were at a good level. 7 (46.7%) of the students defined recycling as "reuse of waste materials" and 8 (53.3%) of the students defined it as "producing new things from recyclable materials". Sample sentences of the students regarding these definitions are as follows:

"Reuse of waste materials as raw materials in the production process (S4)."

"It is the reproduction of materials such as paper, plastic, glass and metal (S9)."

"It is to make a reusable substance from a waste material (S10)".

"Making the waste material reusable (S11)."

"It is the transformation of used materials into useful things (S14)."

Primary school 4th grade students' answers to the question "Have you seen the symbol in the picture before? What does it mean?", it was determined that all students recognized the shown recycling symbol. This indicates that students grasp the significance of recycling for environmental sustainability and recognize its central role in waste management strategies.

Themes extracted from student opinions regarding the question "What is the purpose of recycling?" reveal the versatile purposes and benefits of the recycling process. These opinions show that students are aware of both the environmental and economic aspects of recycling (Table 1)**.**

Table 1. Answers to the question "What is the purpose of recycling?"

Categories	**f**	**%**
Contributing to our country economy	3	20.0
Being sensitive to our environment	2	13.3
Preventing resource depletion	1	6.6
Reducing the amount of garbage	1	6.6
Not polluting nature	9	60.0
Saving	3	20.0
To use something more than once	2	13.3

Based on students' answers to the questions, the themes developed and some examples of relevant responses are as follows:

1. Economic Benefits

- Contributing to our country economy

-To use something more than once

This theme indicates that students grasp the economic dimension of recycling. The recycling process transforms waste into valuable resources, contributing to the national economy. It facilitates the creation of new job opportunities and reduces the cost of raw materials.

"It contributes to the economy of the country (S6)."

"It is to reuse the things we use and make an economic contribution (S15)."

"If we use everything once, it will be economically bad, we will spend more money (S14)."

2. Environmental Responsibility

- Being sensitive to our environment

- Not polluting nature

"We become more sensitive to our environment (S2)."

"Recycling is done to prevent damage to nature. (S3)."

"The purpose of recycling is to keep our environment clean (S12)."

Students are aware that recycling is a fundamental environmental responsibility. This process encourages being environmentally conscious and aids in the preservation of natural resources. Preventing pollution is a crucial step towards maintaining a sustainable environment.

3. Conservation of Resources

- Preventing resource depletion

- Reducing the amount of waste

"It is done to prevent the depletion of resources and reduce the amount of waste (S4)."

These themes reflect the goal of recycling to support a sustainable lifestyle. Recycling prolongs the usability of materials, contributing to savings and the protection of the environment's natural balance.

When the answers given by the students to the question "What materials can be recycled?" were examined, it was determined that the students gave the most examples of paper and plastic (Table 2). They then gave examples of glass, battery and metal, respectively. Some examples of students' answers to this question are as follows:

"Plastic bottles, car tires and metal cans can be recycled (S14)."

"Paper, plastic and food packaging can be recycled (S15)."

"Glass, paper, aluminum, iron, accumulators and engine oil (S4)".

Table 2. Answers to the question "What materials can be recycled?"

Categories	**f**	**%**
Glass	12	80.0
Metal	8	53.3
Plastic	14	93.3
Paper	14	93.3
Battery	9	60.0
Engine oil	1	6.6
Accumulator	1	6.6
Car tires	1	6.6
Food packaging	1	6.6

Considering the materials mentioned by students, the recycling of commonly used materials can be summarized as follows: plastic, paper, glass, battery and metal are the most common and fundamental components of recycling. These materials, frequently used in daily life, are vital parts of the recycling process. Recycling these substances is essential for conserving natural resources and minimizing environmental pollution. On the other hand, special materials like batteries, PET bottles, aluminum, motor oil, accumulators, bottle caps, car tires, and food packaging, also mentioned by students, participate in the recycling process.

When the responses to the question "What happens if we do not recycle waste materials?" were analyzed, it was found that students have a deep awareness of the environmental, economic and ecological importance of waste management. The themes derived from student opinions reveal the wide-ranging negative consequences of not recycling.

Table 3. Answers to the question "What happens if we do not recycle waste materials?"

Categories	f	%
Thethinning of the ozone layer	2	13.3
Environmental pollution	10	66.6
Insensitivity towards our environment	1	6.6
Harm to nature	5	33.3
Waste in our country	1	6.6
Failure to contribute to the national economy	4	26.6
Harm to animals	2	13.3
Extinction of species	2	13.3
Deterioration of the country's economy	2	13.3

The themes derived from these outcomes and some examples of relevant responses are as follows:

1. Environmental Damage

- The thinning of the ozone layer

- Environmental pollution

- Harm to nature

- Harm to animals

- Extinction of species

"Nature gets polluted, animals can die and the ozone layer gets thinner (S6)."

"We would be polluting nature (S7)."

"Waste materials harm all living things under ground. Plants and trees cannot grow in the soil. It harms people. (S12)."

"It kills nature slowly, the world becomes polluted (S13)."

2. Economic Losses

- Failure to contribute to the national economy

- Deterioration of the country's economy

- Waste in our country

Highlighting the economic dimension of recycling, this theme reveals the potential economic losses due to not valorizing waste materials. Not reusing waste not only leads to resource wastage but also results in the loss of potential contributions to the national economy. Some examples of the answers given by the students are as follows:

" As everything is used once and thrown away our economy will be worse, we will spend more money (S14)."

"There will be economic loss (S3)."

"Our country could become poorer (S1)."

3. Social and Ethical Issues

- Insensitivity towards our environment

This theme addresses the social and ethical dimensions of the absence of recycling. A societal shift towards insensitivity to the environment means a reduction in environmental awareness. This contradicts our responsibility to leave a healthy and livable environment for future generations.

"If we do not recycle waste, we are insensitive to our environment and living things (S1)."

The answers given by the students to the question "What is the contribution of recycling to our country?" were analyzed and it was determined that the rate of students who thought that recycling contributed to the national economy was higher. 8 (%53.3) of the students stated that recycling contributes to the national economy, 5 (%33.3) stated that it prevents pollution, 3 (%20.0) stated that it makes the environment cleaner, 2 (%13.3) stated that it cleans the air, and 2 (%13.3) stated that it prevents trees from being cut down (Table 7). The answers to the question highlight the comprehensive benefits of recycling in terms of environmental, economic, and social aspects. The answers provided by students reveal that recycling not only offers economic savings but also protects the environment and contributes to the overall well-being of society.

Table 4. Answers to the question "What are the contributions of recycling to our country?"

Categories	**f**	**%**
Preventing polluting	5	33.3
Cleaning the air	2	13.3
Preventing the cutting of trees	2	13.3
Reducing the extraction of under ground minerals	1	6.6
Maintaining cleanliness	3	20.0
Protecting wildlife	1	6.6
Contribution to the national economy	8	53.3
Animals live comfortably	1	6.6
People are happier	1	6.6
Protecting nature	1	6.6

The themes derived from these outcomes and some examples of students' answers are as follows:

1. Environmental Benefits

- Preventing pollution

- Cleaning the air

- Preventing the cutting of trees

- Reducing the extraction of under ground minerals

- Maintaining cleanliness

- Protecting wildlife

- Protecting nature

This theme emphasizes recycling's critical role in environmental sustainability. Recycling aids in conserving natural resources, reducing air and water pollution, and contributing to the maintenance of biodiversity.

"It ensures that trees are not cut down and minerals are mined less under ground (S2)."

"It makes our environment cleaner (S4)."

"It is to clean nature and prevent trees from being cut down (S6)."

2. Economic Benefits

- Contributing to the national economy

Recycling contributes significantly to the economy by saving materials and energy. The recycling of reusable materials reduces the production costs of new products and directly benefits the national economy.

"*Recycling makes an economic contribution to our country. It prevents waste (S7)."*

"We spend less money (S10)."

3. Social and Community Benefits

- Animals live more comfortably

- People are happier

"Environmental pollution is reduced. Animals live comfortably and people are happy (S9)."

The clean and healthy environment provided by recycling improves the living conditions of animals and enhances the quality of life for people. This positively affects the overall happiness and well-being of society. Overall, students are aware of the environmental, economic, and social benefits of recycling.

Primary School Students' Views about Resue

When the students' answers to the question "What is reuse?" are examined, 8 (%53.3) of the students say "using something over and over again", 3 (%20) say "using recycled stuff", 3 (%)20 say "it is recycle", 1' (%6.6) defined it as "savings".

Sample sentences of the students regarding these definitions are as follows:

"It is using something over again (S12)."

"It's using something one more time (S13)."

"It is reusing an item for something else (S15)."

When the answers to the question "What is the purpose of reuse?" were analyzed, it was found that students expressed various purposes and benefits of reuse. These purposes span a wide range, from environmental protection to economic benefits, from preventing waste to promoting thriftiness.

Table 5. Answers to the question "What is the purpose of reuse?"

Categories	**f**	**%**
Not polluting the environment	5	33.3
Not wasting	6	40.0
Contributing to the national economy	2	13.3
Reevaluate something	4	26.6
Using something several times	1	6.6

The themes developed according to these purposes and some examples of relevant responses are as follows:

1. Environmental Protection

- Not polluting the environment

"Its purpose is to keep our environment cleaner (S1)."

"Our environment becomes cleaner (S3)."

2. Efficient Use of Resources

- Using something several times

- Reevaluate something

"It is the use of something for another purpose (S11)."

Reuse promotes the efficient use of resources and prevents waste, encouraging both individual and societal levels of thriftiness.

3. Economic Benefits

- Contributing to the national economy

- Not wasting

"Its purpose is to spend less money and save money (S5)."

"Its purpose is to be frugal (S9)."

"Its purpose is to avoid waste (S10)."

Reuse also offers economic benefits. Reusing materials and products can reduce the costs associated with materials, energy, and labor needed for producing new products. This supports the national economy and sustainable development.

In summary, the understanding of reuse purposes among students reflects a comprehensive awareness of its benefits across environmental protection, efficient resource use and economic benefits. Through reuse, individuals and societies can significantly contribute to reducing environmental impact, saving resources, and supporting a sustainable future.

The answers to the question “What are reusable items?” show that students are aware of the applicability of reuse on various materials and products (Table 6).

Table 6. Answers to the question "What are reusable items?"

Categories	**f**	**%**
They are recyclables	5	33.3
Plastic bottle	11	73.3
Paper	7	46.6
Battery	2	13.3
Glass	1	6.6
Dress	3	20.0
Notebook	2	13.3
Pen	1	6.6
Book	1	6.6
Metal box	2	13.3

Some examples of students' responses are as follows:

“Plastic water bottles can be filled with other liquid drinks (S15).”

“We can put pencils and paints in metal boxes (S14).”

Overall, students are aware that reuse is not restricted to specific types of materials and that any recyclable material can potentially be reused. These insights underscore the significance of waste reduction, and environmental sustainability.

When the responses to the question "What happens if we don't evaluate waste materials for reuse?" were analyzed, it was found that students emphasize the environmental, economic, and social significance of reuse (Table 7).

Table 7. Answers to the question "What would happen if we did not reuse waste materials?"

Categories	**f**	**%**
Our environment gets polluted	12	80.0
Insensitivity towards our country	1	6.6
Become wasteful	1	6.6
Economic harm	1	6.6
Life gets harder	4	26.6
Our world gets polluted	1	6.6
Increasing need for raw materials	1	6.6

The themes derived from these outcomes and some examples of relevant responses are as follows:

1. Environmental Harm

- Our environment gets polluted

- Our world gets polluted

"Our environment becomes more polluted (S3)."

"The air becomes polluted (S6)."

"The air bocomes polluted, the water becomes polluted (S9)."

"We would not be protecting our environment (S14)."

2. Social and Ethical Issues

- Insensitivity towards our country

- Become wasteful

"We become insensitive to our country (S2)."

"We would be wasting resources (S3)."

3. Economic Losses

- Economic harm

- Increasing need for raw materials

"We would harm our country's economy (S4)."

"We have to produce that material again and we wasting resources on reuse unnecessarily (S15)."

4. Impacts on Quality of Life

- Life gets harder

"Environmental pollution will increase, making life more difficult (S6)."

"Life becomes difficult. Air gets polluted, water gets polluted (S9)."

Overall, students are aware that not reusing could have serious adverse consequences in terms of environmental, societal, economic aspects, and quality of life. Issues such as environmental pollution, resource wastage, insensitivity, and economic losses are highlighted. These insights underline the importance of reuse and its necessity for sustainability.

The answers given by the students to the question "What is the contribution of reuse to our country?" were analyzed and it was determined that the rate of students who thought that reuse contributed positively to nature was higher. 5 (%33.3) of the students stated that it prevents pollution, 4 (%26.6) stated that it reduces garbage, 4 (%26.6) stated that it reduces waste, 3 (%20.0) stated that it saves money, 2 (%13.3) stated that it protects nature, 2 (%13.3) stated that it keeps the environment clean, and 1 (%6.6) stated that it protects animals. 1 (%6.6) student stated that he/she had no opinion on this issue (Table 8).

Table 8. Answers to the question "What is the contribution of reuse to our country?"

Categories	**f**	**%**
Reducing litter	4	26.6
Protect nature	2	13.3
Less waste	4	26.6
Being frugal	3	20.0
Preventing pollution	5	33.3
Protecting animals	1	6.6
Keeping the environment clean	2	13.3
No answer	1	6.6

The themes derived from these outcomes and some examples of students' answers are as follows:

1. Environmental Benefits

- Reducing litter

- Protect nature

- Less waste

- Preventing pollution

- Protecting animals

- Keeping the environment clean

"It reduces litter generation (S1)."

"It prevents environmental pollution and protects natüre (S7)."

"It reduces environmental pollution (S10)."

"Our country becomes cleaner (S12)."

2. Economic Benefits

- Being frugal

"We spend less money and it allows us to save money (5)."

"It makes people shop less (S9)."

Reuse helps individuals become more frugal and avoid unnecessary consumption, fostering a culture of conscious consumption within society. This can positively affect the general welfare of the community in the long term. Overall, students have highlighted the comprehensive contributions of reuse to the environment and economy.

CONCLUSION and DISCUSSION

Today, waste management, recycling, and reuse practices are of critical importance in building a sustainable future. These topics extend far beyond environmental dimensions, having wide-ranging effects in economic and social areas. The views of younger generations reflect an awareness of this multifaceted structure, bringing an innovative perspective to waste management. Students highlight the contributions of recycling and reuse in conserving natural resources, reducing waste volume, providing economic savings, and enhancing societal awareness. In this context, placing recycling and reuse practices at the heart of waste management strategies is crucial for a sustainable future:

- The reinterpretation based on themes related to the question "What is waste?" reveals the multidimensional nature of waste materials and waste management. The responses from students across various categories reflect an increasing awareness and consciousness regarding environmental sustainability and waste management. This encourages future generations to better understand their responsibilities towards the environment and society and to develop innovative solutions to these issues.

- When the students were asked what recycling is, it can be said that some students defined this concept as reuse as well as those who gave the correct definition. In some studies conducted in the literature, it has been stated that some of the students and teacher candidates stated that recycling and reuse mean the same thing (Atabek Yiğit & Ceylan, 2015; Harman & Çelikler, 2016; İpek Akbulut, Kale & Sağır, 2024).

- In our research, it was seen that the majority of students recognized the recycling symbol. Similar results are also found in the study of Harman and Çelikler (2016). It can be said that their

awareness on this issue is high. It is thought that this awareness will have an impact on choosing recyclable packaged products in daily life and collecting recyclable waste separately.

-It was observed that the students mostly evaluated the purpose of recycling and reuse as not polluting the nature and contributing to the country's economy - saving money. These perspectives demonstrate that young generations understand the importance of recycling and its various benefits and are aware of its environmental, economic, and social dimensions. Recycling is a significant environmental responsibility that individuals can implement in their daily lives and that society at large should adopt. This is an important step in encouraging future generations to strive for a greener and more sustainable world.

- The majority of students gave items such as glass, metal, plastic, paper and batteries as examples of recyclable items. Some studies in the literature show similar results (Harman & Çelikler, 2016; Haron, Paim & Yahaya, 2005; İpek Akbulut, Kale & Sağır, 2024; Ural Keleş & Keleş, 2018). Student views in the research indicate that younger generations are knowledgeable about recyclable materials and understand the importance of recycling. This level of awareness provides a significant advantage in environmental conservation efforts and is a critical step towards a sustainable future. It is vital for educators and policymakers to support this awareness and further promote recycling habits to ensure environmental sustainability.

- The students stated that if we do not recycle and reuse waste materials, nature will be polluted and our environment will be damaged. Students evaluated the contribution of recycling and reuse to our country in terms of not polluting the environment and economic benefits. - Student responses show that recycling provides contributions across a broad spectrum, from environmental protection to economic savings, from enhancing societal well-being to sustainable use of natural resources. In the study of İpek Akbulut, Kale & Sağır (2024), students stated that the biggest contribution of recycling to the country's economy is in terms of economy and environment. In another study, they expressed it as meeting the need for raw materials, saving money, and protecting natural resources (Yüksel, 2021).

Incorporating recycling and reuse into daily practices by individuals and communities plays a critical role in reducing pressure on the environment and contributing to a greener future. This approach is important for increasing environmental awareness and promoting the efficient use of resources.

Student opinions show that waste management, recycling, and reuse have a multidimensional structure and wide-ranging impacts in environmental, economic, and social areas. Recycling and reuse contribute not only to waste reduction and conservation of natural resources but also to economic savings and efficiency, as well as the development of social consciousness and

responsibility. Therefore, integrating recycling and reuse practices into the core of waste management strategies is essential for a sustainable future. Student views indicate that young generations have a high awareness of these issues, creating a hopeful foundation for adopting greener and more sustainable policies in the future.

Conclusion

In conclusion, the insights gathered from student perspectives underscore the indispensable role of waste management, recycling, and reuse in forging a path towards a sustainable future. Their understanding of the multifaceted benefits of recycling and reuse—not only in conserving natural resources and reducing waste but also in driving economic savings and enhancing societal well-being—marks a pivotal shift towards sustainability. The emphasis on recycling and reuse as not just environmental obligations but as societal values and economic opportunities reflects a deeper understanding of sustainability among young people. Their recognition of the potential of recycling and reuse to mitigate environmental disasters, promote economic prosperity, and foster a culture of responsibility and awareness sets a promising groundwork for future policy and educational initiatives.

In this context, the following suggestions can be made in line with the research results:

Activities should be organized to raise awareness among students about the definition of the concepts of recycling and reuse and the distinction between recyclable and reusable materials.

It is recommended to increase studies aimed at revealing and improving students' attitudes towards recycling and reuse at all educational levels.

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