Zero Waste: An innovative approach to food waste management in order to educate young people to value food and reduce the waste

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European Synthesis Report on the Needs and Challenges of Food Waste Management in School Education

August 2022

Leader Organization

LICEUL TEORETIC "MARIN PREDA"

Country

ROMANIA

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Leading Organization: Liceul Teoretic "Marin Preda"

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1. GENERAL INFORMATION REGARDING THE RESEARCH

According to surveys, every year about **1/3** of the food that is intended for human consumption ends up in landfills along with the energy, water and chemicals that were used for their production and disposal. The term **food waste** refers to the discarding of food at all levels, starting from the food industry up to the meal that will be cooked by the final consumer. Wasting food is **not only an ethical and economic** issue, but it also **depletes the environment of limited natural resources**. Food waste is **a global issue** that is becoming more and more **political and social,** having enormous implications in many sectors of our life.

Source: foodwastestats.com

The food that ends up in the landfills is not only linked to the waste of money that a consumer primarily paid for it. Behind every consumer's purchase, there are **many phases** and often countries that **food had to go through** during the production line. **Food waste** does not only depend on the chosen technology of production, redistribution and distribution, but it **is also significantly influenced by the final consumption by consumers.** Therefore, it is not possible to separate production from consumption and we have to take under consideration the impact from the first stages of the supply chain economy. In addition, food waste in developed countries also affects the pricing policy. The increase in the price level of food stocks is strongly connected to demand, which is also significantly increased when we have higher waste levels. As a result, people with minimum income who cannot afford to spend more money on food are most at risk.

Regarding the **environmental impact of food waste**, we have to consider the waste of all the energy, water and other valuable resources that food takes not only to grow, but also to be harvested, transported, packaged and distributed. In addition, **the production of food that is not consumed and ends up in the landfills has a significant impact on the environment and global warming**. Food waste decomposes produce harmful methane, which is a gas 21 times stronger than carbon dioxide. Moreover, the need for waste dumping in areas that are located away from habitable zones requires a large volume of fuel, which in the long term significantly affects the environment due to the emissions from the exhaust gasses.

Source: foodwastestats.com

The European Commission, along with EU countries, is committed to meeting Sustainable Development Goal 12.3, taking the issue of tackling food waste by 2030 very seriously. By reducing food waste, we can decrease the resources we use to produce the food that we eat. If we are more efficient in how we manage our food waste, we can achieve saving food for human consumption, while saving money and minimizing the environmental impact of food production and consumption.

ZERO WASTE project is aimed at informing and educating school teachers, through useful training material, about the social, environmental and financial consequences of food waste. The partnership **will also provide best practices for reducing it.** For these purposes, the first project result consisted of **a research** meant to define the knowledge basis on which the whole project is going to be built; therefore, the purpose of our common work was to identify the existing literature on the needs and challenges that schools face in establishing and managing the issue of Food waste. The research was also targeted at discovering how we can improve and develop materials which are already at the disposal of both teachers and students, but, more importantly, we wanted to find out **how we can design new material (resources, tools and instruments)** so that the main needs that educators and pupils have in the field of Food waste management are fulfilled.

The partners representing the 7 countries involved in the partnership (Romania, Greece, Bulgaria, Turkey, Spain, Italy and Cyprus) conducted not only desk research, but also field research based

on a structured questionnaire. The purpose of the instrument mentioned earlier was to collect data directly from the project's primary target group: teachers and students on the secondary level of education. The questionnaire, consisting of 3 sections with 10 questions in total, was applied by every partner institution to at least 25 students and 15 teachers.

Balkan Bridge - Bulgaria

The research activities, part of the Zero Waste project, had the purpose to identify the needs and challenges that the Bulgarian schools face within the Food Waste Management field. Both desk and field research were conducted following the pattern provided by the Project Result's leading partners. The defined target group was students (25) and teachers (15) in School Education, totaling 40 respondents.

Balkan Bridge's experts within the field of research methodologies along with the engaged technicians have developed a questionnaire designed by the online tool Google From. The questionnaire includes multiple choice and checkbox answers (closed questions) as well open questions providing space for short answers. The data from the questionnaire is provided in visually enriched diagrams and charts aiming to illustrate the results in the most approachable way.

The desk research was conducted by the Balkan Bridge's research experts based on the templates provided by the PR's leading partner with the final design adjustments of the Balkan Bridge's technicians. Any relevant sources such as national programme guides, articles and NGOs websites are referenced accordingly.

Center for Social Innovation- Cyprus

In Cyprus, the desk research report, presenting the current state of food waste and food waste management, was developed using a variety of resources, including primary research articles, as well as national reports and projects, governmental websites, and European reports referring to Cyprus' statistics.

For the purposes of the field research, a structured questionnaire was translated in Greek language, and electronically distributed to both teachers and students, using Google Forms, in June 2022. In total, 46 participants completed the questionnaire and provided us with their understanding and their personal experiences regarding food waste and food waste

management; in particular, 30 of the participants were teachers and 16 were students, between 12-15 years old.

Dot2Dot & Innovation Hive - Greece

In Greece, Innovation Hive and Dot2Dot searched the existing literature on the needs and challenges that schools face in establishing and managing the issue of Food waste along with their needs for developing new material or improving the existing ones. At the same time, along with the literature review, a structured questionnaire translated in Greek language and distributed to the primary target group (teachers and students on the secondary level of education) with the aim to identify the most appropriate format for training material and learning content that will meet their needs.

The main topics in the desk research were the economic and environmental impact of food waste, the description of national strategy against food waste issue and the role of private initiatives to raise awareness, the difficulties to collect statistical results in Greece and the lack of existing literature and educational programs related to food waste management.

The field research through the distribution of the questionnaire to 27 students and 16 teachers in Secondary Education gathered some interesting findings, for example that there is a significant knowledge gap about the meaning of food waste and how to manage this issue in Greek Secondary Education. Also, the majority of respondents mentioned that there is a need to create resources to learn about food waste management, as they have never participated in any training related to food waste management.

Petit Pas Aps - Italy

This research focuses on the situation regarding food waste in Italy with a particular focus on the management of this issue in schools. Its purpose is analyzing the initiatives born on a national level to try to limit food waste and the measures taken by schools to educate students about the problem of food waste and the impact it has on the environment, focusing on the collection of primary and secondary data, and analyzing them for report processing.

In order to identify the needs and challenges that schools face in establishing and managing the issue of Food waste along with their needs for developing new materials or improving the existing ones, the following three-step research approach was applied:

1. Collection of data from national sources.

   Data collection involves conducting a preliminary literature review as a secondary research method to motivate interview questions. The literature review covered the policy framework, provisions for students, provisions for educators and teachers, and initiatives to support learning and education in food waste management, as available from national reports, research studies, as well as national laws and data. Based on these data, the interview questions were formulated for teachers and students on the secondary level of education, who responded to assist in the preliminary desk research.

2. Data collection from national sources

   The primary research methods are conducted through interviews, followed by further secondary desk research at the national level.

3. Compile a complete national report

   Based on the data collected, the analysis was completed by highlighting key points, ranking the results to achieve the study objectives, and structuring these results to formulate conclusions and recommendations.

Origin of the data

While primary data were collected through questionnaires directed at the primary target group of the project, secondary data were obtained through internal (within the organization) and external (outside the organization) sources.

For the ZERO WASTE desk research, external sources were investigated to provide answers to the previously exposed issues. Collecting external data has been more difficult because the data has a much greater variety and the sources are much more numerous. To address this, we identified a number of sources most relevant to this research, with a focus on publications no older than ten years:

- National policy frameworks and guidelines
- National reports
- Annual reports and other census data
- Databases
- Relevant textbooks
- National projects
- Local newspapers

These sources can be accessed using search engines such as Google, and any training databases that partners have access to. The reason for including such a large selection of sources is to ensure that there is sufficient coverage of a complex topic that is understood differently among various stakeholders and countries.

The research on the national territory was supported by field research in which students and teachers were interviewed to test their level of knowledge regarding the issue of food waste and food waste management and to study their daily habits in relation to this thematic, collecting suggestions on how to manage the waste of food waste in their country/city.

Liceul Teoretic "Marin Preda" - Romania

As far as the first type of research is concerned (the desk research), Liceul Teoretic "Marin Preda", the Romanian partner, made an in-depth analysis of existing literature on the topic under discussion. We consulted laws, in-force national regulations, strategies, methodologies, relevant and pertinent points of view belonging to specialists in Food waste management, online reports and databases, good practice examples. In the next section, there will be a detailed presentation of our findings. Regarding the field research, the structured questionnaire was applied to 25 students and 15 teachers belonging to our high school. The students participating in the survey are aged 14-19, they come from both rural and urban areas and they study in classes whose profile is different (humanistic or science-oriented specializations). The teachers answering the questions have various levels of teaching experience, they teach different subjects (biology, maths, chemistry, Romanian, foreign languages, history, IT and physics).

GEINNOVA - Spain

The purpose of this research is to investigate the conception and habits surrounding food waste and food waste management in Spain, especially among teachers and pupils.

Indeed, in the first part, desk research has been carried out focusing on EU and national data collection, policies review, national strategies, national laws, EU agenda and EU priorities. As a methodology, firstly, information and data have been gathered from the Spanish government website, national online data archive, scientific papers, research, national and local newspapers. From the data collected, the situation of Spain in terms of food waste management legislation, practices and initiatives has been presented.

For the second part, the field research has been conducted (primary sources) using the online questionnaire which has been spread among different high schools reached through Geinnova's network. The questionnaire has been filled in by a total of 42 respondents: 15 teachers and 27 pupils in secondary education, all residing in Spain. This has been a useful tool to understand concretely how food waste and its management are conceptualized and which are considered the best tools to sensitize future generations.

Geleceğin Eğitimi Derneği - GED - Turkiye

In line with the Zero Waste Project, this research aims at understanding the current situation of people's perception and behavior on food waste management in Türkiye, as well as the existing knowledge and skills of teachers and students on food waste management.

The country based desk research focused on the current situation in Turkiye in terms of legislation and strategies, relevant initiatives, existing statistical data regarding food waste and food waste management. The main resources of the first part are mostly based on the data provided by the governmental statistical data, research of initiatives within this field and academic research. Since food waste management is relatively a new concept, the regulations and laws applied are still subjected to minor changes, but the desk research presents the most current ones.

The second part of this research is data collected directly from the target group of the project. The survey with teachers was applied in May and June 2022, with the participation of 28 teachers and 90 students from mostly secondary schools in Türkiye. The number of schools responding to the questionnaires is 12. Via these surveys, the knowledge level of students and teachers on food waste and its management was investigated. Also, their daily habits in relation to this thematic, collecting suggestions on how to manage the waste of food waste in their schools and how to embed the content into training were examined.

2. THE DESK RESEARCH

Balkan Bridge – Bulgaria

2.1. The food waste issue

Existing national strategy / policies / legal framework on food waste management and available private organizations' initiatives

Target

Bulgaria is committed to meeting the Sustainable Development Goal Target 12.3 to halve per capita food waste at the retail and consumer level by 2030, and reduce food losses along the food production and supply chains. The national programme for the prevention and reduction of food waste (2021-2026) also sets an intermediary target to reduce food waste by 25% by 2026.

Measure

The Ministry of Agriculture, Food and Forestry, the Ministry of Environment and Waters and the National Statistical Institute share the responsibility of monitoring national food waste levels.

The national climate change adaptation strategy and action plan address the vulnerabilities of the agricultural sector due to climate change, including food losses.

Act: The Ministry of Agriculture, Food and Forestry, the Ministry of Environment and Waters, the National Statistical Institute and the Bulgarian Food Safety Agency share the responsibility for handling the food waste record with the statistics on national level.

The National Plan on Waste Management (2021-2028) was adopted in 2021 including a food waste prevention program.

A draft national programme for the prevention and reduction of food waste (2021-2026) has been put together by an inter-institutional working group, which included ministries, agencies, branch organizations and associations in the food sector, as well as food banks. The national programme is accompanied by an action plan that sets the deadlines for implementation, as well as the responsible institutions.

The National programme was adopted by Decision № 700 of the Council of Ministers of October 7, 2021.

The operational **objectives** of the national programme are to:

- establish a national database for food waste data;
- support food production, processing and distribution facilities to prevent and reduce food waste;
- change consumer behavior and attitudes towards food;
- implement food loss and waste prevention measures at all stages of the food supply chain;

- improve the redistribution of surplus edible food for human consumption, to people in need.

The national programme prioritizes prevention of food loss and waste at source and the redistribution of surplus food for human consumption. The Bulgarian Food Law lays down the general requirements for food redistribution activities. An Ordinance on the specific requirements for food banks and for controlling their activity was adopted in 2021.

The action plan of the national programme includes actions to encourage food business operators to employ 'use by' and 'best before' date marking correctly. Awareness raising activities are a key action strand of the national programme, with actions to increase consumer understanding of the meaning of date marking, to promote the consumption of fruit and vegetables that do not meet cosmetic standards, to develop educational materials on food waste for teachers and students.

Bulgaria aims to establish a National Platform on Food Loss and Waste, gathering all actors across the food supply chain and public authorities, to cooperate on a voluntary basis and to help implement the national programme. Members will be asked to adhere to a Memorandum of Cooperation.

In the context of a pilot project for primary school (2019-2020), experts from the Bulgarian Food Safety Agency offered training on food waste prevention at home and at school to 3rd and 4th grade students. Unfortunately, the project was disrupted due to the Covid-19 pandemic and the virtual format of classes.

The Fourth Round table on “Sustainable food consumption in Bulgaria” was held in the University of National and World Economy in September 2021 with the financial support provided by the University of National and World Economy – Sofia with the project “Sustainable food consumption in Bulgaria” (NID-NF-18/2021). Experts from institutions, academia, NGOs and business presented their opinions on sustainability of the food system, provision of healthy and safe food, reduction of food waste, policies and legislation on enforcement of sustainable food consumption practices in Bulgaria.

University of Food Technologies in Plovdiv, in cooperation with CROSS-KIC EIT REGIONAL EXECUTIVE ACADEMY in Bulgaria organized a 2-day online workshop in December 2021 covering some of the current topics: Farm to Fork Strategy, Circular Economy, Prevention and reduction of food loss, Redistribution of food. Useful exchange of knowledge and up-to-date information took place, good practices were presented.

Events

Iana Ivanova, Executive Director of the Food Drink Bulgaria Association, participated in the Fourth Round Table on "Sustainable Food Consumption in Bulgaria", organized by the Department of Natural Resources Economics at UNWE.

Campaigns

Food and drink manufacturers play a leading role in supporting and implementing practices for environmental protection and the promotion of natural resources. Moreover, they support the development of standards and methodologies that are as environmentally friendly as possible.

Campaigns case studies:

1. Coca Cola HBC Bulgaria: My Green City - For more than 11 years, Coca-Cola employees in Bulgaria have contributed to the environment as part of the campaign "My Green City". In 2018, the initiative took place as part of the global commitment of World Without Waste: by 2030, to assist in the recycling of the equivalent of each bottle or ken sold to achieve 100% waste recycling. https://bg.coca-colahellenic.com/bg/%D1%83%D1%81%D1%82%D0%BE%D0%B9%D1%87%D0%B8%D0%B2%D0%BE-%D1%80%D0%B0%D0%B7%D0%B2%D0%B8%D1%82%D0%B8%D0%B5/%D0%BE%D0%BA%D0%BE%D0%BB%D0%BD%D0%B0-%D1%81%D1%80%D0%B5%D0%B4%D0%B0/
2. Bulgarian Coca Cola soft drinks industry sets ambitions to make its plastic packaging more sustainable. Sustainable development is essential for the Coca-Cola Company. Efforts in this direction are part of the company's long-term strategy to develop in the right way, establishing itself as a responsible producer of a complete portfolio of diverse beverages. https://www.coca-cola.bg/istorii/the-spot-promqnata-koqto-pravim-zaedno
3. On 17/09/21, a round table was organized in three panels: "Legislation, policies and initiatives to promote sustainable food consumption", "Good practices for imposing sustainable food models and reducing food waste in Bulgaria" and “Youth Session”.

The aim of the round table was the views of experts from institutions, academia, NGOs and businesses on the sustainability of the food system, ensuring healthy and reliable food, reducing food waste, the need for labels, public policies and laws on imposing sustainable patterns of food consumption in Bulgaria to be heard. During the event, the ecological transition in the food system and the policies for promoting sustainable food consumption in Bulgaria in the light of the European Green Pact and the strategy "from farm to fork" were discussed.

Private organizations

Their initiatives are plenty of networking events, developed applications and recommended daily practices aiming to reduce food waste.

Stationzero.bg – First shop with zero waste

Магазин Без опаковка – First food and grocery shop with zero waste

Blagichka – Zero Waste – First restaurant with zero food waste

Revolucia

Zero Waste Sofia

Thrift Sheep

Фондация „Корен" - their initiative „Компостирай у дома: Градски експериментариум" gets a huge popularity in composting practices in order to reduce the food waste

Food Wave Sofia – Bulgarian branch of the global "Food Wave"

За Земята – NGO

Mobile application: https://foodobox.com/#

This application is based on the worldwide popular mobile applications - Too Good To Go, FoodForAll, Olio, FlashFood, Food Rescue US. FoodoBox offers the opportunity to buy a "surprise me box" of food with a discount up to 40% from a restaurant that otherwise will throw it in the bin. It is estimated that every box reduces the carbon emissions up to 2,5 kg.

Such practices are considered a very efficient way of building a sustainable food system with very effective food waste management. That will reduce methane emissions from landfills and lower the carbon footprint, it will conserve energy and resources, preventing pollution involved in the growing, manufacturing, transporting, and selling food (not to mention hauling the food waste and then putting it in the landfill).

National statistics on food waste and food waste management

In the EU, **around 88 million tonnes of food waste are generated annually** with associated costs estimated at 143 billion euros (FUSIONS, 2016). While an estimated 20% of the total food produced is lost or wasted, 36.2 million people cannot afford a quality meal every second day (Eurostat, 2020). In **Bulgaria,** most food is thrown away by households - 54%. Every Bulgarian wastes 70 kg. per year, while in the EU average is 173 kg per person.

- Food Waste from households
- Food Waste from manufacturing, trading, industries and services

The total amount of food waste in the country in 2018 is close to 500 thousand tons, of which nearly 57% are food waste of a domestic nature.

It should be noted that the number of the latter are not included in the potential amounts of food waste that can be expected to contain in the "fine fraction" "4 cm" (which is reported in the National Methodology for morphological analysis of municipal waste).

The diagrams below summarize data on food waste generation by sectors in Bulgaria and in the EU-28 (average results).

Households are the main source of food waste both in the country and in the EU, followed by the processing sector and food production.

That is why reducing the amount of food waste is necessary for everyone's sources of formation and especially food waste of household nature and from food processing and production.

Comparative data on the generation of food waste are presented in the report of the Joint Research Center of the EC "Waste Prevention in the circular economy: Analysis of strategies and sustainable goals. Example food waste ”2016. The table below presents the rate of formation of food waste per person in the EU and in Bulgaria.

Quantity of food waste

Survey	Year	Food waste per capita
14 EU members	2012	127 kg
Bulgaria	2016	94 kg

The value for Bulgaria, determined on the basis of the average annual population for 2016, is more favorable than the average of the Member States of the survey, but targeted policies and measures are needed to prevent food waste.

2.2. Food waste management in education

Existing literature on food waste management

As long as food waste is a global issue, there is a relatively big amount of existing literature. Articles such as “Restaurant food waste and the determinants of its effective management in Bulgaria: an exploratory case study of restaurants in Plovdiv” and the document from Bulgarian National ecological ministry describing the national waste management plan are good examples of literature with detailed analysis on the topic.

Fundamental aspects of the effective food waste management are the restaurant's food waste management, as this sector is considered to contribute significantly to the issue. “Restaurant food waste represents a significant societal challenge in transitional economies where the frequency of dining out is rising. The problem of restaurant food waste in this context is however under research, which hampers understanding of its causes and effects. This paper contributes to knowledge with a case study of food waste management in restaurants of Plovdiv in Bulgaria, a transitional economy in South-Eastern Europe. Through the lens of qualitative research, it establishes the causes of restaurant food waste and explores managerial approaches to mitigation. The study highlights the crucial role of targeted governmental support in more effective management of restaurant food waste. The government should train restaurateurs on how to quantify and characterize major food waste streams. It should further provide reliable

services of waste collection to facilitate on-site food separation and recycling. Lastly, public awareness campaigns should be developed to better engage customers in restaurant food waste minimisation."

When it comes to the national strategy for reducing food waste, it is explored partially. The document from Bulgarian National ecological ministry describing the national waste management plan focuses on the waste as a general issue which mostly includes industrial waste and the pollution consequences that it causes.

Existing educational initiatives on food waste management

Word search puzzles are a simple, fun and innovative idea to help remember technical terms explained in class. They can be played by people of all ages, can be done in any language and can be done with different levels of complexity to suit the audience. Difficulty depends on the number and type of hidden words, size of the word search puzzles in terms of columns and rows, and if a list of words to be found is provided or not. Below are two example created using the free online tool "word search", part of "Discovery Education's Puzzlemaker" but teachers will be able to do their own word search puzzles that suit their classes using this link. The word search puzzles can be done individually or in groups, and can be printed or done online. The online tool provides a web link to the word puzzle once it has been created. This link could be shared with participants and asked to complete it online.

Easier word search– 10 hidden words

R E N E W A B L E M A
N A S O T I H C T Q L
N O I T A V O N N I G
E R U T L U C A U Q A
S U S T A I N A B L E
G R A S S L A N D T G
N E G A L L O C U V O
F E R T I L I S E R G
A I N O D E C A M X M

More difficult word search – 15 hidden words

A J A R C D H P E M U K S E N
L J Q M E O L L O R L U K L L
G S U I T S L T R L S C H B W
A S A N E O I L W T A G Z A C
E A C G O B B L A A L N T W H
S M U B I I V I I G Q Y D E I
U O L Z O W N N S T E M L N T
F I T F J A O K C C R N K E O
P B U B B D Y B V Z C E E R S
R E R L E G N I M R A F F H A
L V E C N O I T A V O N N I N
G R A S S L A N D C A R B O N
B M C D E P U H G X P A Y N Y
X A P H F C J C M J S W C C A
K K T L K C A D I M I Z O M P

Students and teachers may not be able to solve the entire food waste issue, but as consumers, they can control the amount of food loss the household experiences within the following food-friendly steps.

1. Plan Ahead

If you are in the habit of running out to the store to pick up what you need for a meal you likely end up with unused ingredients and food scraps at the end of the meal. By planning ahead you can combine menu items that use some of the same ingredients and save wasting food.

2. Make a List

Making a list of the things you need before you go shopping is a great way to reduce food waste as it prevents overbuying. Make sure to check the fridge and pantry to find out what you really need before adding anything to your list.

3. Be Realistic

Many fall to the temptation to buy lots of fresh fruits and veggies with the intention of suddenly eating healthy. Unfortunately, many also fail and let the fresh produce go bad in the fridge. Get in the habit of shopping realistically and buying only as many fresh fruits and vegetables as your family will eat in the next few days to avoid food being wasted.

4. Shop Small

Just because your grocery store sells items in giant containers doesn't mean you need to buy them. Stop and consider how much of the product your family will realistically use before it goes bad. Buying too much food is sure to lead to more food waste.

5. Prioritize

If you are serious about reducing food waste, resist the urge to buy some of everything you find appealing. Instead of trying several types of cheese, choose one that everyone will love. Likewise, choose fruits and veggies that are most likely to be eaten right away. If you feel the need to experiment with different foods, choose one new food at a time to help reduce food waste.

6. Stock the Essentials

Keep your pantry and freezer stocked with foods your family uses and loves. This includes spices, seasonings, rice, and grains. When the pantry is well-stocked you are more likely to use up leftovers in a new dish and your family is more likely to eat it too.

7. Don't Over Prepare

No one likes to throw away perfectly good leftovers, but the truth is sometimes the leftovers sit in the fridge and go bad. One way to solve this dilemma is to use care not to cook more than your family will eat at one meal.

8. Take Leftovers Home

Food waste is common at restaurants because they often serve larger portions than you can reasonably eat. But don't let that food go to waste! Bring home your leftovers for another meal or to share with other family members.

9. Use Up Leftovers

Plan the use of your leftovers. Soups, stews, and casseroles are a great way to use leftover meats and veggies.

10. Keep Food Fresh

Take the time to repackage foods when you get home from shopping to keep them fresh. Use the veggie crisper and keep fresh foods visible so you are more likely to eat them before they get stale.

11. Don't Toss Food Before It Spoils

Be conscious of tossing food into the trash before it has actually gone bad or expired. Use stale bread for breadcrumbs or make croutons. Combine odds and ends of fruits to make a fruit salad or fruit cup for dessert.

12. Preserve It

Fresh veggies, fruits, and meats can be frozen to prolong their life. Consider getting a food saver to freeze items efficiently and store them in the freezer. Likewise, if you have an abundance of fresh vegetables from the farmer's market, make sauces or cut them into bite-size pieces and freeze them for soups and stews in the winter.

13. Make the Freezer Your Best Friend

Repackage family packs of meats and freeze them in the amounts you will need for your favorite recipes. Another alternative is to make freezer meals and combine all the ingredients for slow cooker recipes in large freezer bags. This way, entire meals can be prepared at a moment's notice and your produce will always be fresh.

14. Share It

If your favorite recipes make more than your family can eat and you don't want the fuss of reducing the recipe, go ahead and make it anyway and share the extras with a friend or neighbor. That extra bowl of two of hot chili is sure to hit the spot on a chilly night.

15. Compost It

Some food waste is unavoidable, but that doesn't mean you need to throw it in the trash. Buy a kitchen composter, like Lomi, and get into the habit of composting your kitchen wastes like peelings, cores, and scraps of vegetables.

Center for Social Innovation- Cyprus

2.1. The food waste issue

It is undoubtable that there is a great need in Cyprus for reducing food waste considering that it is distributed among the European Union countries with the highest food waste production. According to UNEP (2021), it is estimated that Cypriot households produce 95 kg of food waste per capita, which is equal to more than 113 000 tonnes per annum[8]. A more recent study, published in 2022, showed that an estimate of 72 kg of food waste per capita is generated in households. The table below presents the results of food waste in the different stages of the food supply chain (primary production, processing and manufacturing, retail and other distribution of food, restaurants and food services, and households)[9].

Stage of food supply chain	Food waste (tn)	Per capita per year (kg per capita)
Primary Production	43564	50
Processing and manufacturing	169706	194
Retail and other distribution of food	50268	57
Restaurants and food services	27145	31
Households	63338	72
Total	354021	404

Overall food waste results in Cyprus in all stages of the food supply chain

Source: Ioannou *et al.* 2022[9]

A report by the FoodPrint project (2021) showed that most of the food waste (69%) is produced because of slower consumption and subsequently reaching the expiration date, with about 30% of food waste being generated because individuals forget about it or purchase more than what they actually need. In regards to how they manage food waste, it was reported that most of the consumers throw it away in trash (72%), with only 28% (3 out of 10) give it to pets and 9% compost

it. In regards to food waste management, it was found that most individuals (72%) bin the food is considered unsuitable for consumption, while 28% use food waste for animal feed, and only 9% apply food waste composting[9]. Participants were also asked to report how frequently they collect food leftovers from outings, but also how important is this process to them; results found that only 25% of consumers always take leftovers, while 30% of them responded rarely or never. Furthermore, only 16% of the participants expressed that it is important to collect food leftovers; however, they do not always do it[10].

To some extent, it seems that Cyprus has recognized the need for reducing food waste and implementing good practices. The Department of Environment has developed **The Municipal Waste Management (MWM) Strategy 2021-2027** that defines the actions and measures that need to be taken the following 6 years for the management of municipal waste, with the following principles: agreement with the obligations arising from the European Directives on waste management; utilization of existing waste management infrastructure (e.g., private waste management plants); usage of the waste hierarchy; and best practices adoption and value for money[11]. Regarding food waste, the strategy enhances the reduction of food waste generation in primary production, in processing and manufacturing, in retail and other distribution of food, in restaurants and food services, and in households setting a goal of **50% reduction per capita global food waste by 2030**. It also highlights the importance of food donation and other redistribution, with human consumption being a priority compared to animal feed and reprocessing into non-food products[8]. Several measures that are in place to prevent food waste are the **LIFE project (FoodPrint)**, the **'Sincerely, Food Cyprus'** project by **AKTI Project and Research** Centre, the Waste mapping guidance for hotels, and volunteer initiatives, such as **Zero Food Waste Cyprus** that redistribute food waste from local markets (https://zfwcy.org/). Both projects aim to raise awareness regarding food waste and the environmental problem through different activities, such as campaigns, workshops and presentations at schools, hotels and restaurants, local authorities, and non-governmental organisations, and many other innovative ways such as a cooking competition aiming to prevent food waste during preparation, organized by the 'Sincerely, Food Cyprus'[8].

2.2. Food waste management in education

There is limited existing literature on food waste, with several articles focusing on overall solid waste, while others only focus on the hospitality industry. A recent paper was published by Ioannou *et al.* (2022) that presented the procedure that is food waste quantification in the

different stages of the food supply chain[9]. Another recent study by Demetriou (2022) explored the interest of hoteliers/hotel owners in reducing food waste and any potential implications in this process, in an attempt to provide solutions for reducing hotel food waste, such as effective food storage, freezing food, and compiling shopping lists of food[12]. Several papers focus on overall solid waste, including one by Zorpas *et al.* (2012) that reports solid waste from the hospitality industry produced specifically by guests[13].

Regarding educational programmes, in 2018, the Ministry of Education, Sports and Youth (MEEPA) established an Education Unit for the Environment and Sustainable Development aiming to raise environmental and sustainability awareness through education. The goal of this unit is its permanent integration in all the qualification levels and schools across the country. The Unit offers educational material for both teachers and students and contributes to articles writing and seminars/conferences development[14]. In particular, for the School Year 2021-2022, the Unit designed virtual seminars on food waste (such as 'our role in food waste', 'the effects of food waste on the Greenhouse Effect', 'utilization of food waste', 'biomass', 'composting', and 'managing and reducing food waste'), targeting students in Primary Education (5th and 6th grade) and Secondary Education, and covering one or two teaching periods[15].

Different projects are also in place aiming to enhance food waste education at schools. Firstly, AKTI provides presentations at schools to create awareness, but it also focuses on door-to-door awareness raising in two municipalities (one in the north part of Cyprus and one in the south part) through the Sincerely, Food Cyprus Project (akti.org.cy)[8]. Furthermore, an ongoing EU project, FoodRescue is focusing on the development of an innovative teaching and educational package for students aged 8-12 (primary education)[16]; however, this deliverable has not been completed yet. FoodPrint has also focused on the development of training materials targeting professionals and/or students of the food and hospitality industry[17].

Dot2Dot & Innovation Hive - Greece

2.1. The food waste issue

The food waste issue at national level

While Greece has a National Strategic Waste Prevention Programme based on an assessment of socioeconomic conditions, waste prevention/management performance and interaction with other policies, the knowledge gap regarding the compositional characteristics of food waste is significant. The reason is that the legislation encouraging bio-waste separate collection and treatment has only been recently put into practice. Therefore, the most important steps on food

waste issues have been implemented through social innovative actions initiated by individuals and NGOS. [22, 40, 42]

Source: https://www.eu-fusions.org/

National strategy, legislation, market-based instruments, regulatory instruments, voluntary agreements, communication and campaigns, projects and other measures focused on food waste management:

- The Ministry of Environment, Energy and Climate Change established the National Waste Management Plan in 2015. [19]
- The art. 46§1 of Law 4238/2014. Donations of food are exempted from VAT and may be available for free in public entities or private non-profit organizations to be distributed solely for the convenience or comfort of vulnerable social groups.[20]
- The Law 4042/2012 incorporating the Waste Framework Directive 2008/98/EC. It expands the 'polluter pays' principle and sets clearer requirements across the waste management.[21]
- “Boroume” is an NGO that fights food waste by organizing the distribution of surplus food for charity throughout Greece.[34]
- “Bread and Action” is an NGO that collects and distributes large edible food leftovers or cooked food to service centers.[35]
- Currently voluntary agreements are not in place in Greece. [40]
- Festivals against food waste. [40]
- Workshops where famous chefs cooked leftovers and food products near their expiry date and shared valuable cooking tips and recipes with the aim to reduce food waste. [40]

- The volunteer-run campaign, "Let's do it Greece" makes a systematic effort to share best practices related to food waste management.[37]
- Guidelines for Food Waste Reduction at home [41]
- Food Loss and Waste Sector Guidelines [42]
- The report "Alliance for the Reduction of Food Waste" by American College of Greece (ACG) and coordinated by the NGO 'Boroume' with AB Vassilopoulos, operating under the auspices of the Hellenic Ministry of Environment & Energy in 2021.[23, 34]
- The project "Better Life". [24, 36, 38]
- The LIFE Project ENV/GR/000622 "Development and Demonstration of a Waste Prevention Support Tool for Local Authorities – WASP Tool". [40]

National statistics on food waste and food waste management

It is difficult to analyze food waste in Greece, not only because of the lack of extensive and in-depth research, but also due to the absence of public debate on this topic. Public discussion about food waste started a few years ago and the only national statistics that exist come from United Nations' surveys. [43]

- In Greece the largest percentage (42%) of food waste occurs in the household use stage.
- According to the "Food Waste Index Report" by the United Nations (UN), the Greeks not only waste almost double the amount of food that is being wasted on average around the world, but they are also first in the entire Europe. Greece discards a total of 142 kilograms (1,48 million tons in total) of food per year per capita.

2.2. Food waste management in education

Existing literature on food waste management

In Greece there are not many research studies and technical reports related to food waste management, as concrete and detailed data on food waste are not currently available. The majority of existing literature focuses on the description of attitudes and behaviors of Greek households regarding food waste and its prevention, and on best practices and case studies related to food waste management:

Source: http://env-edu.fmenr.duth.gr/

- WWF (2013), Food Wastage Report (in Greek) [24]
- Food Waste Prevention as A Tool For Climate Change Mitigation: A Case Study From Greece [25]
- Attitudes and behaviors of Greek households regarding food waste prevention [26]
- Preliminary assessment of food waste in households in Greece [27]
- Integrated management of bio-waste in Greece–The case study of Athens [28, 39]
- Household food waste in Greece: A questionnaire survey [29]
- Life cycle assessment of food waste home composting in Greece [30]
- Food waste during Covid- 19 lockdown period and consumer behaviour - The case of Greece [31]
- Food waste prevention in Athens, Greece: The effect of family characteristics [32]
- Food waste volume and composition in households in Greece [33]

Existing educational programs on food waste management

Source:https://eepf.gr/

and its prevention and recycling in Greece. While most EU countries have already officially integrated education on food waste management in their schools, in Greece there are only references on the protection of the environment and recycling topics in school books. Awareness on food waste management depends on initiatives and raises due to the willingness of some school directors and teachers to include presentations or audiovisual material related to the topic in their lesson plans.

Unfortunately, there is no dedicated official educational program related to food waste

Needs for developing new training resources or improving existing ones

In Greece, it is necessary to develop centralized training resources related to food waste management, with the cooperation and good organization amongst the Directorate of Secondary Education, the Ministry of Education, the Ministry of Environment and Energy, and experts/stakeholders. As the schools are numerous and scattered all over the country, it is crucial that the training materials have digital formats that are easier and cheaper to distribute, are useful in the communication and information networks for teachers and are more interactive to engage the target group. Also, it is essential to develop handbooks, guides and manuals for teachers and trainers in order to inform, train and educate them on food waste management.

Food waste prevention and recycling can be included in standard schools' curriculum and official schoolbooks integrated into existing courses, such as environmental studies, geography, home economics, etc. or it can be an independent course under "circular economy".

The best way to prevent food waste is to educate, inspire and encourage the public and especially young generations to take action. Education on the term of food waste, its impact and ways for it to be managed can change the attitude, mindset and behavior of children, encourage them to act as responsible citizens now and in the future and, at the same time, inspire their parents and relatives to adopt more sustainable household practices.

Petit Pas Aps - Italy

2.1. The food waste issue

The research collects some of the measures adopted at the national level such as: national plans to combat food waste, legislative measures, awareness campaigns, and research aimed at providing the community with tools for understanding the social, behavioral and lifestyle dynamics that generate and determine family waste.

- **PINPAS (Piano Nazionale di Prevenzione dello Spreco Alimentare)**, the National Food Waste Prevention Plan, consists of 10 measures to tackle food waste, which in Italy stands at an average monthly value of about 30 euros per family.
  PINPAS will first of all focus on defining measures to reduce the amount of food products destined for consumption that end up in waste. Through the first national awareness campaign against food waste in Italy, the Plan will also have an impact on the domestic side, between the refrigerator and the household waste bin, where food waste reaches 0.5% of GDP.

- The update on the National Waste Prevention Program, established with DM 8 July 2014, n.185 and renewed with DM 27 June 2017, n.168

- The **Gadda law of 19 August 2016, n. 166** on "*Provisions concerning the donation and distribution of food and pharmaceutical products for the purposes of social solidarity and for the limitation of waste*" has among its aims, among others, to help reduce the production of waste, promote reuse and recycling as well as contributing to the achievement of the general objectives established by the national waste prevention program. In summary, the law states that: Food business operators can donate their surpluses to people in difficulty free of charge. Foods that are no longer good for people can alternatively be donated to feed animals or to create composting materials.

- **Campagna Spreco Zero** (Zero Waste Campaign) is a national awareness campaign on waste issues launched in 2010 by Last Minute Market.
  Spreco Zero is the national awareness campaign against food waste coordinated by the REduCe project (Research, Education and Awareness: an integrated approach for the prevention of food waste). The campaign, created in 2010 by Last Minute Market, a spin-off of the University of Bologna, is aimed at disseminating the results of the project itself and promoting good practices and initiatives against food waste existing in Italy, in continuity with the work started through the 2014-15 National Food Waste Prevention Plan (PINPAS). The Campaign is promoted by the Ministry of the Environment, Land and Sea which responds, also through this tool, to the objectives of reducing food waste by

2020/2025 from various international institutions (United Nations and European Commission).

Image Source: https://www.facebook.com/unannocontrolospreco

- **National Food Waste Prevention Day** 05/02/2022

Image Source https://www.rai.it/ufficiostampa

- ALIMENTANDO ONLUS is a non-profit organization committed to fighting the problem of waste and all its social, economic and ecological consequences. It does so actively, reducing waste and redistributing "saved" food to those who need it most, those who live close by but often remain silent and invisible to most people.

- **The Waste Watcher Observatory** – Waste Watcher is a research carried out with a scientific method, based on opinions and self-perceptions. It aims to provide the community with tools for understanding the social, behavioral and lifestyles dynamics that generate and determine family's waste. It is an Observatory capable of generating common and shared knowledge, to guide prevention policies and actions on food waste by public and private actors.

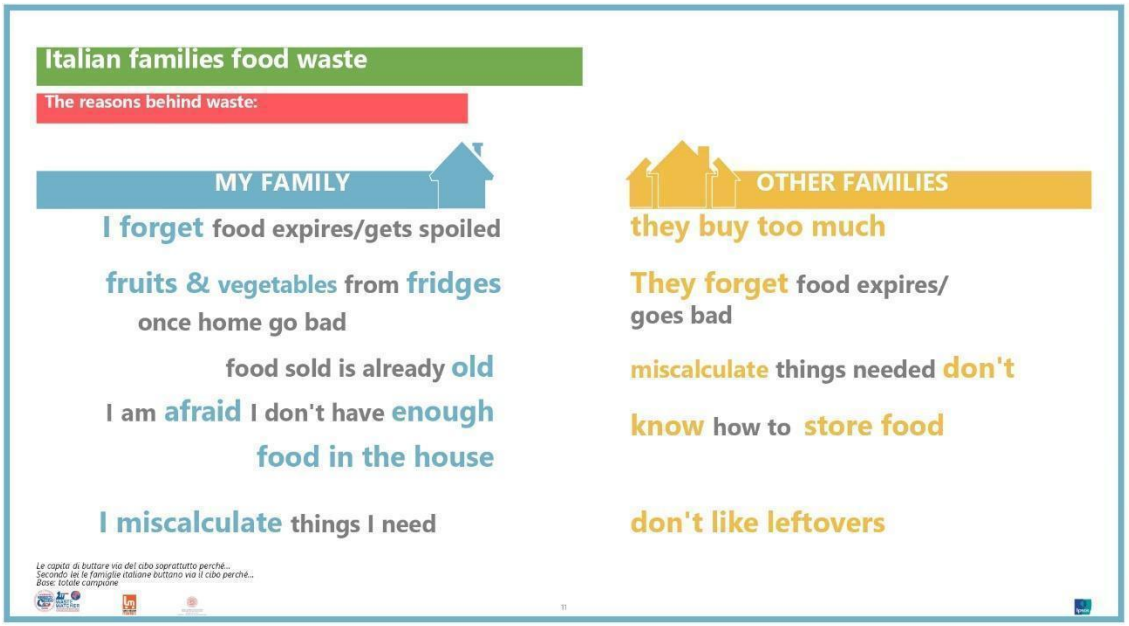
WASTE WATCHER
International Observatory on food and sustainability

Image source:

https://www.sprecozero.it/waste-watcher/

The data reported below come from the report prepared by the **Waste Watcher International Observatory** on Food and Sustainability, called "The case of Italy" explaining the situation on Italian's household food waste: What, how often and why.
Data Survey period is 17-19 January 2022 collected on Italian population of age. Sample: 1200 cases, with representative shares for gender, age and area of residence.

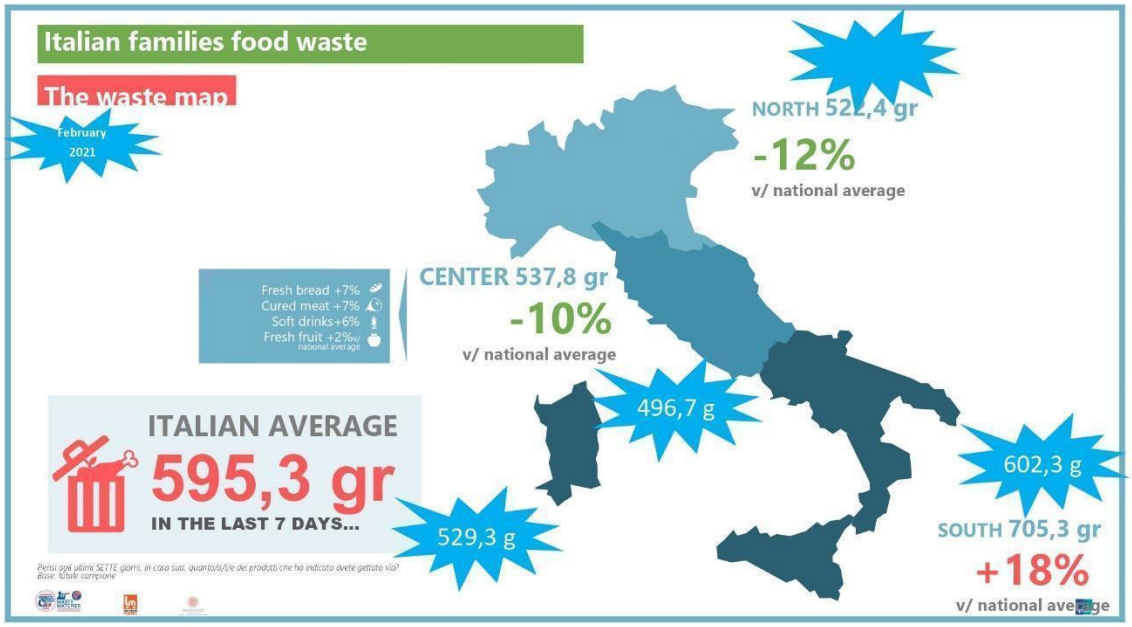
Italian families food waste
The negative effects of waste
Dati febb 2021
Money waste
families
83%
85%
Counter-instructive
on young people
80%
84%
Immoral
80%
83%
Waste of vital
resources
78%
80%
Increases pollution
(garbage)
76%
77%
Produces economic and social consequences: 74%, Produces environmental consequences: 74%, Causes the failure to distribute food to those who cannot afford it: 73%, Causes an increase in inequality between rich and poor countries: 73%, Has negative economic consequences on my family: 69%, Contributes to global warming: 68%, Reduces the efficiency of the production system: 64%, Causes an increase in food prices: 63%
Quanto condivide ciascuna delle seguenti affermazioni sullo spreco alimentare? (% Condivide fortemente+condivide+condivide in parte)
Base: Totale campione

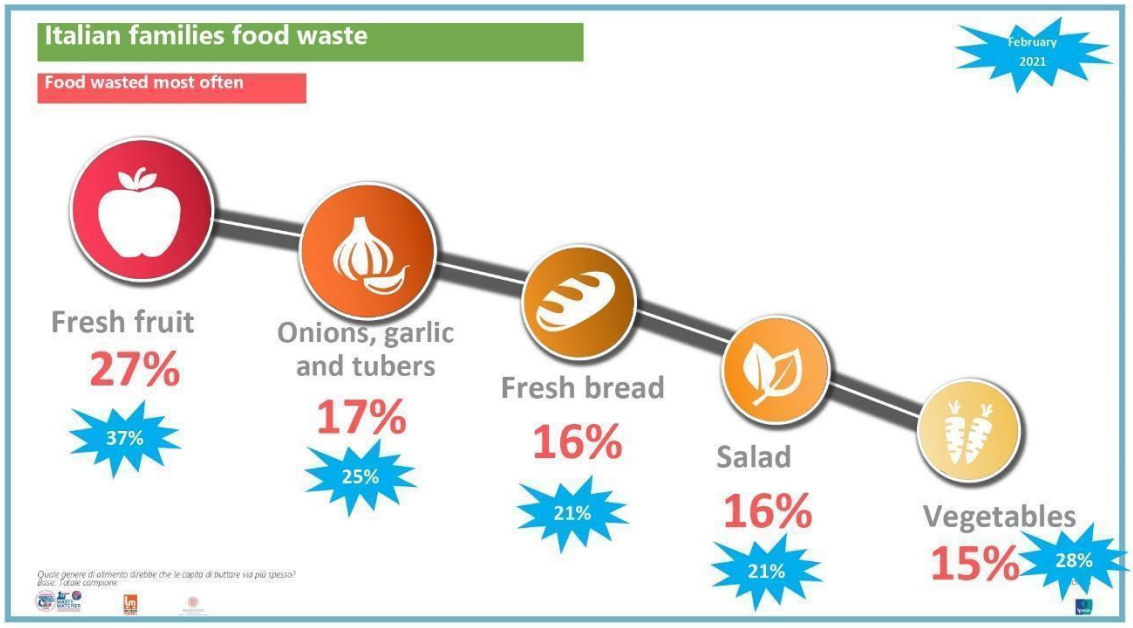

Italian families food waste
The reasons behind waste:
MY FAMILY
I forget food expires/gets spoiled
fruits & vegetables from fridges
once home go bad
food sold is already old
I am afraid I don't have enough
food in the house
I miscalculate things I need
OTHER FAMILIES
they buy too much
They forget food expires/
goes bad
miscalculate things needed don't
know how to store food
don't like leftovers
Le capita di buttare via del cibo soprattutto perché...
Secondo lei le famiglie italiane buttano via il cibo perché...
Base: totale campione

IFebruary 2021
Italian families food waste
Why do OTHERS waste?
46 45% buys too much
47 44% forgets about food expires/deteriorates
43 41% miscalculates the amount of food needed
34 35% desn't know how to store food properly
34 32% doesn't like leftovers
fear of not having enough food at home: 25%; they buy packages that are too large: 25%; fruits and vegetables are often stored in the fridge and when they are brought home they go bad: 22%, they overcook: 21%, they buy things they don't like: 14%, there are too many offers: 13%, the foods sold are already old : 13%, the time between one shopping and the next is too long and the food deteriorates: 10%
Secondo lei le famiglie italiane buttano via il cibo perché...
Base: totale campione
Valori % (esclusi non so)
10

February 2021
Italian families food waste
Why does MY FAMILY waste?
46 47% I forget it and it expires / deteriorates
42 46% fruits and vegetables stored in the fridge go bad
31 35% foods sold are already old
27 33% I fear I don't have anough food in the house
28 30% I miscalculate the things I need
there are too many offers: 29, I buy too much: 29, I buy too large packs: 28; I don't like leftovers: 28, I cook too much: 26, the time between one shopping and the next is too long and the food deteriorates: 25, I don't know how to store: 19, I buy things I don't like: 17
Le capita di buttare via del cibo soprattutto perché...
Base: totale campione
% Sempre+Spesso+Qualche volta
9

Italian families food waste
Wasteful and sparing families profile
% difference in quantity wasted in the last 7 days compared to the national average
THEY WASTE MORE
+18% South
+12% Without children
+12% Lower middle class
+7% Popular classe
-11% Alcoholic drinks
-10% Desserts
-7% Cheeses
-4% Salads
-4% Hotdogs
+8% Average municipalities (30-100 thousand inhabitants)
-4% Sauces
THEY WASTE LESS
-12% North
-7% Center
+ 7% Fresh bread / Cold cuts
+ 6% Soft drinks
+ 2% Fresh fruit
-10% With children
-9% Middle class
-12% Big municipalities


Italian families food waste
The waste map
February 2021
NORTH 522,4 gr
-12%
v/ national average
CENTER 537,8 gr
-10%
v/ national average
Fresh bread +7%
Cured meat +7%
Soft drinks+6%
Fresh fruit +2% v/ national average
ITALIAN AVERAGE
595,3 gr
IN THE LAST 7 DAYS...
496,7 g
602,3 g
529,3 g
SOUTH 705,3 gr
+18%
v/ national average



Source https://www.sprecozero.it/wp-content/uploads/2022/02/Il-caso-Italia-2022-4-febbraio-2022.pdf

2.2. Food waste management in education

In Italy, there has not been detected an extensive literature on food waste in schools.
The only reference at governmental level can be identified in the *guidelines aimed at managing bodies of school, company, hospital, social and community canteens, in order to prevent and reduce waste connected to the administration of foods, create the Italian ministry of health*.
This document contains a decalogue for school canteens with indications aimed at preventing and reducing food waste in school canteens.

Another example of existing literature on the subject is the report containing the "National Survey on waste in school canteens and a proposal for a detection methodology" created by the Ministry of the Environment and Land and Sea Protection - Directorate General for Waste and Pollution and the REDUCE project coordinator.

In Italy there are several school initiatives to address the issue of reducing food waste, most of the time organized independently by each individual institution. Two of the largest projects on the national territory that provides a specific methodology to be applied in schools are:

REDUCE - RESEARCH, EDUCATION AND COMMUNICATION: AN INTEGRATED APPROACH FOR THE PREVENTION OF FOOD WASTE

Image source https://www.sprecozero.it/cose-il-progetto-reduce/

Project funded by the Ministry of the Environment for Land and Sea Protection (MATTM), coordinated by the Department of Agri-food Sciences and Technologies (DISTAL) of the University of Bologna. The project includes a specific line of action dedicated to the world of school. The research activity aims to develop a methodology (which provides for the direct involvement of students) for the qualitative and quantitative analysis of food waste in school canteens, also capable of providing a clear picture of the actors behind the phenomenon. As part of the project, an educational kit was also created for primary schools. The Kit is proposed as an experimental

path of active education that also includes a manual, sensorial, and relational dimension. The kit has been developed in such a way that it can be easily integrated with the contents foreseen in the didactic planning for primary school and can be adapted according to the specificities of the different teaching subjects and the different age groups.

Green School is a project financed by the Italian Agency for Development Cooperation and coordinated by the Emerging Countries Solidarity Association - ASPEm Onlus

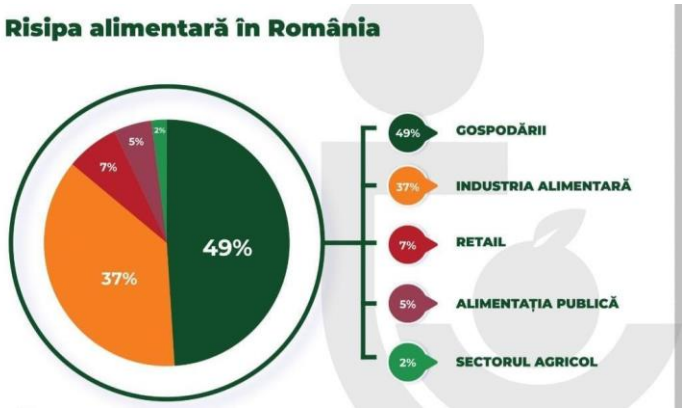
The Green School project aims to support local schools that are committed to environmental sustainability through the reduction of their ecological footprint and the dissemination, among students, families and communities, of an active and virtuous behavior for the environmental protection, also addressing the fight against food waste which is one of the pillars of the Green School project.

Image source: https://www.green-school.it/uploads/files/123.pdf

Liceul Teoretic "Marin Preda" - Romania

2.1. The food waste issue

Approximately, one third of all food products in Romania end up in the trash or are wasted, our country occupying the 9th place in the EU, being part of the category of wasteful countries. According to the most recent data published by the National Institute of Public Health on this topic, in Romania, food waste is estimated at 6,000 tons per day, 49% coming from households, 37% from the food industry, 7% from retail, 5% from public food and 2% from the agricultural sector.



Source: The Department for Sustainable Development (www.intersect.org.ro)

From February 1st, 2019, the law on reducing food waste entered into force. According to the normative act, economic agents have to be more responsible, in order to reduce food waste, through measures such as the sale at a reduced price of products close to their expiry date. Other obligations that economic operators have according to this law are:

- drawing up an annual plan to reduce food waste, which they will present to the competent authorities in the field of food waste, at their request
- carrying out at least one annual internal communication with employees regarding the objective of reducing food waste
- adapting production to market conditions - supply-demand, ensuring traceability - culture plan depending on the market;
- education and information measures related to the prevention of food waste, the quantification of food waste;

However, although Romania has implemented the law against food waste, it is ineffective, because it has rules that "touch" large commercial chains, where food waste is too small compared to that of households.

A study published by the United Nations (UN) shows that 17% of all food produced worldwide goes to waste. Although the issue of food waste has come to the attention of EU decision-makers in recent years, in Romania no serious studies have been carried out on this subject. For this reason, the UN representatives used estimated figures for our country.

According to the estimate of UN specialists, every year Romanians throw away 1.35 million tons of food. The data refers only to the food or cooked food that is thrown away from the households of Romanians, because there is no data regarding the food waste resulting from commerce or HoReCa.

Romania is in the middle of the European ranking in terms of the amount of food it throws away, according to the study published by the UN, analyzed by Free Europe. We have approximately 70 kilograms of food per inhabitant that ends up in the trash every year, just like in other neighboring countries. All these countries, including Romania, have in common the lack of credible studies that the UN would have taken into account when establishing the figures. For this reason, the indicators were obtained based on an estimate in which specialists used scientific methods.

Source: https://www.traieste.maibine.org/impactul-multidimensional-al-risipei-alimentare/

Paradoxically, some Romanians know that the main problem is the amount of food purchased. An experimental study was carried out by the EPC environmental consultant at the request of an environmental association (MaiMultVerde) and the Resource Center for public participation (Ce-Re). Specialists applied around 100 questionnaires to consumers and have discussed with representatives of manufacturers and retailers. According to this study, 39% of survey respondents believe they could reduce waste by estimating correctly the food they need, 34% would like to be able to selectively collect food waste or could recycle, and 15% think they could use them. Nevertheless, the specialists carrying out the study did point out that a much more in-depth analysis of the phenomenon of food waste is needed.

Regarding legislative initiatives for promoting the principles of the new CEAP (Action Plan of European Commission), Romania has taken the first steps in this direction - adopting measures that refer to the banning of non-biodegradable plastic bags, as well as other actions, such as extended producer responsibility. There are collective systems that enhance producer responsibility for most post-consumer waste streams (packaging, waste batteries and accumulators, used tires, etc.). Through OUG (Governmental Emergency Order) no. 74/2018, Romania chose to transfer to producers the full responsibility of financing the management of post-consumer waste.

On March 2, 2016, the Chamber of Deputies decided to adopt the law which established 16th October as The National Day of Food and the Fight against Food Waste. As a result, public

administration authorities, as well as non-governmental organizations, are encouraged to organize public demonstrations and actions, to support the fight against food waste.

In Romania, Food safety is regulated by law no. 150/2004, representing the basis for ensuring a high level of health protection to people and consumer rights. Law no. 217 of November 17, 2016 regarding the reduction of food waste, republished on February 11, 2019, provides for the measures at the disposition of economic operators to diminish food waste:

• responsibility for reducing food waste on the agri-food chain, starting with production, processing storage, distribution, marketing, reaching up to the final consumer, including in the industry sector hotel and food services;

• reduced price sale of products located close to expiry of the consumption limit date;

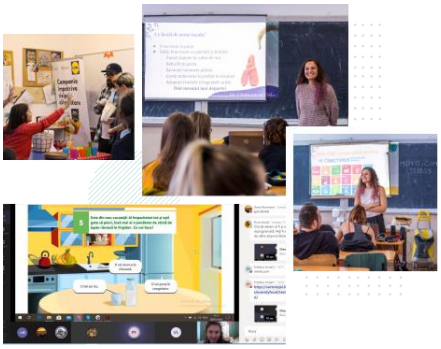
• food transfer through donation or sponsorship, for human consumption, but close to the expiration of the limited consumption data, to entities that have become operators from the agri-food sector as a result of ANSVSA registration, with the obligation to comply with the legal provisions regarding hygiene conditions, including temperature requirements during storage and transport, as well as appropriate labeling;

• directing by-products not intended for human consumption according to Regulation (EC) no. 1.774/2002 of the European Parliament;

• directing agri-food products that have become unsuitable for human or animal consumption by transformation into compost;

• directing agri-food products that have become unsuitable for human or animal consumption by transformation into biogas.

2.2. Food waste management in education



The most important food recovery and redistribution initiatives belong to NGOs, supported almost without exception by private companies, having no encouragement or support from public administration. The situation is therefore similar to the very few studies/researches of the problem carried out in Romania, which started only from this sector, without contributions from the university or academic environment. Also, the projects, programs and campaigns of education and raising awareness belong, without exception, only to the private sector.

Food Waste Combat - initiative started in 2012, which is currently the most active in Romania on anti-waste education. The members of the initiative wrote and published the first book on the topic of waste in Romania and a consumer's guide and carried out

citizen awareness campaigns through presentations in schools, film screenings, community dinners with hundreds of beneficiaries.

MaiMultVerde Association, in partnership with www.foodwaste.ch and the Resource Center for Public Participation, implemented between March 2016 and May 2017 the project called "Romania against food waste". Its general objective was to increase the role and level of information and involvement of civil society and the general public in the process of making and implementing public policies in Romania in the field of reducing food waste. The message of the project reached over 1,000,000 people, by informing the general public about the problem of food waste during an educational caravan in seven cities in the country. The project also included participation in agri-food fairs, information actions in hypermarkets, and creation of a documentary on the topic of food waste in Romania, as well as some animated clips that present tips for reducing waste.

The Consumer Protection Association - Info Cons has been active in the field since 2012. It is currently implementing a European project "Global approach to food waste through non-formal education" and is carrying out a campaign to inform and educate consumers about food waste, in partnership with MADR.

Terra Millennium III has been implementing both educational and direct action projects to help reduce and combat waste, such as "Too good to waste" - an educational project on food waste, aimed at students, implemented in 2016 and 2017 and the project titled "The Romanian values food", developed with the support of the City Hall in Roman, carried out in 2018.

On January 5th, 2018, the ***National Waste Management Plan***, approved by GD no. 942/20.12.2017 was published in the official Monitor and it contains the National Program for the Prevention of Waste Generation.

Every county in Romania is obliged, according to Law no. 211/2011, to design and implement Regional Waste Management Plans. According to this normative act, the county waste management plans were developed by the County Councils, in collaboration with the County Agencies for Environmental Protection, based on the principles and objectives of the National Program for the prevention of Waste Generation and the general framework described by the Order of the Minister of the Environment no. 140/2019, regarding the approval of *The methodology for the development, monitoring, evaluation and revision of the county waste management plans and the waste management plan for the municipality of Bucharest*.

The "Stop food waste" project is addressed to young people, students, teachers, consumers, local entrepreneurs, small producers, people from vulnerable groups and encourages

socialization, inter-generational connection and between various social categories. The project took place between July and December 2021 in the online environment and in Timișoara. It was financed by the *Fund for a better future in Timisoara communities*, a program coordinated at national level by the Federation of Community Foundations in Romania - FFCR, financed by Lidl Romania and implemented at the local level by *Timișoara Community Foundation*.

Source: https://www.fundatiacomunitaratimisoara.ro/stop-risipa-alimentara/

According to The Ministry of Agriculture and Rural Development (MARD), in accordance with the

prerogatives conferred by the specific national legislation in the field of preventing and combating food waste, public authorities with regulatory and control responsibilities in the agri-food sector are encouraged to carry out actions in order to inform and educate consumers regarding the prevention and reduction of food waste. The following actions were suggested: media information campaigns, information campaigns in schools, online campaigns, organization of seminars, conferences, forums, educational, voluntary, social events, printing advertising and information materials.

In this context, MARD enjoys the collaboration and support of specialized forums/authorities, namely ***FAO***, with which it concluded an agreement on February 17, 2020, according to which it can use a published educational package in information and education programs in 2019, called: ***Do Good: Save Food! Educating future generations for a zero food waste world!*** It includes four books, by age groups, respectively, 5-7 years, 8-9 years, 10-13 years and 14 +. Education and information on the importance and benefits of preventing and reducing food waste is a tool that will in the future lead to a change in society's behavior, in general, and that will contribute to the achievement of global objectives regarding the reduction of food waste, it being necessary that these measures be supported and conjugated.

In Romanian schools, the issue of Food waste is mainly addressed through extracurricular activities and projects, carried out according to an educational plan created individually, based on the interest and preoccupation of each school. Unfortunately, there are few nationally guided actions which require mandatory participation from teachers and students. As far as the national curriculum is concerned, there are scarce chapters in school books used during certain classes

which address topics such as health education or environmental education, and in these lessons, teachers partially deal with the issue of food waste. The situation is the same when it comes to training courses for teachers.

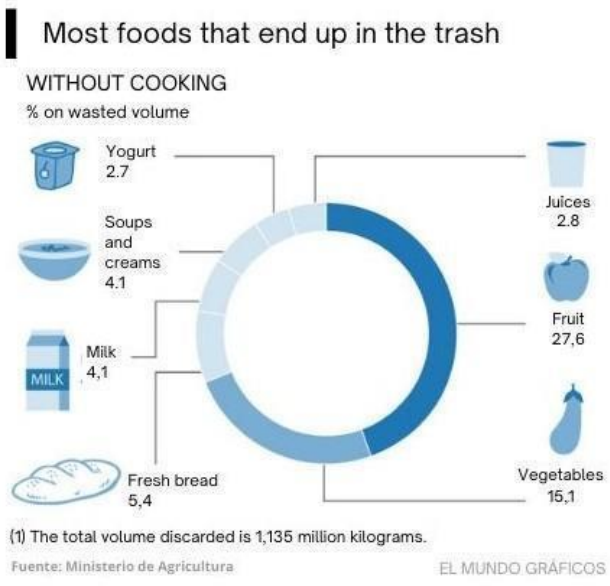
With regards to websites and apps which encourage the reduction of food waste and promote responsible consumption of natural resources, in Romania, most of them are accessed especially by young people who come from more financially developed areas. A more detailed description of these websites and apps will be presented in the section dedicated to the interpretation of the responses gathered with the help of the structured questionnaire.

GEINNOVA - Spain

2.1. The food waste issue

Globally, approximately a third of all food produced for human consumption is lost or wasted (FAO, 2011). In the EU, households generate more than half of the total food waste in the EU (47 million tonnes) with 70% of food waste arising at household, food service and retail (FUSIONS, 2016). In Spain, three out of four Spanish households threw away food and drink in 2020, with an average of 31 kilos/litres per person. In total, 1,364 million kilos/litres of food ended up in the household rubbish bin. [73]

The Spanish Ministry of Agriculture, Food and the Environment developed the "More food, less waste" strategy in 2013 [74], which aims to "significantly limit food loss and waste, to maximize the social and economic and environmental value of discarded food, and to reduce environmental degradation." The Strategy (2013-2016) prioritized the actions of: prevention (of food waste), reuse, recycling and other types of recovery. It is implemented through recommendations, voluntary agreements and self-regulation.



The plan was divided in 5 actions:

1. Conduct studies to find out how much, how, where and why food is lost and wasted.
2. Disseminate and promote good practices and awareness-raising actions.

3. To analyze and review regulatory aspects.
4. Collaborate with other agents.
5. Encourage the design and development of new technologies.

More in detail, the national strategy aim was raising awareness of the problem, teaching good practices in the production chain, and establishing stable collaboration frameworks with NGOs, food banks, consumer associations and charity groups. The Strategy also served as a platform which drives all initiatives that contribute to reducing food loss and waste and help to make better use of food. The Strategy requires the participation of broad segments of society and stakeholders in the food chain.

The second phase of the Strategy (2017-2020) [75], efforts have focused on aspects that were less developed in the previous period, as well as on those actions with the greatest impact on the fight against food waste. The actions that have been carried out to achieve the goal proposed in the Strategy were framed within the 8 areas of action:

1. Knowledge building
2. Training and awareness-raising
3. Promotion of good practices
4. Collaboration with other actors
5. Sectoral agreements
6. Regulatory aspects
7. Research and innovation
8. Food waste, environment and climate change

Within the Strategy, in 2021, Luis Planas, the Minister of Agriculture, Fisheries and Food, has presented the awareness campaign "Aquí no se tira nada" [76] (Nothing is thrown away here), which aims to promote responsible consumption among citizens and reduce food waste, an objective that he considered a priority for the ministry, and which is a "social necessity". In November 2020, it was launched the slogan "Food from Spain, the richest country in the world", and following this trend, it has initiated by the Ministry the campaign in order to transmit to citizens the value of foodstuffs, the fact that they are quality products, and that cannot be wasted.

https://www.alimentosdespana.es/es/campanas/ultimas-campanas/alimentos-de-espana/el-pais-mas-rico-del-mundo/aqui-no-se-tira-nada.aspx

However, according to national data collected by the Ministry of Agriculture, Fishery and Food [77], after the pandemic the amount of food waste in the house has decreased due to an increased awareness but also because people have less time to try new recipes and so they waste less food. 1 in 4 households do not throw anything away. It has been underlined that better results can be achieved if a process of awareness raising about how to better plan weekly diets and quantities among people +65 years old was generated.

Based on the data and from the crisis which is crossing Europe after the breakup of the Russian invasion of Ukraine and to be in line with the awareness campaign on food waste management, in June 2022, the Spain government has approved a new law about food waste and its intention is for it to enter into force on 1 January 2023 [78]. This law is interesting since it goes to cover all the phases of potential food waste: primary production, industry, distribution and households.

- All **chain companies** must have a waste prevention plan based on a self-diagnosis of their procedures. Once they have identified where losses occur, they will have to take measures to minimize them and decide how to use them.

    1. Human consumption through donation. The agents in the chain must sign agreements with companies, social initiative entities, NGOs or food banks,

specifying the conditions under which the products are collected, transferred and stored between the parties.

2. Transformation of the food. They will opt to transform food that they have not been able to dispose of, but which is still in an optimum condition for consumption (jam, juices).

3. Animal feed in case food does not fit human consumption anymore.

4. Other uses/ fertilizers.

- **Restaurants**: they must offer to their customers the right to take away food (free of charge) that has not been consumed. To do so, they must have consumer-friendly packaging that is reusable or can be easily recycled.
- **Supermarkets**: In an attempt to ensure that food can be used before the end of its "shelf life", the law includes a series of good practices for this type of establishment. Three examples:
    - Having a sales line for "ugly, imperfect or unaesthetic" products.
    - Promote the consumption of seasonal, local or organic products.
    - Encourage sales of products with a short or near expiry date.

Bureau Veritas, a global-level company, is also contributing to the goal. It provides a course and a certification of food waste management in order to contribute to minimize the food waste, based on transparency and responsibility. [79] It addresses Its objectives are to

- Optimize our own production processes by minimizing waste.
- Reduce waste management costs.
- Align with the EU Farm to Fork Strategy [80] and SDG12 [81] by promoting the circular economy and, in particular, with target 12.3 to halve global per capita food waste.
  Indeed, it is going to address all the food chain, from the farm to the fork: primary production, industry, distribution, restaurants and households.

2.2. Food waste management in education

In Spain there is a large amount of literature regarding the issue of food waste and its management. The main focus of the existing literature seems to be the raise of the awareness of consumers, given that the main share of wasted food is produced by households. However, great importance is also given to the retail sector, which often offers more than what consumers need. The result is that the food in excess is thrown away, since it is impossible for some products to be

stored, especially fresh products such as vegetables and fruit, whose demand is particularly high in Mediterranean countries, such as Spain.

Some materials and/or initiatives about food waste management in educational format:

- Under the “More Food, Less Waste" strategy, the Ministry of Agriculture, Fisheries and Food has developed a Practical guide to reduce food waste in schools "Buen Aprovecho", where information on food waste, games, an audit model, initiatives and much more content are provided in order to help educators for the challenge of educating to combat food waste [82].
- La Cátedra del Banco de Alimentos is working to raise awareness of this problem among young people in order to tackle the 1.3 billion tonnes of food wastage according to the FAO. Since children are quick learners, they believe that these school awareness campaigns should be extended. To this end, they propose combining practical learning and entertainment to create a change in the youngest, who will transfer it to their families. Some of these possible activities include: creating compost in the classroom and applying it to the school garden as home composting (it can potentially divert up to 150 kg of food waste per household per year), preparing tasty smoothies and juices from bruised or sweetened fruit that can be brought in by pupils, recognizing really stale food in a practical way. These actions will make children aware of the environmental impact of waste and the insignificance of the appearance of natural food, building consciousness young people which will govern society and will contribute to the progressive creation of a better world. [83]
- Unilever and Ambientech promote the fight against food waste among young people through an educational activity in secondary schools [84]. Unilever's subsidiary in Spain and the non-profit organization that promotes universal education in science, health and the environment are teaming up to raise awareness among young people in Spain about the importance of minimizing the amount of food that ends up in the rubbish bin every day. The initiative foresees the development of a free online educational pathway on this environmental issue that will impact more than 2,000 schools during the new school year. This itinerary, specifically designed for secondary school students, will be available for free access to all schools in the country that want to learn more about reducing food waste, one of the challenges included in the UN Sustainable Development Goals.

Educational programmes for pupils and children have already proved to be efficient in reducing the amount of food wasted. A practical example, in this case, could be a study conducted in a public primary school (Nursery to year 6 of Primary Education) in the city of Valencia (Spain) from March to May 2019 [85] . The aim of the study was to understand whether a didactic intervention, consisting of informing teachers and pupils and involving pupils in reducing FW, could bring about changes in the level of knowledge and attitude towards FW and in the amount of FW generated during the mid-morning break and lunch at schools. Subtle changes in the level

of knowledge and attitude towards FW were detected in teachers and pupils after the intervention. Around 30% of FW reduction at lunch was observed in the intervention group but not in the other groups. A decrease of almost half of the average weight was observed during the mid-morning break in the rest of primary groups. The results clearly show that addressing the FW issue in classrooms can have a very positive effect on children's attitudes: a reason more to put the efforts on schools, especially at the very beginning of the educational journey.

Geleceğin Eğitimi Derneği - GED - Turkiye

2.1. The food waste issue

Turkey wastes nearly 2 million tons of food every year, according to data from the country's Scientific and Technological Research Council and, so far, there is no national strategy on food waste management in Turkiye. However, the framework is outlined in the 11th Development Plan (2019) prepared by the Turkish Presidency that includes the following targets; "Effective stock management, reduction of losses in the supply chain, prevention of waste, development of rules and capacities for the regulation of markets will be ensured for food safety." and "Consumer awareness will be increased in order to prevent food loss and waste."

The most important initiative regarding waste management is Zero Waste (https://sifiratik.gov.tr/) led by the Ministry of Environment, Urbanization and Climate Change. The Zero Waste initiative outlines the waste management in each sector such as schools, hospitals, hotels, factories by providing sets of waste management procedures in managing various kinds of waste including food. These sets of procedures are inspected by the ministry only for some of the sectors/organization types such as municipalities, airports, shopping malls, industrial zones but most sectors/organizations are not obliged to follow these procedures. The Zero Waste initiative is planned to be spread all over the county and will be the official policy for the waste management in the near future.

As for the action plans focusing on food waste management, the Turkish Ministry of Agriculture and Forestry has been cooperating with the Food and Agriculture Organization of the United Nations (FAO) to design a national strategy document on "Prevention of Food Losses and Food Waste in Turkiye". The document contains many objectives including Awareness Raising and Consumer Awareness, Capacity Building, Preventing and Reducing Food Waste at the Mass, Sales and Storage and at the Consumer levels. In this document, it was also indicated that the success of this action plan depends on the collaboration between public institutions, the industry, consumers, the academia, and NGOs.

As for the other initiatives;

- Municipalities in Turkiye have been considering waste food as a source of compost for many years due to its efficiency and ease. For example, the Municipality of Istanbul produces daily 1000 Kilogram of compost from waste food. (https://cevre.ibb.istanbul/atik-yonetimi-mudurlugu/kompost-ve-geri-kazanim-tesisleri)
- "Campaign to Prevent Bread Waste started" in 2013 with the aim of reducing the decrease the amount of bread waste which is a major issue in Turkiye since 33 % of the bread produced is wasted. The project was selected as a success story by the Food and Agriculture Organization of the United Nations as it decreased the bread waste by %18.
- WWF-Türkiye and Boğaziçi University have been organizing a certification program called Green Generation Restaurants to bring a conscious consumption approach to the food and beverage industry, to transform/evaluate the waste generated while reducing the amount of waste.
- There are many NGOs and other types of organizations working in the field with focus of awareness raising against food waste at home such as Gıda İsrafı, Gıda Kurtarma Derneği, Sabri Ülker Vakfı.
- As the technology and information technologies developed and spread all over the world, one of the current approaches towards waste management is to sell the food products online as their best before dates approaches. "Fazla Gıda" and "Yenir" are the two example applications in which buyers and sellers meet to buy/sell food (or donate) food products with the limited time to decay.

As for the national statistics, according to the "Food Waste Index Report 2021" by the United Nations Environment Programme; the household food waste is estimated as 93 Kg per capita per year in Turkiye[1]. When it comes to the restaurants it is 28 Kg per capita per year and 16 Kg per capita per year in retail stores[2]. This makes around 11 million kilograms of food waste per year. The cost of this huge amount of waste for the economy is around 4 Billion Euro per year[3]. According to a research conducted by Türkiye İsrafı Önleme Vakfı in 2019, 27% of the participants indicated that they waste food at home and only 32% of them never leave food on their table as waste[89].

According to a research conducted with 29 restaurants in Istanbul, the majority of the respondents (79.3%) stated that the highest amount of waste was produced in the service department of restaurants. Regarding the management of food wastes, 82.7% stated that they reused food leftovers in meal production (vegetable juice, soup, sauce etc.) in various ways.

As for the food waste management, most of the food waste collected by municipalities and there are 9 facilities that actively turn food waste into compost as fertilizer. The total amount of compost produced in 2020 is around 120 thousand tons[91]

2.2. Food waste management in education

Similar to the situation for food waste management in general, the existing literature on food waste management in Turkiye is very limited. There are only few researches in this field and information on food waste management is limited. However, the cooperation between FAO and governmental bodies, companies and local NGOs are emerging to focus on food waste management research in Turkiye. Instead of focusing on how to decrease the waste of food, the existing literature mostly covers the recycling of food waste to provide economic resources such as biofuel, biogas and fertilizer.

Although the specific educational programs on food waste and food waste management is very limited, references can be found in the current curriculum;

- First Grades; Eating as much as needed, preventing waste of bread and food, Distinguishing food that can be recycled.
- Second Grades; Eating as much as needed and preventing waste of bread.
- Third Grades; Prevention of food (especially bread) waste and evaluation of surplus foodstuffs.
- Fourth Grades; Prevention of food waste, Food storage conditions
- Seventh Grades; Importance of recycling and reuse, Designing projects related to recycling of domestic solid and liquid wastes, Emphasizing the contribution of recycling facilities to the economy
- Eight Grades; Designing projects for the efficient use of food resources, Explaining the importance of separating solid wastes for recycling, Making research to gather data on the contribution of recycling to the country's economy.

The Sabri Ülker Foundation with the Turkish Ministry of Education joined their forces to develop and implement the FAO's "Do Good: Save Food!" series of teaching manuals targeted to children between 10 – 13 years old. Do Good: Save Food! contains information and hands-on activities that promotes awareness of the economic, social and environmental consequences of wasting food, advantages of preventing food waste, actions that children can take to reduce food waste and good habits that they can develop and introduce to their friends, families and communities to reduce food waste.

Besides, a special program for the secondary schools is being prepared by translating the existing curriculum in England and Italy that were developed with the contribution of FAO. Another program is being developed by the Ministry of Agriculture to be used in the primary and secondary schools in Turkiye. The ministry is currently providing seminars with the secondary school students based on the experiences of the local staff without constructed content.

Apart from the existing educational programs in schools, there is a training program in the retail sectors for the suppliers on the food waste management. The training is called 10x20x30 and provided by Migros Grocery Stores with the cooperation of the Ministry of Agriculture and FAO with the aim of decreasing the food waste by 50% by 2030. Metro Grocery Stores is also implementing very similar training for its suppliers.

As the current situation implies, there is a need for developing new training resources. The first step towards food waste management is focusing on the awareness raising at both public and organizational levels. Although the current data shows the huge dimension of food waste in Turkiye, these data are actually created by foreign organizations or NGOs. Therefore, the first step should be collecting sufficient data regarding the food waste to provide reliable data for the people and NGOs so that they can create awareness raising campaigns. This way, the further steps

can be based on the needs of the country and people. For example, bread is highly consumed in Turkiye and there are many campaigns on wasted bread. This shows us that once the data is collected, people can be easily informed and new campaigns start.

The second step is the creation of synergies and cooperation among the public authorities and NGOs to design suitable campaign and training contents tailored to the country' need. Although there are a number of NGOs in the field, the cooperation of them with the local or regional public bodies is not in existence. This is mostly due to the confusion in the roles of public bodies in the field of food waste management since the nature of the issue requires involvement of many organizations.

The final and the most important lack in this field is the lack of a holistic curriculum in the schools on food waste management since the current curriculum only aims at raising awareness on the importance of food waste management. Therefore, a training program that contains not only basic information on food waste management but also "how to" reduce food waste and make use of wasted food is needed. The resources can be created in various forms including hand-on activities, games, videos, constructed visits, guides, manuals for teachers, informative sessions at all levels. These resources should be created with the involvement of key stakeholders from the field and should aim at fostering the teachers and youth to take action against wasting food and managing the wasted food. The curriculum should be integrated in primary, secondary and even higher levels providing that it should start at the earliest level possible.

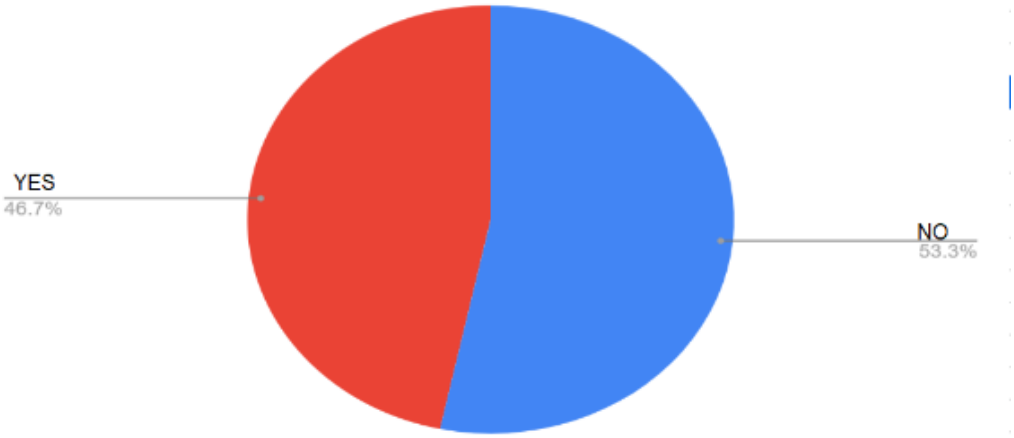
3. THE FIELD RESEARCH – INTERPRETATION OF QUESTIONNAIRE

Balkan Bridge - Bulgaria

3.1. Teachers' responses

Summary of the responses that the teachers from different high schools in Sofia, Bulgaria provided for the purposes of the Zero Waste project.

1. Do you know what food waste management is?



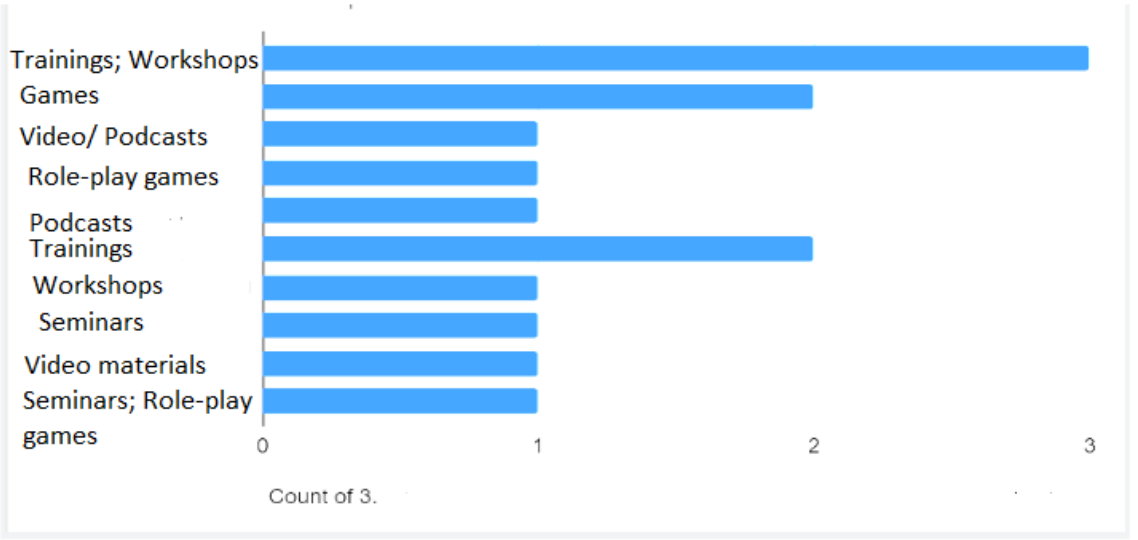
It could be concluded that approximately half of the teachers were already introduced to the topic of Food Waste Management and the other half, were not.

2. What do you understand by food waste management? (Open question)

Prime answers:

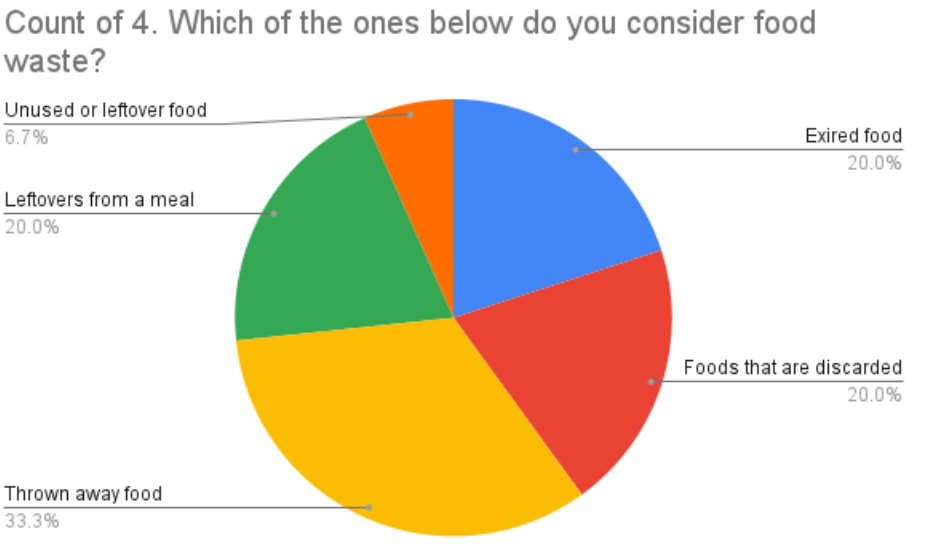
- Not buying more than we need
- Giving away food
- Preventing Food Waste
- Leftovers from big events could be sent to people that need
- Composting and similar practices
- Better food logistics

3. How would you like to find out more about food waste management?

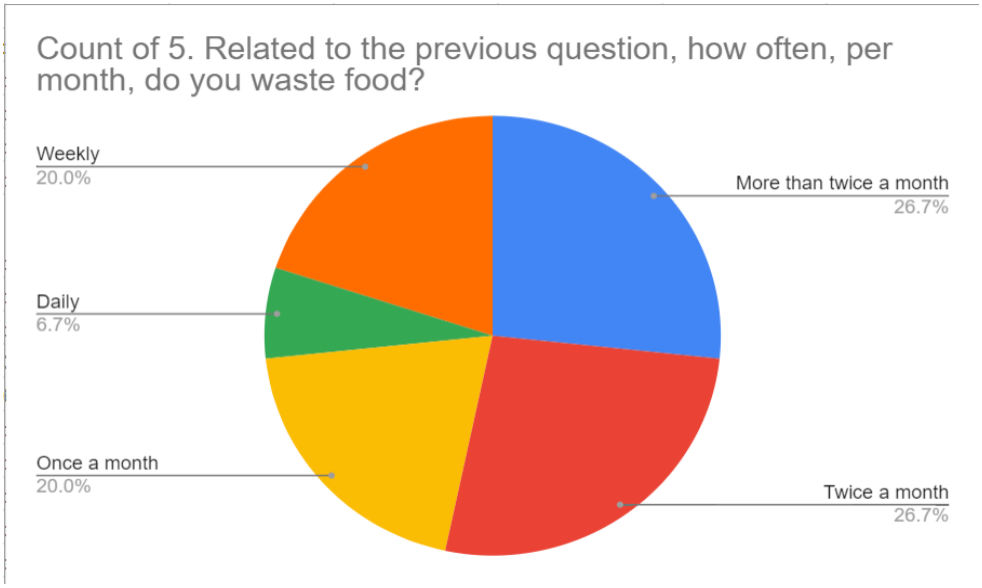


According to teachers' response analysis their pedagogical expertise suggests that gaining knowledge through interactive approaches such as gamified solutions, workshops and video training is more effective.

4. Which of the ones below do you consider food waste?



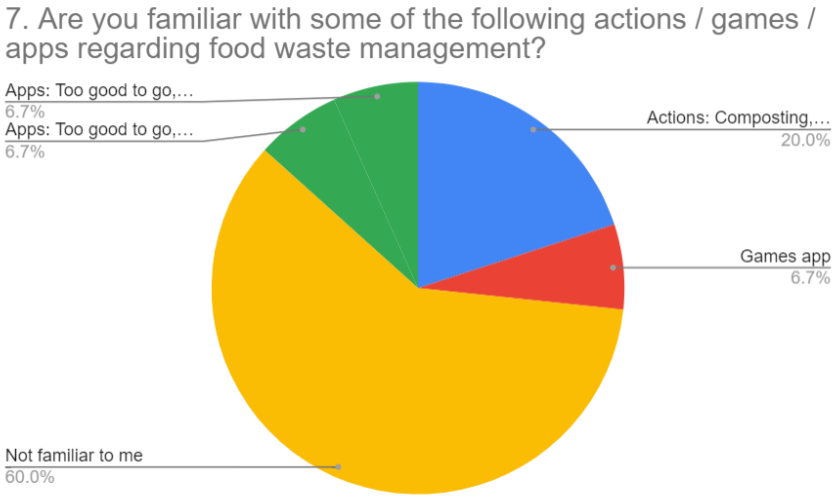
5. Related to the previous question, how often, per month, do you waste food?



6. Have you taken part in any training/activity related to Food Waste Management?

The majority of the respondents have not participated in trainings/related activities to the Food Waste Management.

7. Are you familiar with some of the following actions / games / apps regarding food waste management?



8. What could be done, in your country/community, to reduce /avoid food waste?

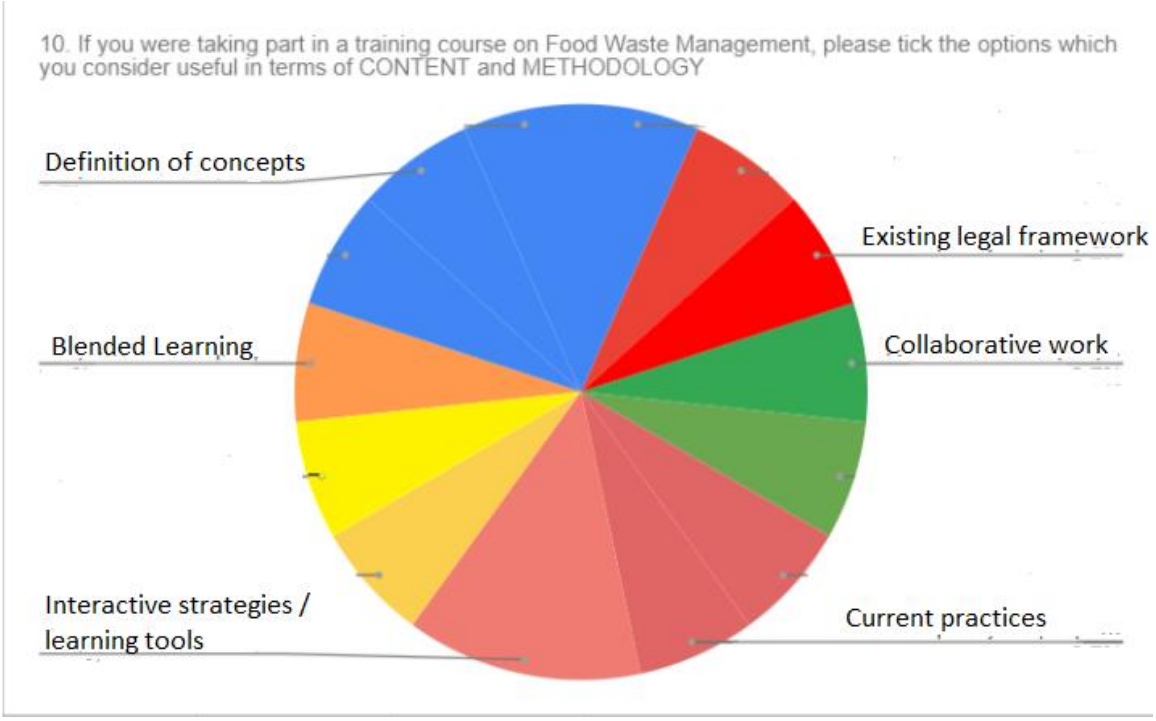
Prime answers:

- Organise training courses about Food Waste Management (for both teachers and students)
- Organise workshops / conferences / debates, World Cafes on Food Waste Management

9. Please mention your top 3 most important/stringent needs in the fight against Food Waste (for example, to know more about Food Waste Management or to get involved in activities aimed at raising awareness about Food Waste Management)

- Development of training materials; online seminars; educational e-platform
- Extracurricular activities; Role play methods ; online apps
- Responsible shopping; Responsible cooking; Responsible consumption
- Video lessons on the topic along with educational campaigns
- Extracurricular activities; Good practices; seminars
- Food Freezing; Food preservation; Food composting
- Introduction of additional courses/subjects/lessons on the topic

10. If you were taking part in a training course on Food Waste Management, please tick the options which you consider useful in terms of CONTENT and METHODOLOGY and Add ONE more option of your own:



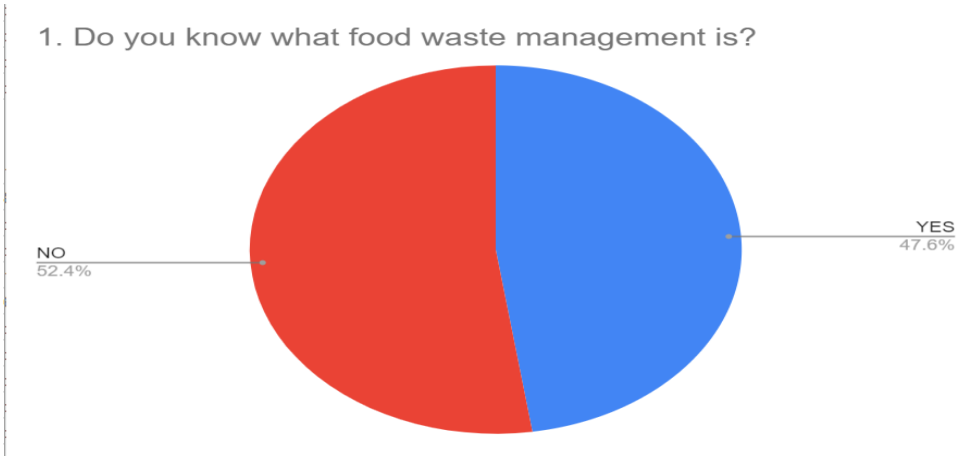
The Options:

- Definition of concepts
- Existing Legal Framework
- Current practices
- Blended learning (face-to-face and online)
- Collaborative work
- Interactive strategies / learning tools

Each of the suggested answers is equally recognised by the teachers as significant in terms of Content and Methodology usefulness for the training course.

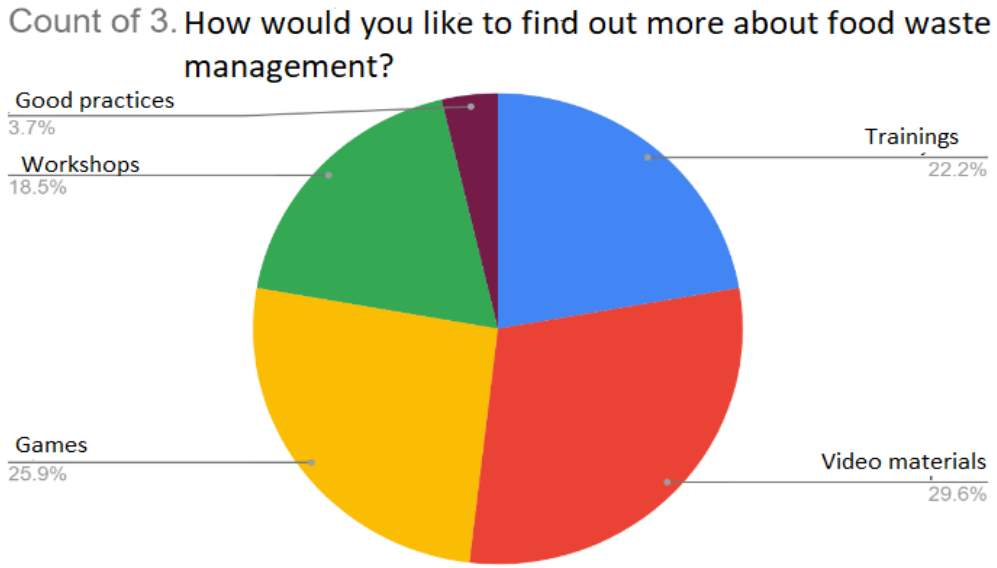
3.2. Students' responses

The students in Secondary Educational Level are the prime target group of the ZERO WASTE project so the following answers are considered extremely important for shaping the future Project Results.

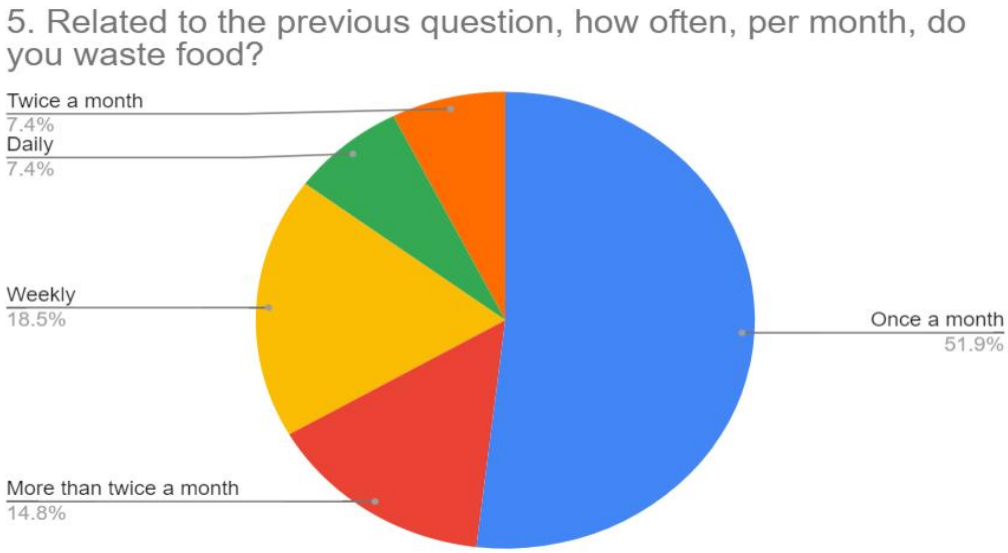


2. What do you understand by food waste management?

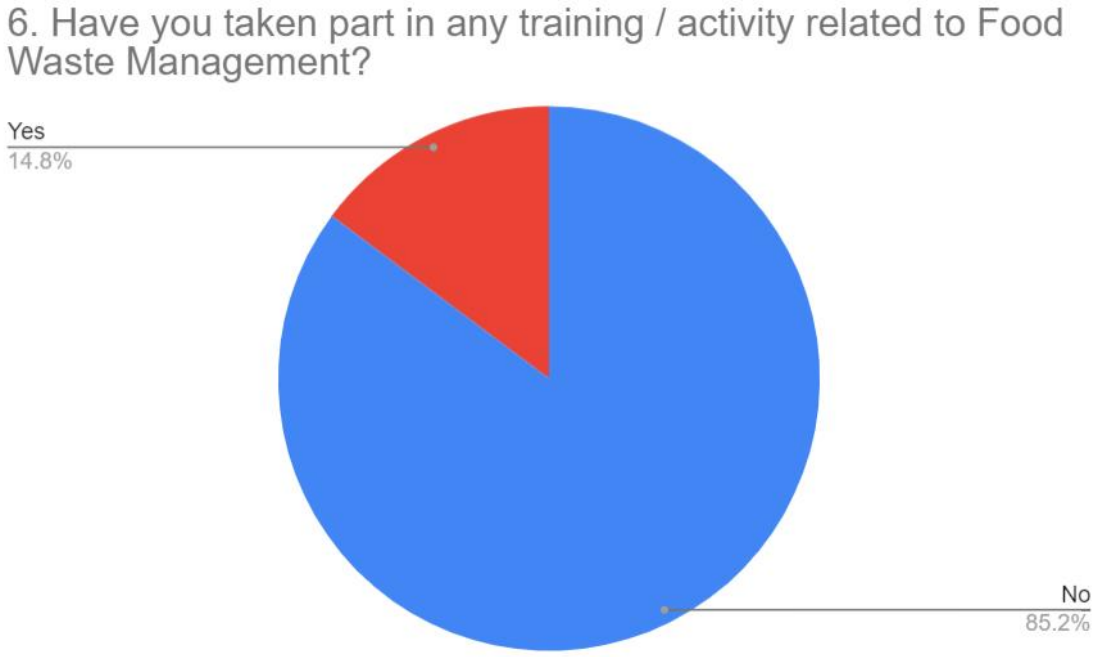
- Cutting down on buying excess food, planning how much we need
- system that reduces food waste
- Not to buy more than we can eat
- It should be ensured that excess food is not thrown away, but if there is any, it should be given to homeless animals and people in need.
- Throwing away, wasting food.
- Food tracking
- Food left over after an event to be distributed among institutions that need it
- In my opinion, this should mean efficient distribution of the rest of the food and efficient use of the food itself, trying not to waste it.
- Management of food waste disposal, measures against the problem
- Planning the meal so it doesn't get thrown away
- Preventing food waste.
- People should judge how much food they need, not throw it away and let it spoil.
- Better supply logistics
- Follow an algorithm to manage food waste
- The choice is of the right amount so that it is not wasted
- Prevented food spoilage through recovery such as donating animal feed or
- To manage the use of food in such a way that no or minimal food is thrown away and wasted.
- Composting and taking action according to needs and possibilities.
- Donating unnecessary food
- Awareness of topics such as climate change, pollution and energy conservation.
- Utilization in different ways and directions.
- The disposal of food by households and pt hotels and businesses
- The uneaten food should be tracked and given to those who need it

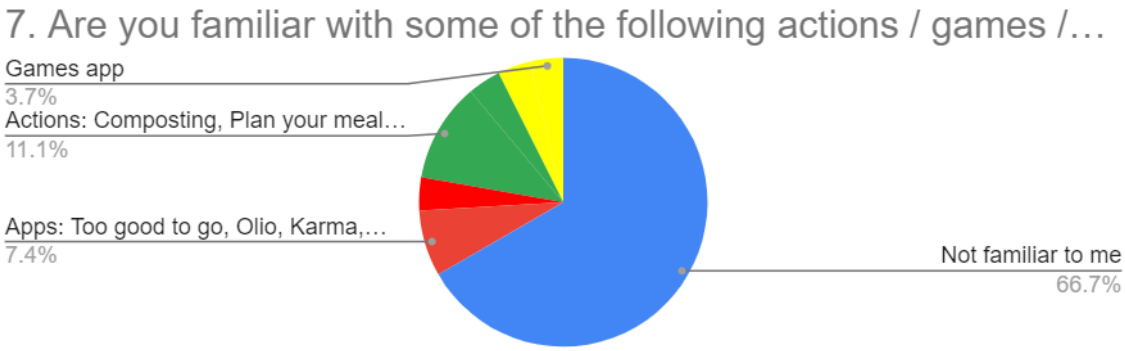


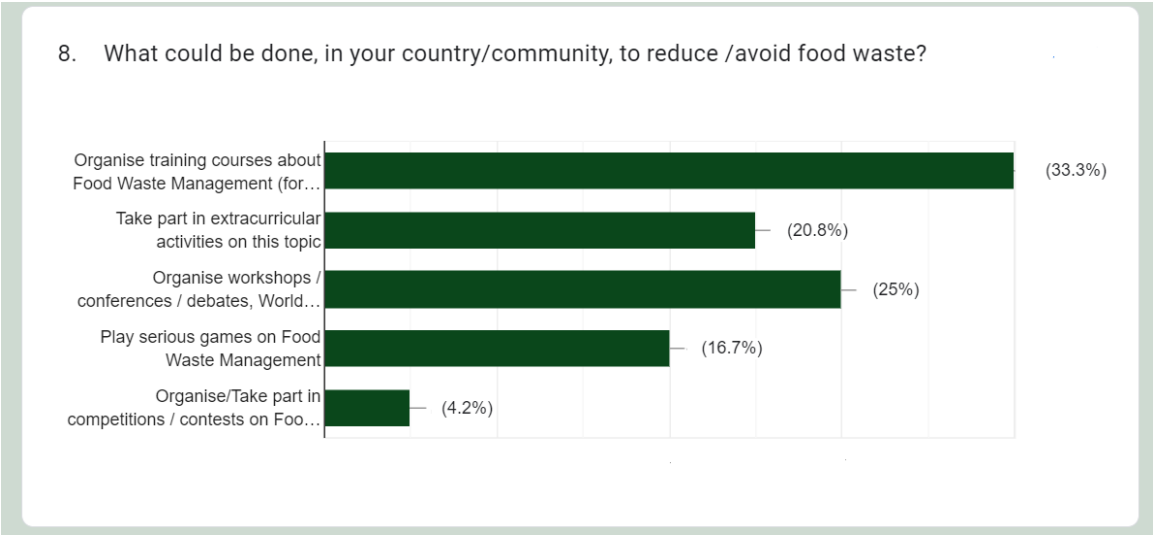
Answers of question 3 illustrates the students' preference of gaining knowledge throughout interactive approaches such as gamified solutions, workshops and videos



Regarding the frequency of food being wasted the most preferable answer of the students appear to be “Once a month” having the percentage of 51,9% which is little more than the half of the reponses.







Center for Social Innovation- Cyprus

The field research recruited 46 participants: 30 (65%) teachers and 16 (35%) students. All of the participants live in Cyprus.

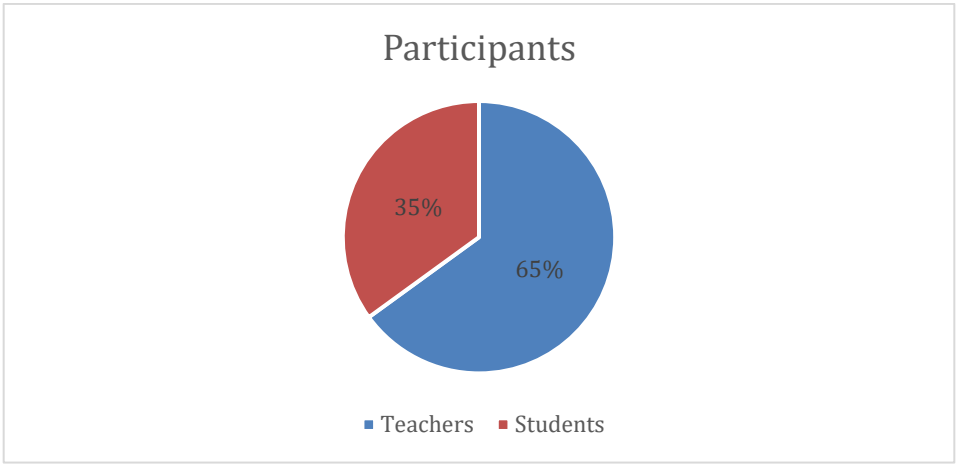


Figure 1. Percentage of participants; teachers versus students, CY survey.

Source: own elaboration

3.1. Teachers' responses

- ***Do you know what food waste management is?***

According to **Figure 1**, 76,5% of the teachers (26 teachers) declare knowledge on food waste management, while only 4 of them stated that they do not have the knowledge.

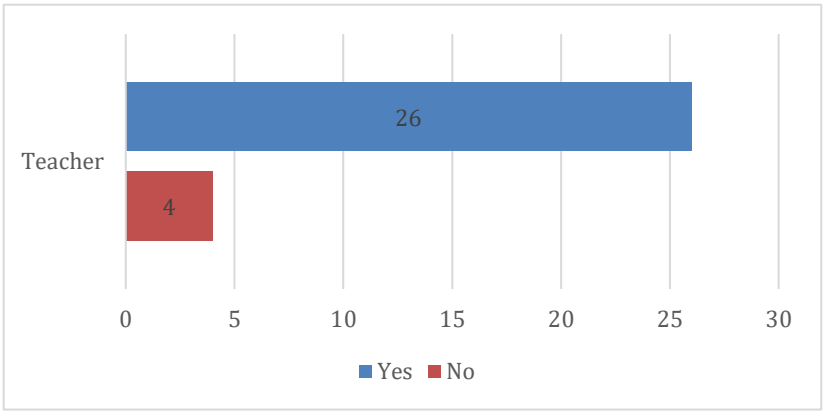


Figure 1: Knowledge of teachers on food waste management, CY survey.

- ***What do you understand by food waste management?***

The answers can be categorized under 3 statements based on the wording that the participants have used:

(a) **proper** management/utilization of food waste,

(b) waste reduction, and

(c) recycling – reusing – composting.

It is important to highlight that statement (a) is too vague and doesn't specify what kind of management can be implemented. Statement (c) indicates the participants' confusion or ignorance with the terms recycling/reusing regarding food waste, which can be also considered to be part of food waste utilization (statement "a"). Statement (b) was the least mentioned, and it is a bit general, considering that the word 'food' was not used. To note, one teacher participant expressed the idea of making biomass out of food waste.

- ***How would you like to learn more about food waste management?***

The majority of teachers participants showed preference in attending educational programs (70%) to increase their knowledge on food waste management or even watch related videos (50%). Seminars and Games are finding almost equal preference among participants, with 43% and 40%

respectively. Interestingly, one teacher proposed visiting a waste treatment facility as an alternative learning method.

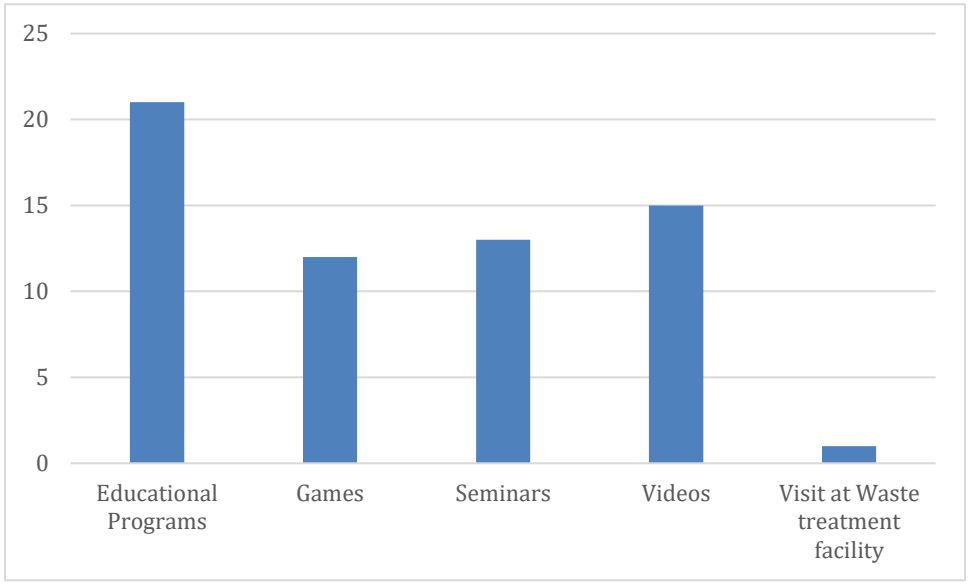


Figure 2: *Teachers' preferences on learning about food waste management, CY survey.*

- ***How often do you waste food in a month?***

According to **Figure 3**, most of the teachers (65%) stated that more than twice a month they waste food. 19% of the teachers seem to waste only once a month, while the lowest percentage (16%) was those who waste food twice a month.

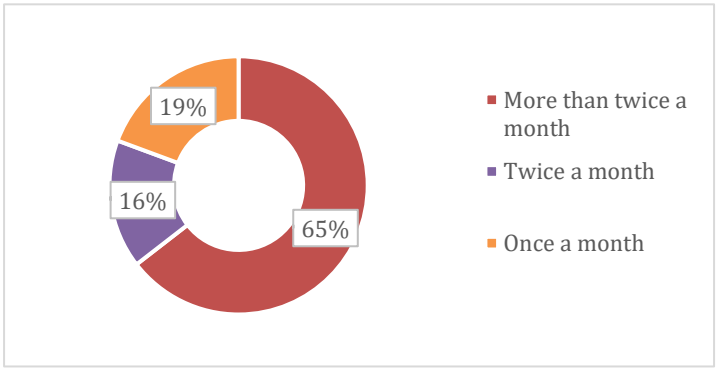


Figure 3: *Teachers' frequency of food waste, CY survey.*

- ***Do you take/have you taken part in any training/activity related to Food Waste Management?***

Importantly to note is that a minor proportion of teachers has ever taken part in any training/activity related to food waste management, as shown in **Figure 4** below; specifically, only 3 out of 30 teachers (10%) reported 'yes'. Positive responses indicate that there are teachers who participate(d) in related trainings/activities once per semester, 3 times a year and just once.

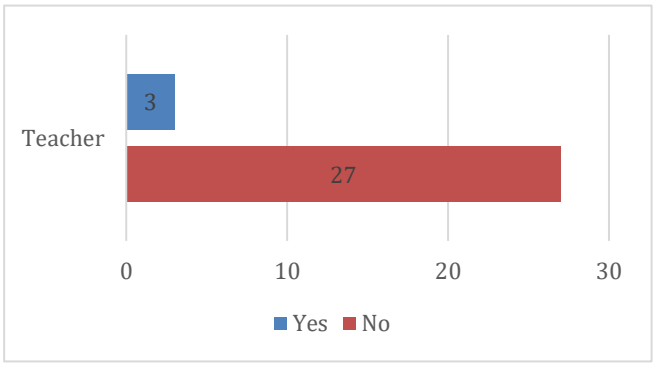


Figure 4: *Participation of teachers in training/activity, CY survey.*

- ***Are you familiar with some of the following actions/games/apps regarding food waste management?***

The following question examines whether *teachers are familiar with any of the suggested examples related to food waste management*. The results show that most of the teachers (97%) are aware of actions that can be implemented, such as composting, meal preparation and management of food surplus, while disappointedly none of them is familiar with food waste management games; only one teacher (3%) has knowledge on relevant mobile applications (**Figure 5**).

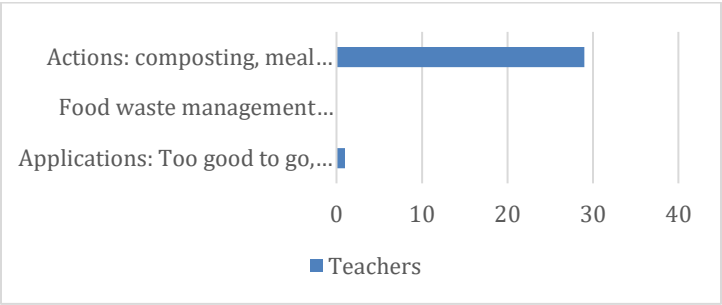


Figure 5: *Knowledge of teachers on related food waste management actions, CY survey.*

- ***What could be done, in your country/community, to reduce/avoid food waste?***

Figure 6 depicts the beliefs of the teachers on *what could be done to reduce/avoid food waste*. It is notable that on the top of teachers' preferences comes the organization of food waste management courses, with a high percentage of selection (80%). More than half of the teachers also consider workshops/conferences/discussions and extracurricular activities as an ideal mean of reducing food waste (56.6% and 66.6%, respectively). Following the teachers' responses on this question, designing and developing Games is the least appealing of all choices, with only 40% of teachers selected this option. As a general remark, it seems that teachers prefer more traditional ways of learning, such as courses and workshops.

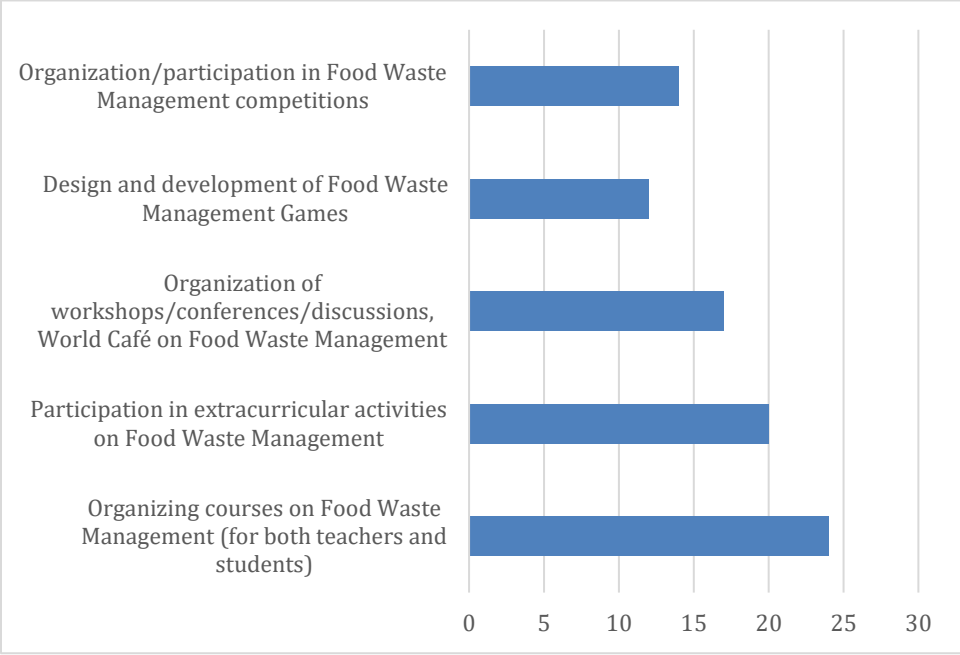


Figure 6: *Suggestions for the reduction of food waste by teachers, CY survey.*

- ***List your 3 most important needs related to the topic of addressing food waste (e.g. need to learn more about Food Waste Management or need to get involved in activities aimed at raising awareness about Food Waste Management).***

A variety of responses came from the teachers who underline the need of:

- Raising awareness on food waste management,
- Providing information and updates on the topic,
- Training,

- Development of tutorials, videos, interactive games,
- Involvement in educational programs,
- Organization of field trips and study visits,
- Organization of school workshops,
- Providing practical everyday solutions to reduce food waste or to use food scrubs,
- Providing practical solutions on how to deal with food that soon expires,
- Information on how supermarkets or/and restaurants manage their food surplus,
- Incentives to implement food waste management practices,
- Support from local governments to implement actions,
- Tips on smart shopping,
- Providing help to families in need by distributing food surplus.

- ***If you attended a training course on Food Waste Management, tick the options you find useful regarding its CONTENT and METHODOLOGY and add ONE more option of your own.***

When asked, in terms of the content and methodology of the training course, most teachers highlight the importance of current practices implemented and interactive material/strategies applied. Equally in significance are the "existing of legal framework", "blended learning" and "collaborative work".

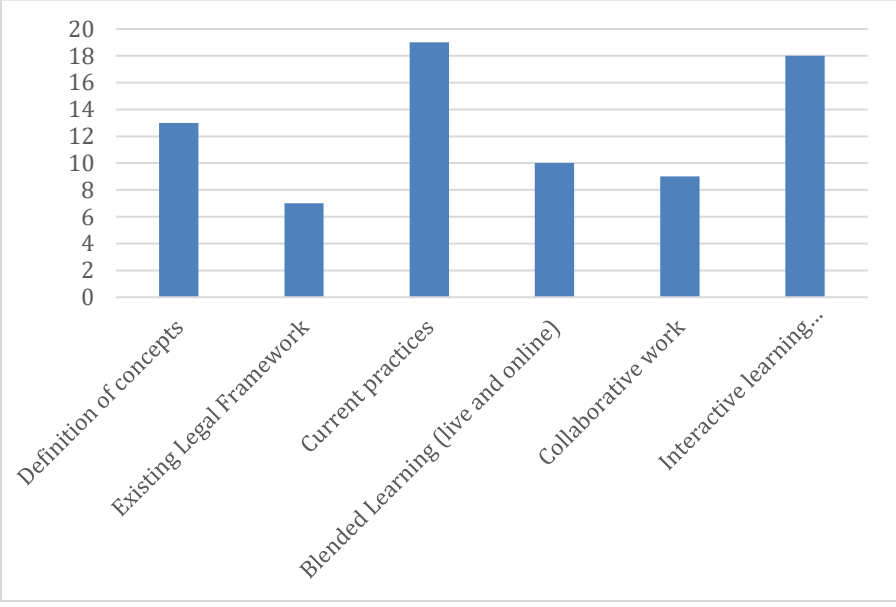


Figure 7: *Useful aspects regarding content and methodology, CY survey.*

3.2. Students' responses

- ***Do you know what food waste management is?***

According to **Figure 8**, the percentage of the students reporting knowledge on food waste management is 50-50.

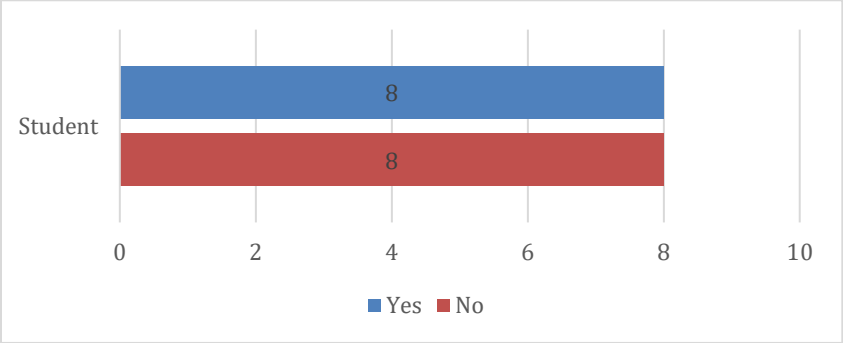


Figure 8: Knowledge of students on food waste management, CY survey.

- ***What do you understand by food waste management?***

Students' answers can be categorized under 2 statements:

(a) **proper** food waste management and

(b) recycling – reusing – composting; statements that were also mentioned by teachers.

It is important to highlight that statement (a) was the most mentioned (9 out of 16 students).

- ***How would you like to learn more about food waste management?***

Similar to teachers' choice, the highest percentage of students expressed preference in attending educational programs (62.5%) to learn more about food waste management, followed by the use of games (31.25%). Games are considered slightly more attractive than seminars or videos, which can be interpreted with the fact that younger generations are more familiar with electronics and online interactive platforms. Seminars and Videos were chosen by 25% and 18.75% of students, respectively (**Figure 9**).

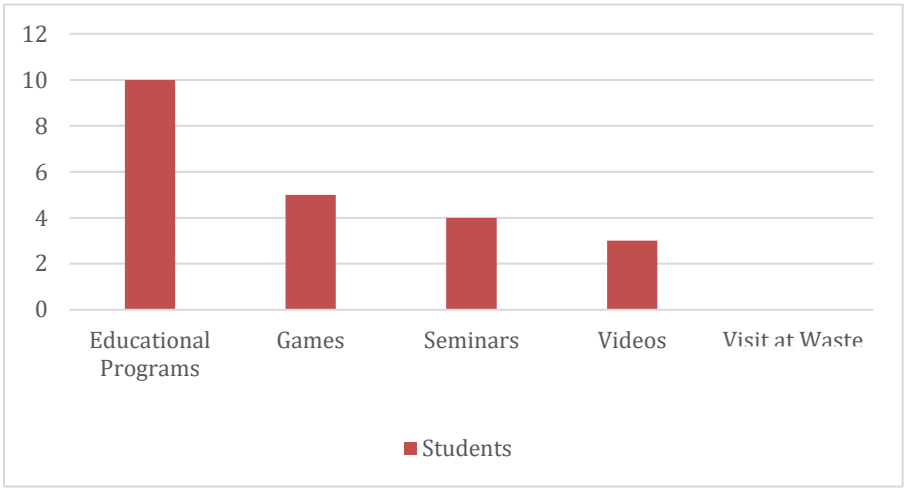


Figure 9: *Students' preferences on learning about food waste management, CY survey.*

- ***How often do you waste food in a month?***

According to **Figure 10**, 6 out of 16 students (38%) reported that they waste food twice a month. The remaining students seem to waste food more than twice a month or once a month, reaching the same percentage of 31%.

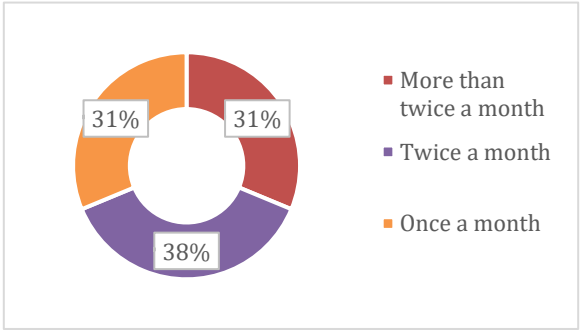


Figure 10: *Students' frequency of food waste, CY survey.*

- ***Do you take/have you taken part in any training/activity related to Food Waste Management?***

Similar to teachers' responses, the highest percentage of students have not taken part in any training/activity related. Only 4 out of 16 students (25%) responded that they have been involved in such trainings/activities (**Figure 11**); two noted that they had once participated, with one of them clarifying that the training was referring to general waste management and not just food waste, and the other two on a regular basis/ plenty of times.

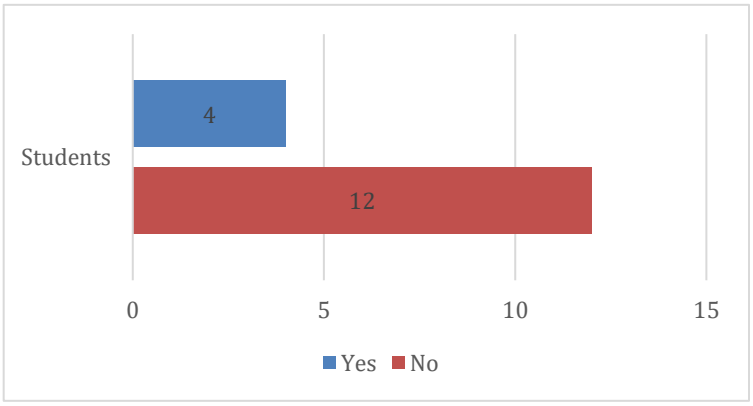


Figure 11: *Participation of students in training/activity, CY survey.*

- ***Are you familiar with some of the following actions/games/apps regarding food waste management?***

Similar to teachers' responses, the vast majority of students are familiar with actions taken to manage food waste, such as composting, meal preparation and management of food surplus. In contrast, only 3 students (18.75%) seemed to be familiar with food waste management games, while none of them are with any Applications on food waste management (**Figure 12**).

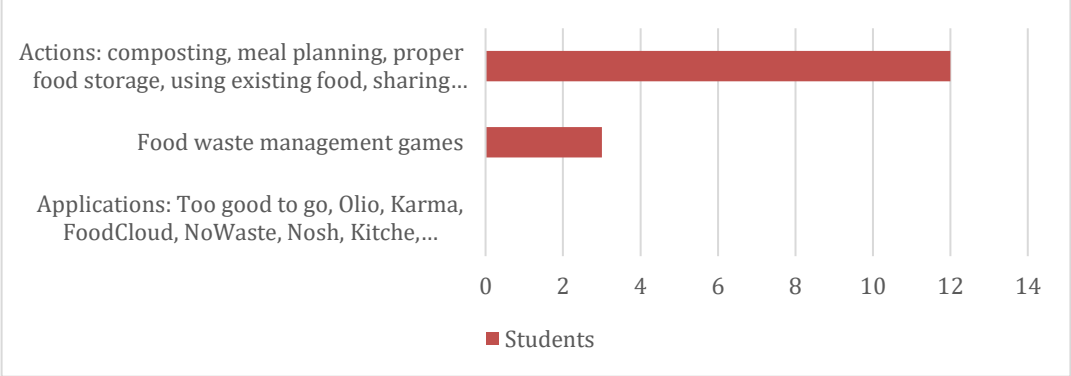


Figure 12: *Knowledge of students on related food waste management actions, CY survey.*

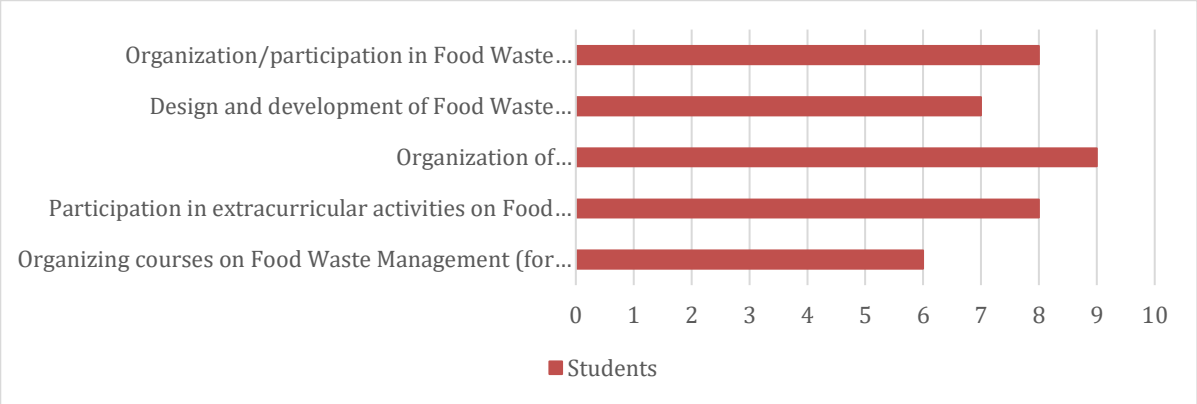
- ***What could be done, in your country/community, to reduce/avoid food waste?***

The organization of food waste management courses has the least percentage (37,5%) on students' preferences. More than half of the students (56.25%) consider workshops/conferences/discussions as an ideal means of reducing food waste. Fifty percent of students reported that both extracurricular activities and competitions would be important for

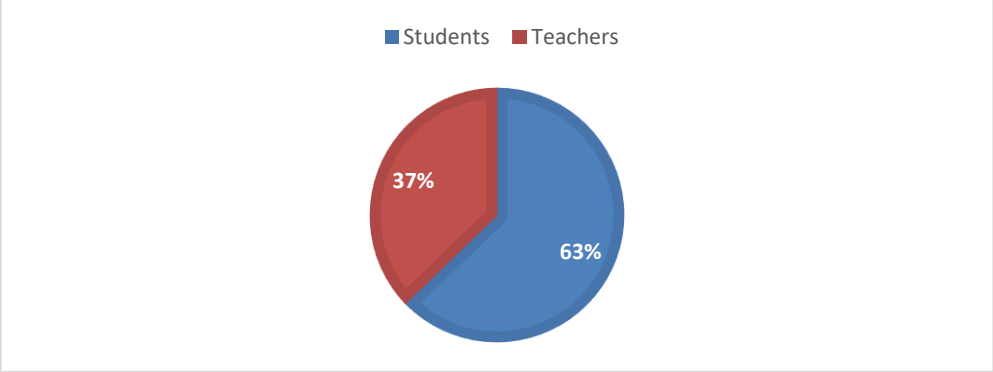
the reduction/prevention of food waste. Less than half of the students (43.75%) stated that the design and development of food waste management games would be helpful (**Figure 13**).

Figure 13: *Suggestions for the reduction of food waste, CY survey.*

Dot2Dot & Innovation Hive - Greece



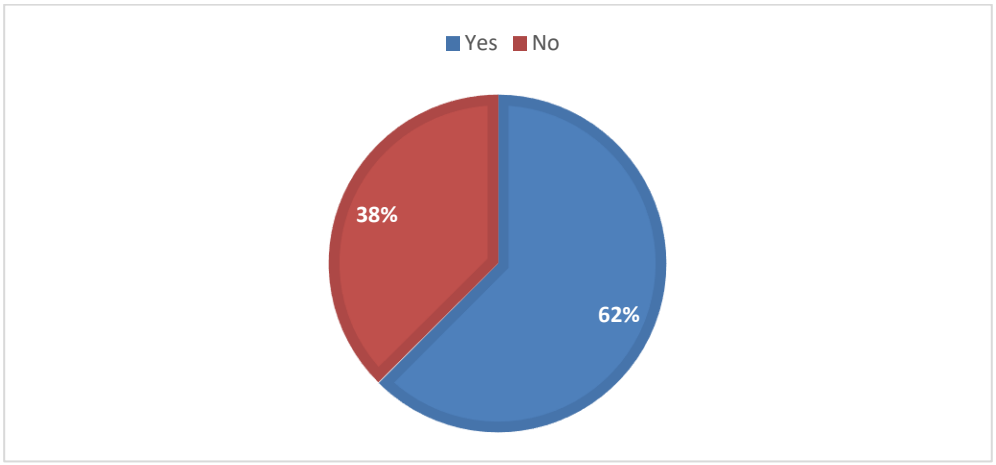
In the context of the field research, 43 responses were gathered in total. All of the respondents live in Greece.



As seen in the above pie chart, 63% of the respondents were students and 37% of them were teachers. More specifically, 27 students and 16 teachers in Secondary Education filled in the questionnaire. Their responses are listed below and displayed in the form of graphs where applicable.

3.1. Teachers' responses

- Do you know what food waste management is?

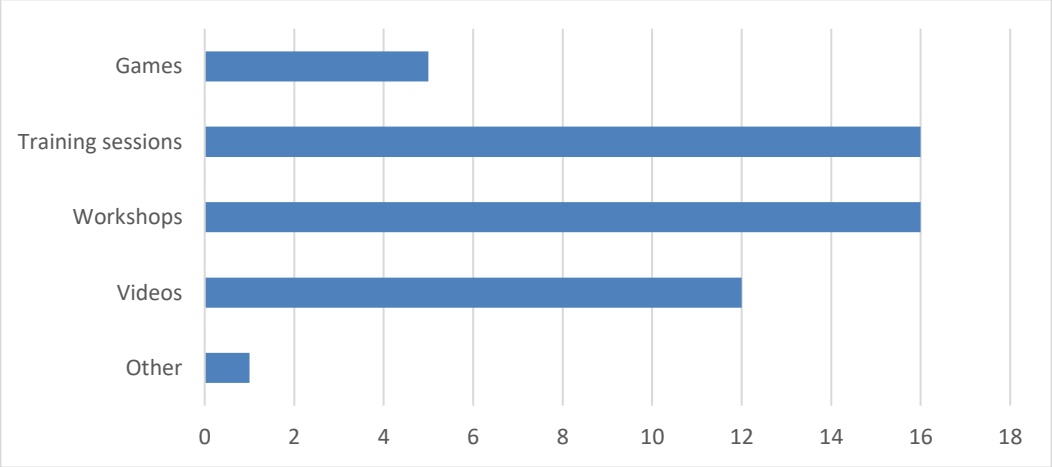


In this question, 10 teachers (62%) replied that they are familiar with the food waste management concept. 6 of them (38%) stated that they do not know what food waste management is.

- **What do you understand by food waste management?**

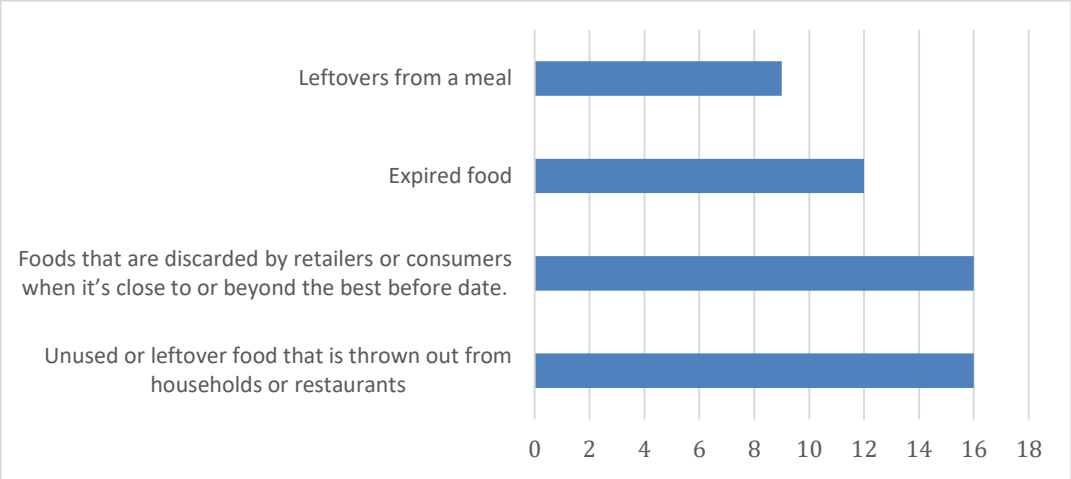
When it comes to what teachers think the term "food waste management" means, the most popular response was optimal use of food and limiting waste. Another response that was given was related to finding ways to make use of the food that is not consumed.

- **How would you like to find out more about food waste management?**



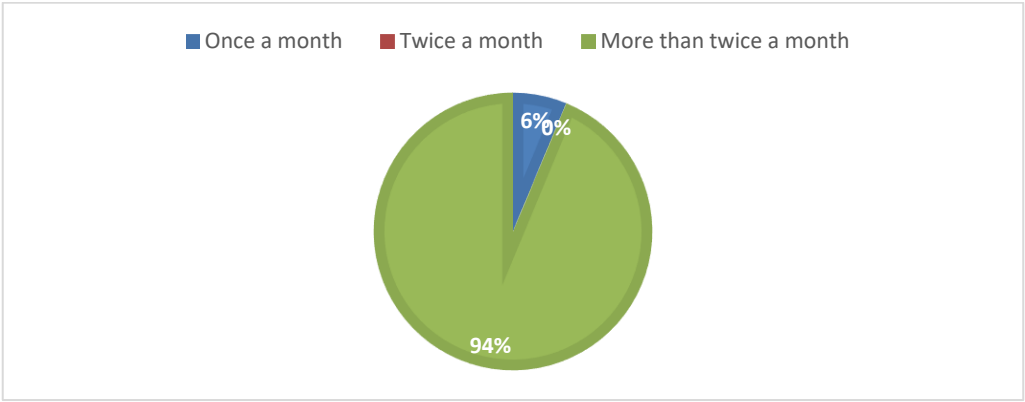
As seen in the above graph, all teachers stated that they would like to know more about the concept of food waste management with the help of workshops and training sessions. 12 of them answered that they would be interested in watching videos on the topic. Only 5 of them stated that they would be interested in food waste management related games.

- **Which of the ones below do you consider food waste?**



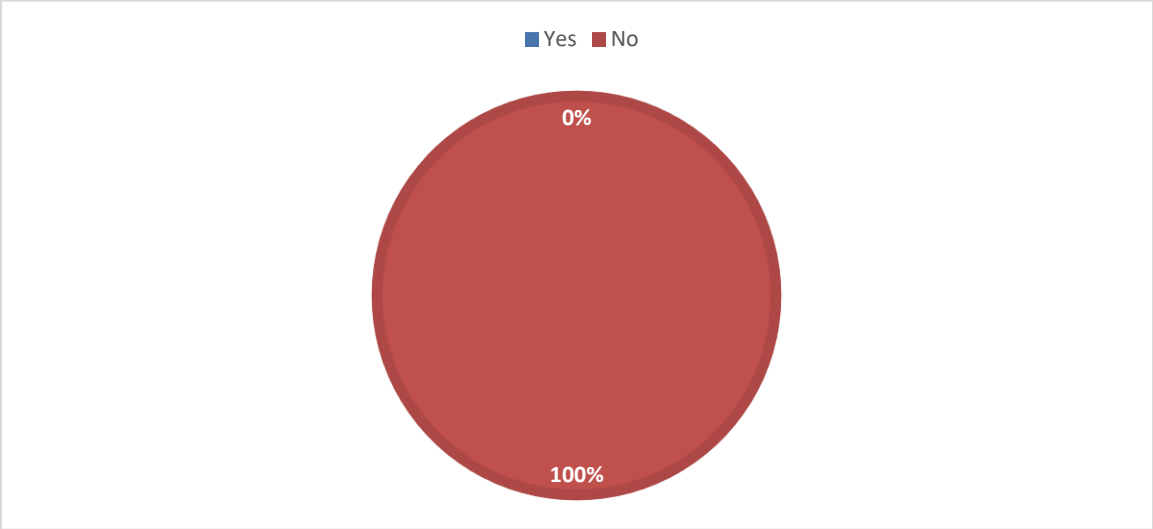
The above graph demonstrates that all 16 teachers (100%) in the Secondary Education that responded to the questionnaire stated that they identify food waste as leftover food that is thrown away in households or restaurants, as well as food that is discarded when it's close to or beyond the best before date. 75% of the teachers responded that they consider expired food as food waste, while 56% of them described leftovers from a meal as food waste.

- **Related to the previous question, how often, per month, do you waste food?**



According to the responses that were gathered in this question, the vast majority of the teachers in Secondary Education (94%) wastes food more than twice per month.

- **Have you taken part in any training / activity related to Food Waste Management?**

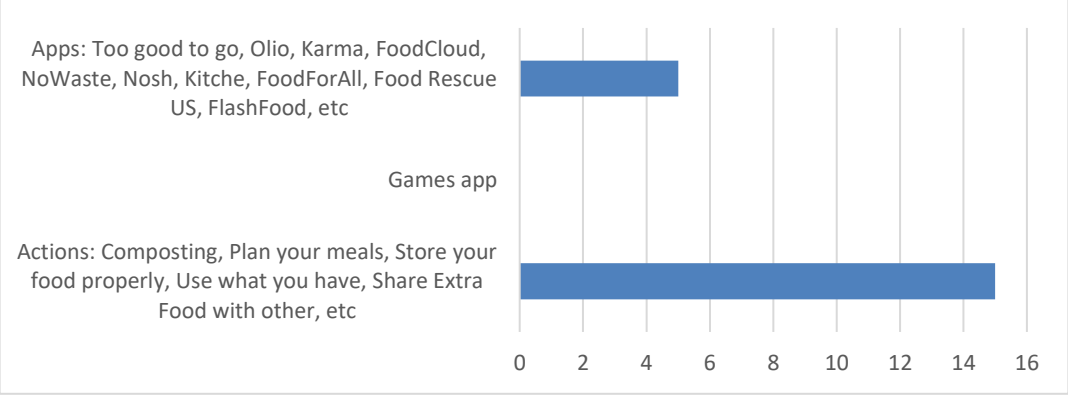


One of the most interesting findings in this survey is depicted in the graph above. More specifically, all teachers (100%) stated that they have never participated in any training or activity related to the topic of food waste management.

- If the answer to the previous question was Yes, please explain how often: only once, on a regular basis (every month/semester)

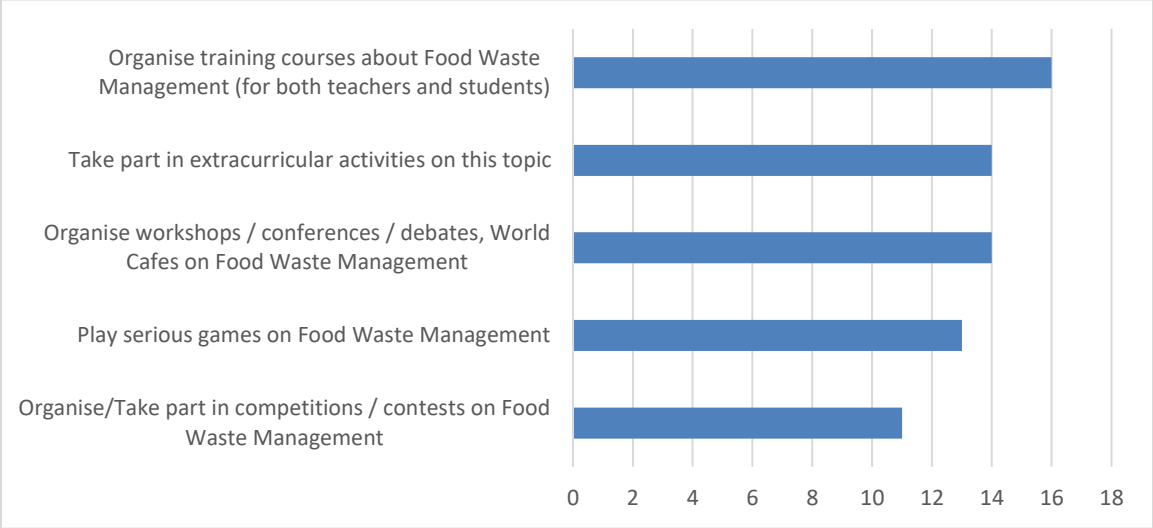
Since all teachers replied that they have never participated in any training or activity related to food waste management in the previous question, no responses were gathered for the specific sub-question.

- Are you familiar with some of the following actions / games / apps regarding food waste management?



15 of the teachers replied that they are familiar with actions regarding food waste management, while 5 of them claimed that they are familiar with relevant apps. It should be noted that none of the respondents stated to be familiar with food waste management related games.

- What could be done, in your country/community, to reduce /avoid food waste?



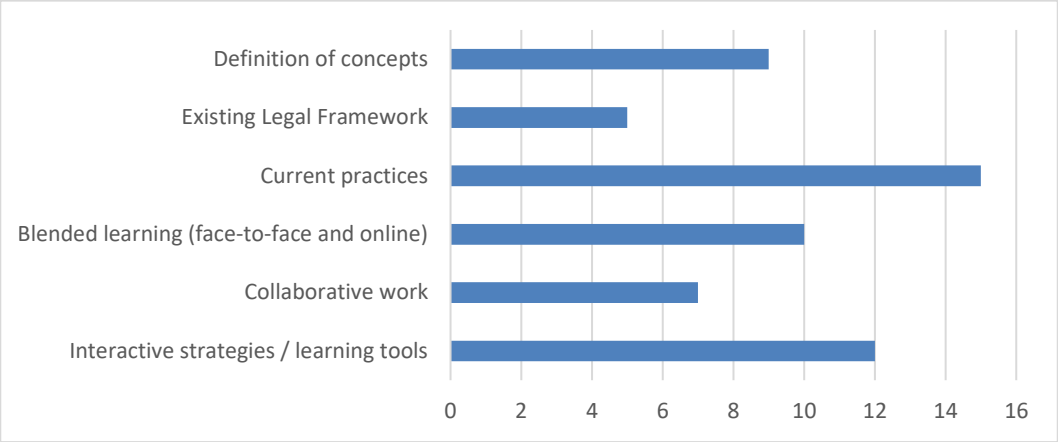
As seen in the above graph, all teachers replied that training courses about Food Waste Management for both teachers and students would help in reducing or avoiding food waste. 14 of them chose extracurricular activities and workshops / conferences / debates or World Cafes on Food Waste Management. 13 of them answered that they would consider playing serious games as a helpful measure, while fewer were the ones that chose contests on food waste management.

- Please mention your top 3 most important/stringent needs in the fight against Food Waste (for example, to know more about Food Waste Management or to get involved in activities aimed at raising awareness about Food Waste Management)

The responses that were collected from the teachers had to do with:

- the participation in educational programs / seminars / workshops,
- the participation in activities aimed at raising awareness about Food Waste Management,
- the access to information about available tools,
- the inclusion of the subject in the school curriculum / creation of educational activities,
- the access to information on ways of proper management,
- the access to information on the economic and environmental consequences of food waste
- the access to information on existing good practices / initiatives at local level.

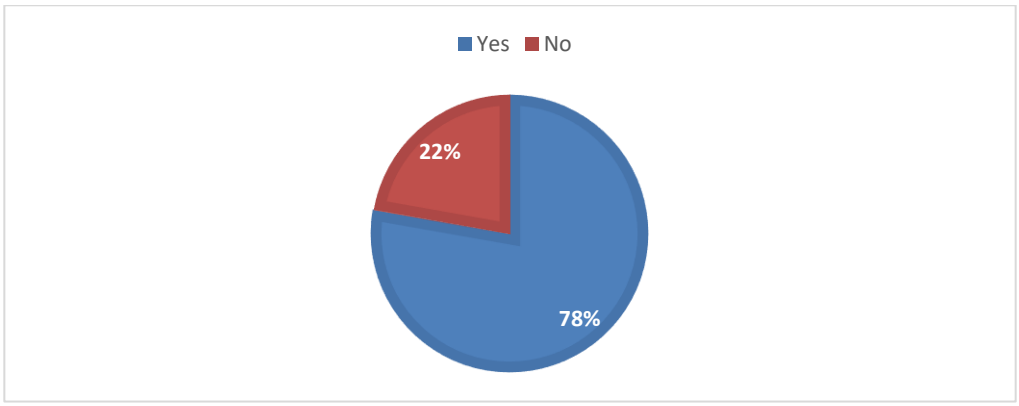
- If you were taking part in a training course on Food Waste Management, please tick the options which you consider useful in terms of CONTENT and METHODOLOGY and Add ONE more option of your own:



Regarding their desired content and methodology of a training course on Food Waste Management they would participate in, the vast majority (15 teachers) stated that they would like to know about the current practices, while 12 of them consider interactive strategies / learning tools as important. We also notice that 10 teachers picked blended learning as an important feature of such a training.

3.2. Students' responses

- Do you know what food waste management is?

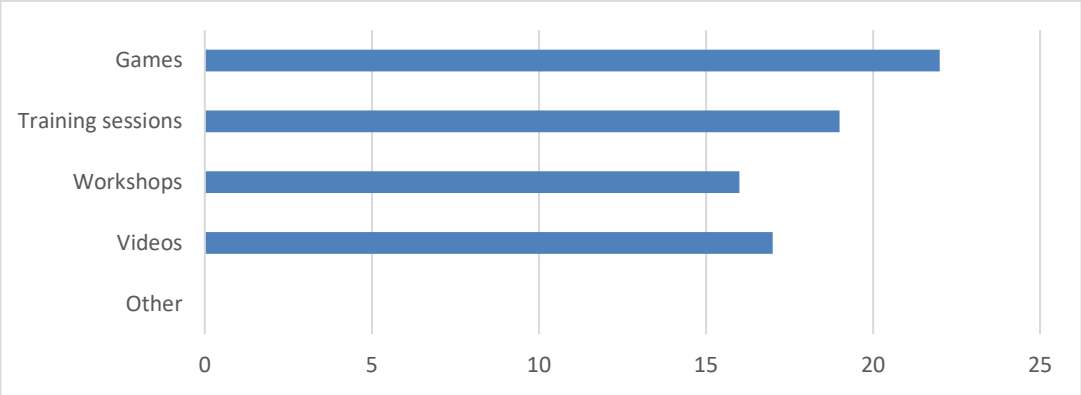


As seen in the pie chart above, 78% of the students (21 students) that completed the questionnaire stated that they are familiar with the food waste management concept. 6 of them (22%) stated that they do not know what food waste management is.

- What do you understand by food waste management?

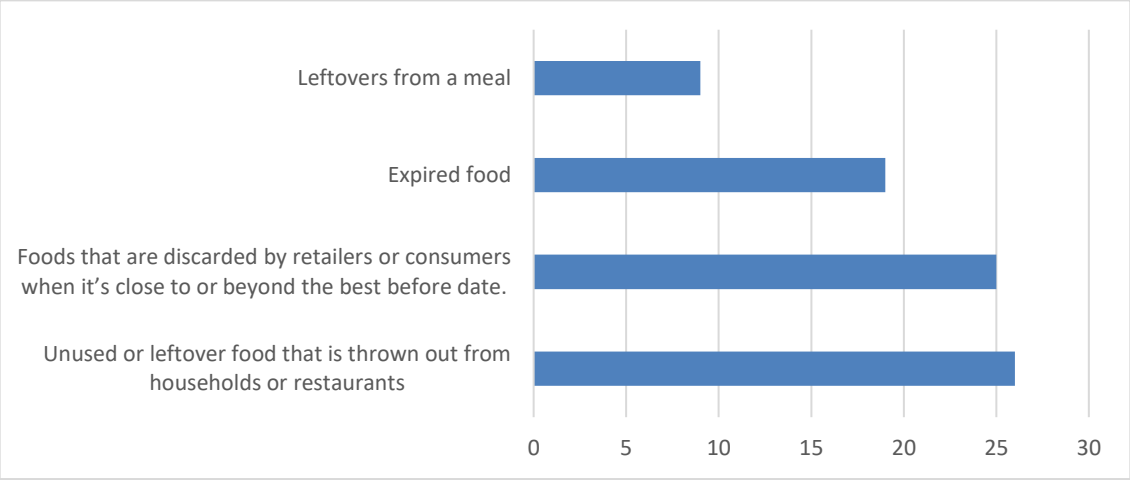
The responses that were collected from the students regarding their perception of the term of food waste management can be summarized into making proper use of food resources and reducing food waste.

- How would you like to find out more about food waste management?



The above chart demonstrates that 22 of the 27 respondents would like to know more about the concept of food waste management by playing games with a relevant theme. 19 of them answered that they would be interested in training sessions on food waste management, while 17 of them stated that they would prefer watching videos on the topic. 16 of the students answered that they would like to learn more on food waste management by participating in relevant workshops.

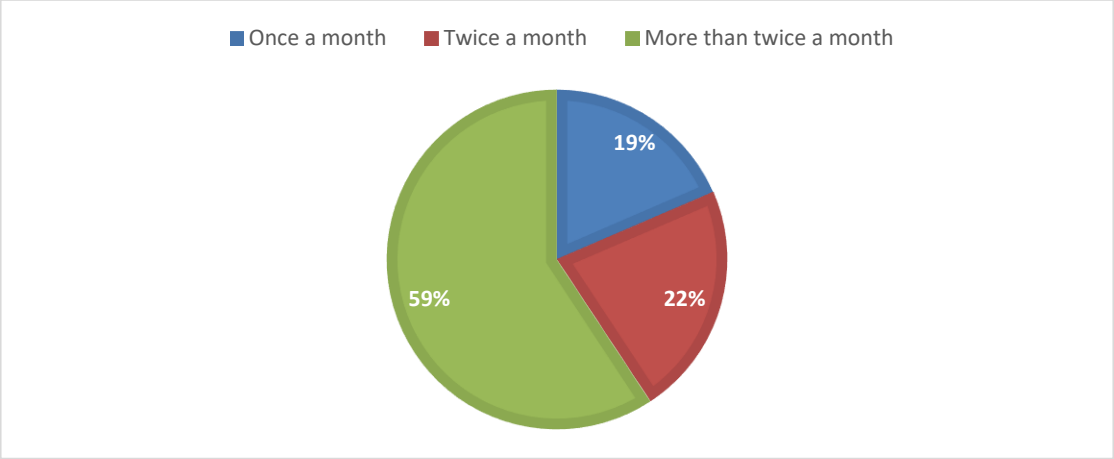
- Which of the ones below do you consider food waste?



Almost all students that completed the questionnaire (26 students) replied that they identify food waste as leftover food that is thrown away in households or restaurants, while 25 of them (92.6%) answered that they consider food that is discarded when it's close to or beyond the best before

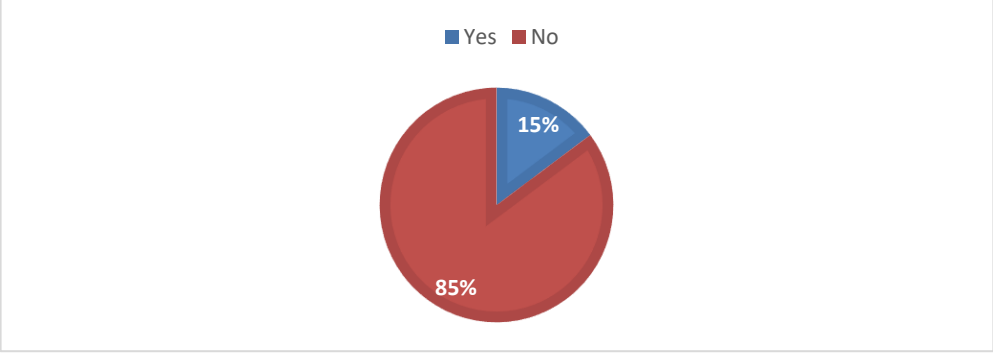
date as food waste. 70.4% of the students responded that they consider expired food as food waste. Finally, only 33.3% of the respondents seem to consider leftovers from a meal as food waste.

- Related to the previous question, how often, per month, do you waste food?



According to the responses that were gathered in this question, the majority of the students in Secondary Education (59%) wastes food more than twice per month. Almost 1 out of 5 students stated that they waste food once and twice per month accordingly.

- Have you taken part in any training / activity related to Food Waste Management?

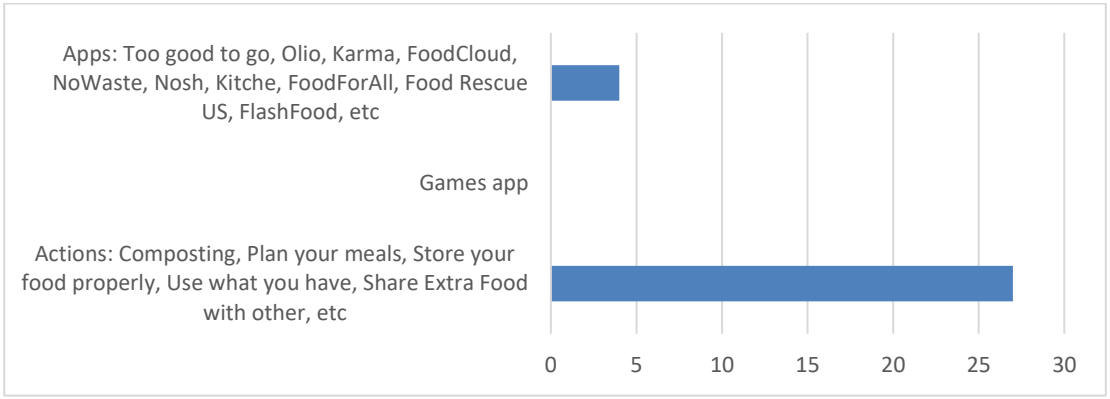


The above pie chart demonstrates that 85% of the students in Secondary Education have never participated in any training or activity related to food waste management. Only 15% of them replied that they have taken part in a relevant training or activity in the past.

- If the answer to the previous question was Yes, please explain how often: only once, on a regular basis (every month/semester)

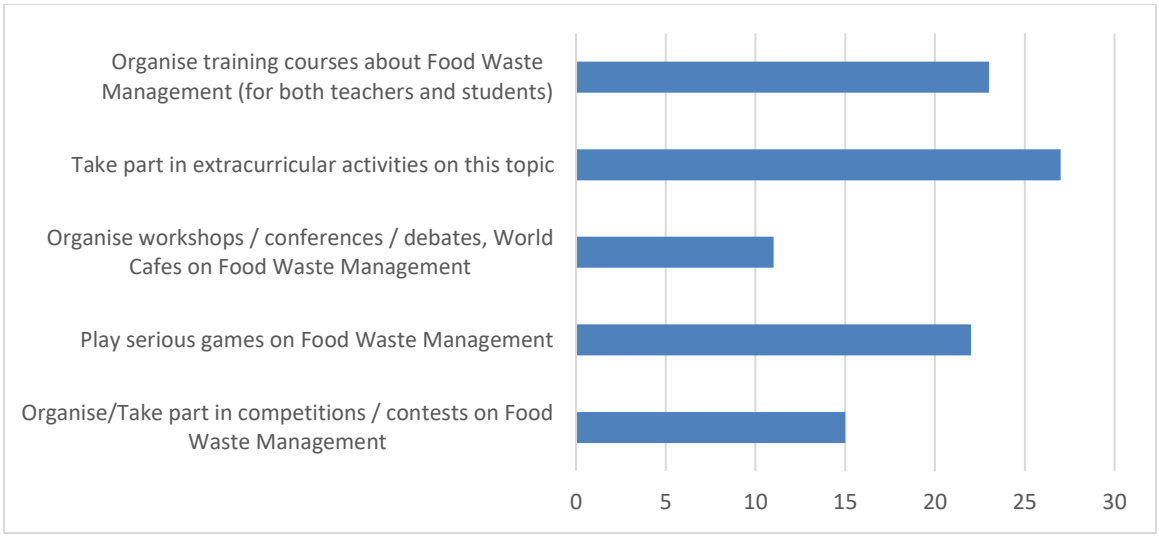
In this sub-question, 2 of the 4 students that claimed to have previous experience with trainings or activities on food waste management replied that they participated in such a training or activity only once, while the other 2 stated that they do so regularly.

- Are you familiar with some of the following actions / games / apps regarding food waste management?



All of the students replied that they are familiar with actions regarding food waste management, while 4 of them claimed that they are familiar with relevant applications. It should be noted that none of the respondents were familiar with food waste management related games.

- What could be done, in your country/community, to reduce /avoid food waste?



As seen in the above graph, all students (100%) replied that taking part in extracurricular activities would help in reducing or avoiding food waste. 23 of the students (85.2%) believe that training courses about food waste management for both teachers and students would be helpful, while

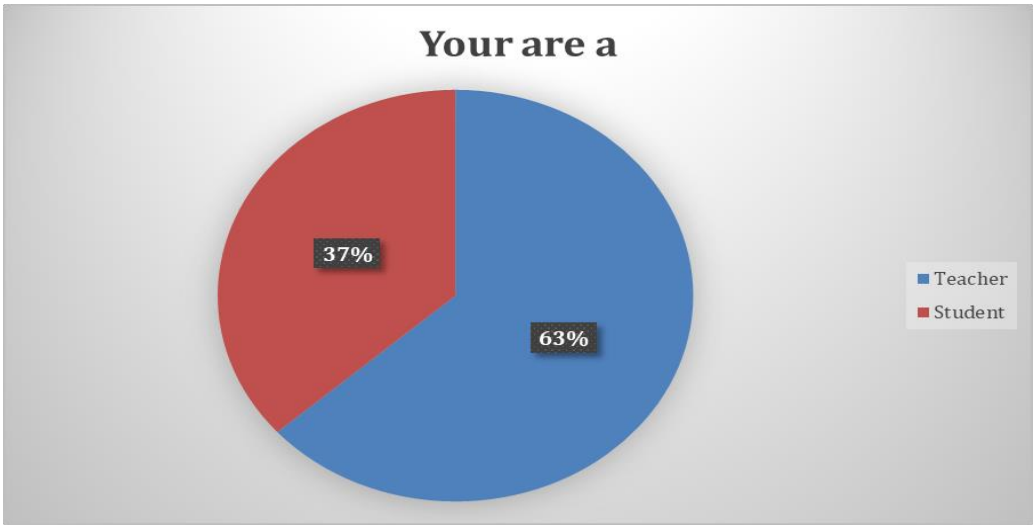
22 of them (81.5%) would consider playing serious games as a helpful measure. 15 of them chose organizing and taking part in contests related to food waste management, while 11 of them believe that relevant workshops / conferences / debates or World Cafes could help in reducing or avoiding food waste.

Petit Pas Aps - Italy

3.1. Teachers' responses

To conduct the desk research, in May 2022 Petit Pas during an event organized in a secondary local school submitted to the participants the questionnaire "Field Research Questionnaire - Project Result 1" to collect suggestions for actions to improve the current situation of food waste, the level understanding on food waste and food waste management concepts and food waste practices/habits. Thanks to the questionnaire it was also possible to investigate if the respondents had the opportunity to take part in trainings or activities on food waste management.

Of the **41 answers** collected, **15 respondents were teachers**, for which the questionnaire included two specific questions addressed only to them to collect preferences regarding the contents and methodology of a possible training course on food waste management. Below are the data collected from the teachers' answers:



Out of 41 answers collected, 15 teachers (36,6%) completed the questionnaire.

3 teachers declare that they are not aware of the food waste management concept, the other 12 teacher respondents declared to know it instead.

To the question "what do you mean for food waste management" the majority of teachers responded:

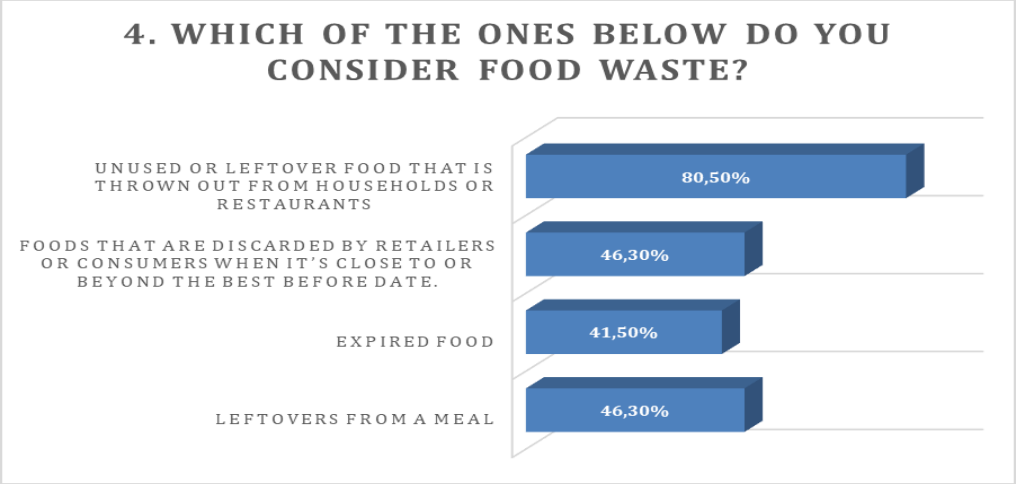
- *avoid food waste*

but also

- *differentiate food types appropriately*
- *Reuse of food for charitable purposes*

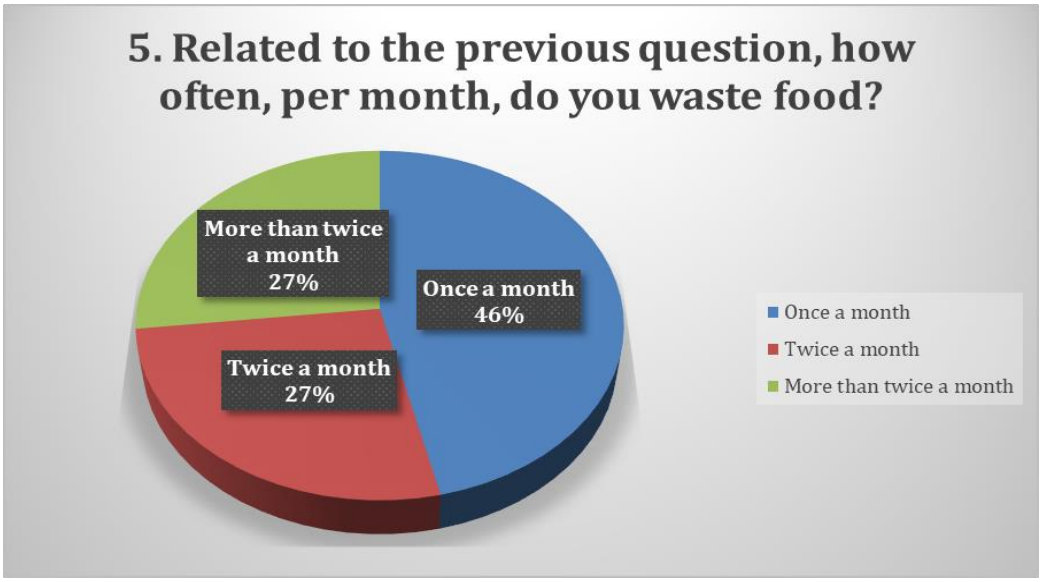
Teachers stated that the preferred way to receive information on food waste would be via

- Video
- Game/app



To the question which of the following do you consider food waste teachers answered

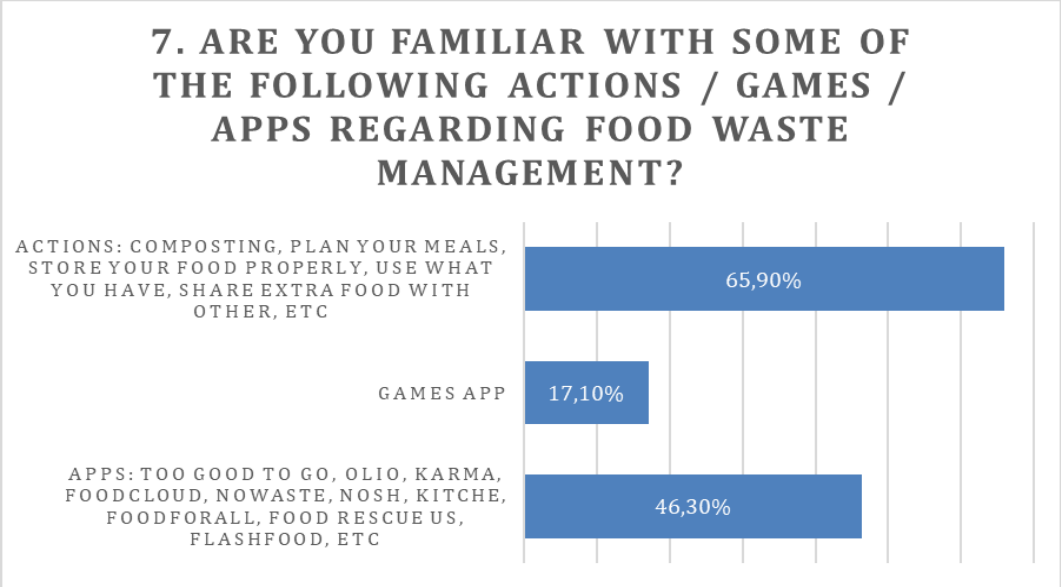
- *expired food, unused or leftover food that is thrown away by families or restaurants*
- *leftovers from a meal*



When asked how many times a month do you waste food, the majority of teachers said

- *more than twice a month*

100% of the teachers interviewed replied that they had never participated in any training / activity related to food waste management

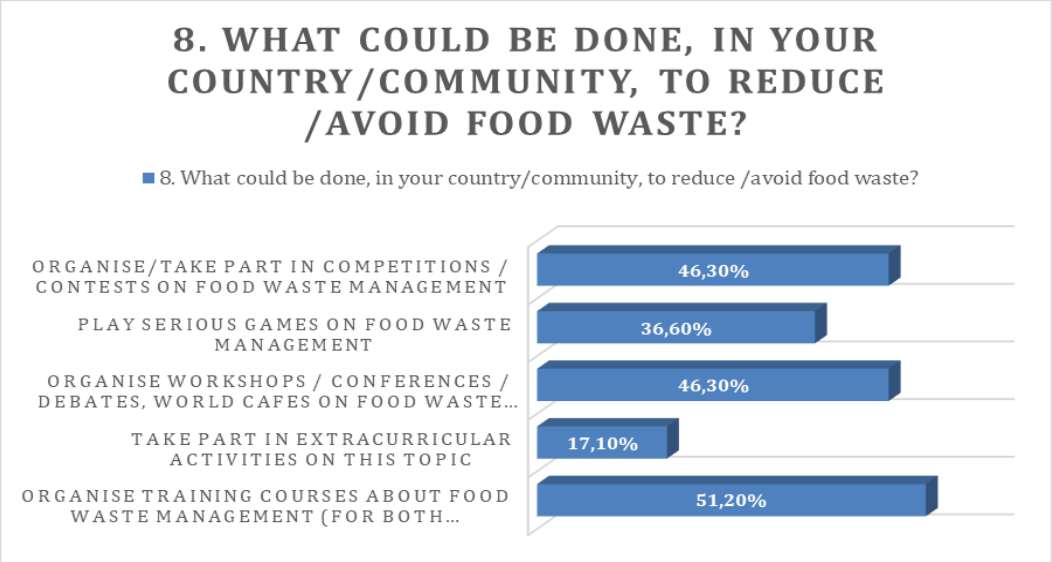


60% of teachers replied that they were more aware of actions aimed at reducing food waste

- *compost, plan meals, properly store food, use what you have, share extra food with others, etc.*

while the remaining 40% also replied

- *Apps: Too good to go, Olio, Karma, FoodCloud, NoWaste, Nosh, Kitchen, Food For All, Food Rescue US, FlashFood, etc*

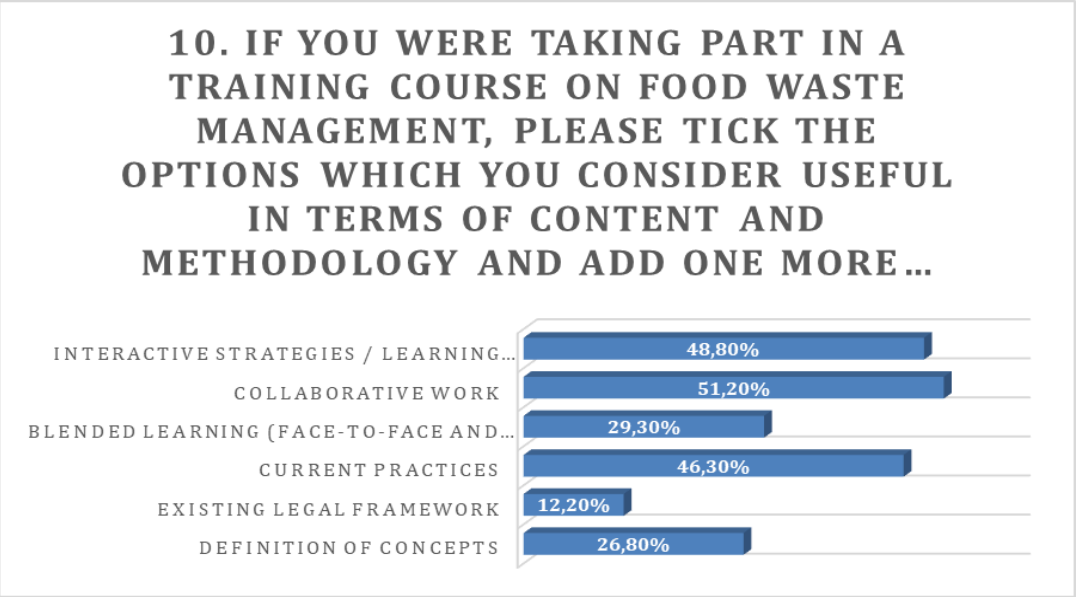


The majority of responding teachers answered the question what could be done in your country/city to reduce or avoid food waste

- *Organize training courses on Food Waste Management (for teachers and students),*
- *Organize workshops / conferences / debates, World Cafes where we talk about food waste*

The field research questionnaire also included two questions addressed exclusively to teachers who were asked what are the 3 most important needs to be addressed in the fight against food waste. Here are some of the answers collected:

- *Awareness and dissemination of information on what food waste is. Indicate ways to combat food waste. Organize activities / workshops to allow everyone to approach the topic*
- *Conscious purchase, conservation techniques, and training on actions to combat waste*
- *advertising and media to raise awareness among young people about food waste*
  workshops to understand how to reuse food waste to the maximum.
  Create games to learn and maybe pay people who recycle food well or reuse it, donate to those who need it most.
- *Know the legislation governing waste management; raise awareness among families and young people on the subject*
- *Information/ Action / Awareness raising*



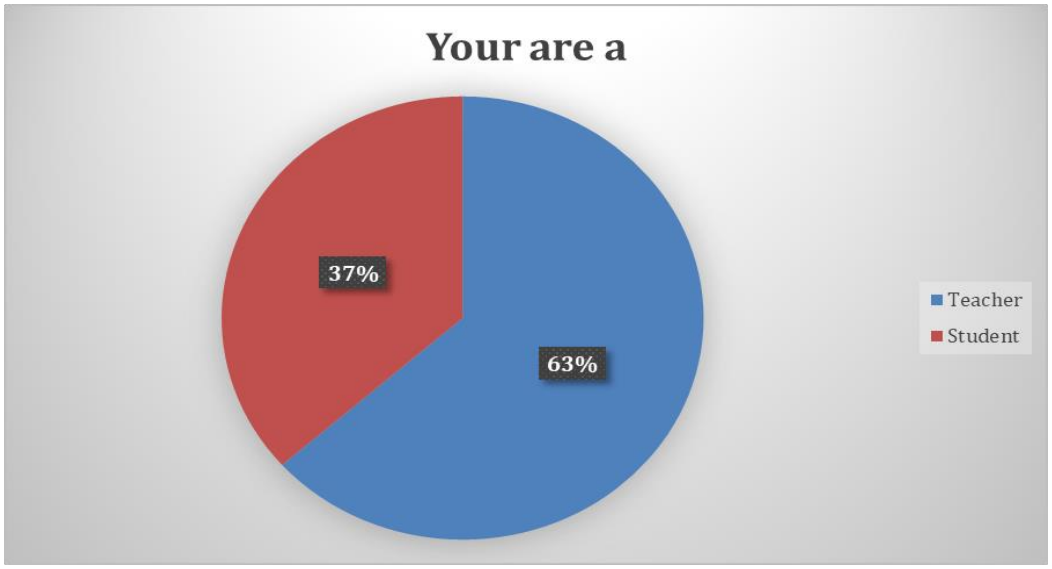
As useful suggestions in terms of CONTENT and METHODOLOGY on a Course on Food Waste Management, the teachers indicated:

- *Current practices, Blended learning (online and face-to-face), Interactive strategies / learning tools*

3.2. Students' responses

To conduct the desk research, in May 2022 Petit Pas during an event organized in a secondary local school submitted to the participants the questionnaire "Field Research Questionnaire - Project Result 1" to collect suggestions for actions to improve the current situation of food waste, the level understanding on food waste and food waste management concepts and food waste practices/habits. Thanks to the questionnaire it was also possible to investigate if the respondents had the opportunity to take part in trainings or activities **on food waste management**.

Of the **41 answers** collected, **26 respondents were students**. Below are the data collected from the students' answers:



Out of 41 answers collected, 26 students (63.4,%) completed the questionnaire.

70% of students declared in the survey that they are familiar with the concept of food waste management

When asked what is meant by food waste management, the majority of students replied

- *recycling*
- *knowing how to better manage food waste*

Students stated that the preferred way to learn more about food waste is through

- *Games / App, Laboratories*

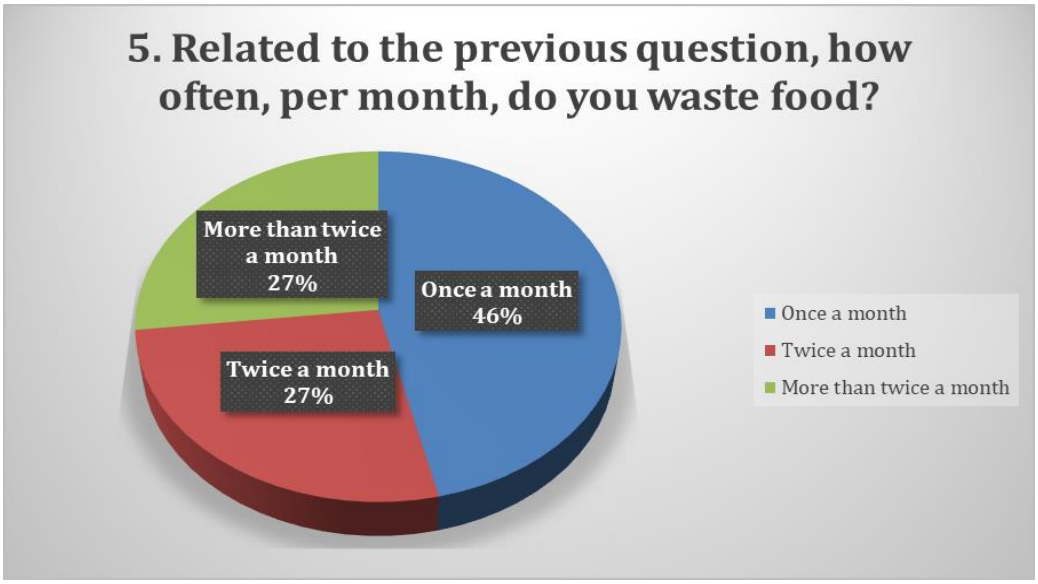
a small percentage also mentioned

- *lessons in school and workshops*

The majority of responding students stated that they consider food waste

- *Leftovers from a meal, Expired food, Food that is discarded by retailers or consumers when the expiration date approaches or passes.*

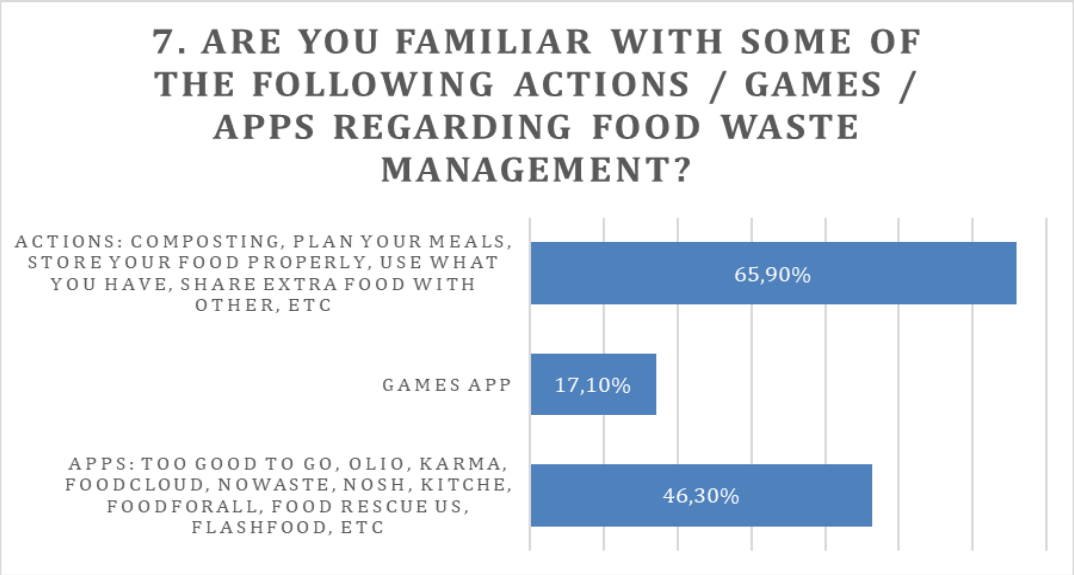
- *Unused or leftover food that is thrown away by families or restaurants*



The majority of responding students stated that on average they waste food with a frequency of

- *once a month*

90% of the students have never participated in any training / activity related to Food Waste Management



Regarding the possible tools to manage the issue of food waste, *Actions: composting, planning meals, storing food correctly, using what you have, sharing extra food with others, etc.* prevail over the knowledge of *Apps: Too good to go, Olio , Karma, FoodCloud, NoWaste, Nosh, Kitchen, Food For All, Food Rescue US, FlashFood, etc*, albeit slightly

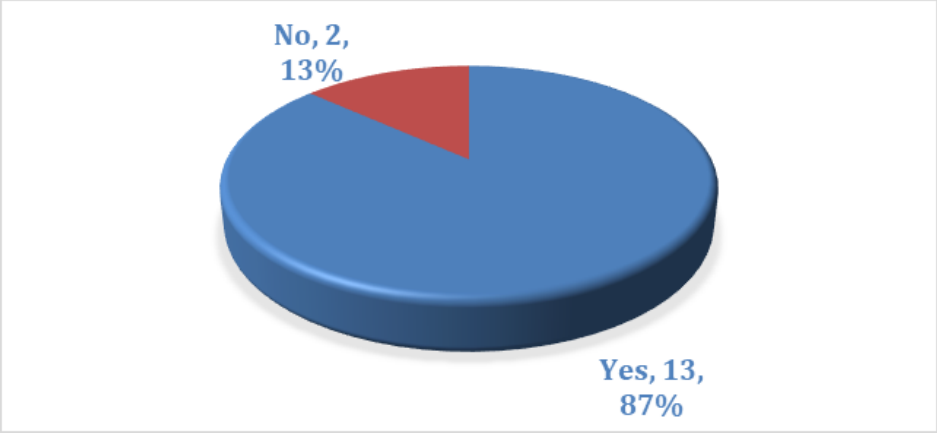
According to the students' responses, the measures to be taken in their own country to reduce or avoid food waste are

- *Organize training courses on Food Waste Management (for teachers and students)*
- *Organize workshops / conferences / debates, World Cafes where we talk about waste*

Liceul Teoretic "Marin Preda" - Romania

3.1. Teachers' responses

1. Do you know what food waste management is?

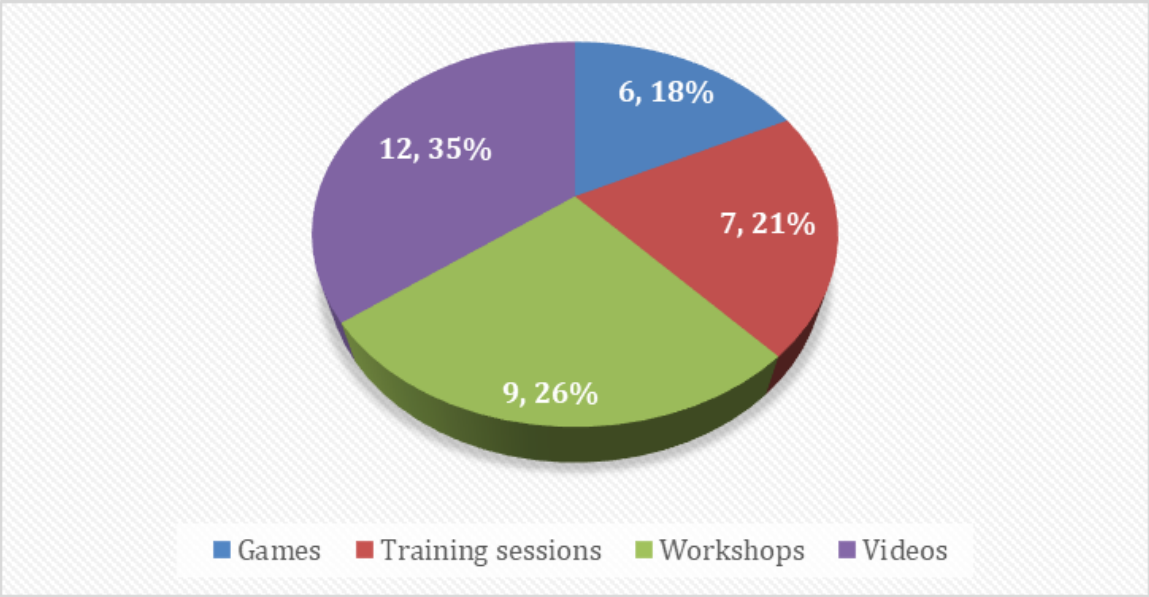


According to the answers provided, most teachers (87%) believe they have a good understanding of food waste management.

2. What do you understand by *food waste management*?

When we wanted to find out what they thought food waste management is, the answers were quite varied: *education about collecting, transportation, treatment, recycling and storage of waste; better education regarding waste and identification of solutions for reuse of natural resources; sorting garbage on categories in order to reduce pollution; creating an organized system through which food waste is eliminated; a set of actions which will lead to limited amount of food waste; creation of organizations which are responsible for collecting food waste*.

3. How would you like to find out more about food waste management?

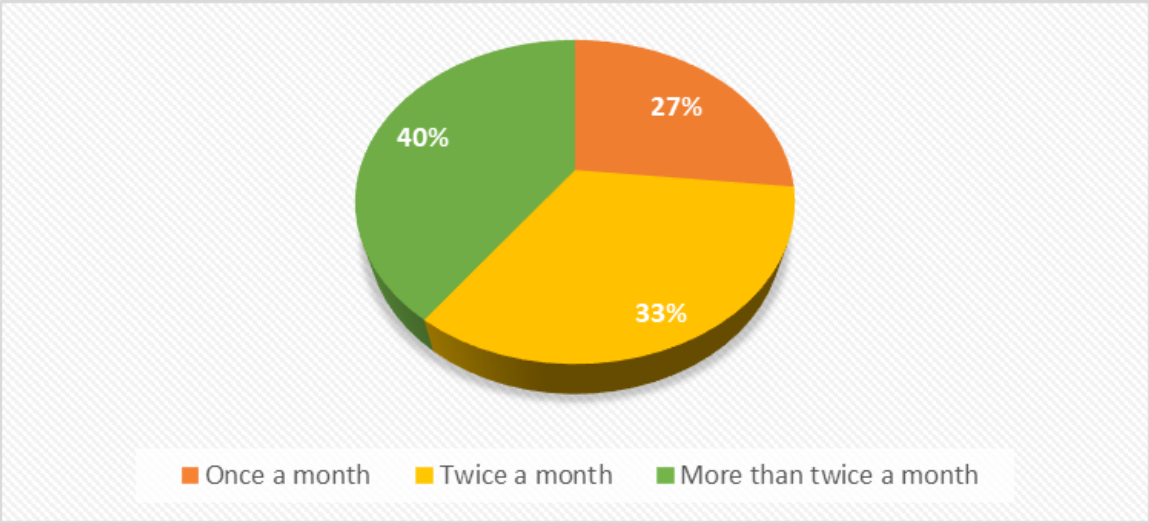


Regarding teachers' preferences in terms of means to gain more knowledge about food waste management, as can be seen in the diagram, their answers were quite balanced, with a slightly higher interest in video materials.

4. Which of the ones below do you consider food waste?

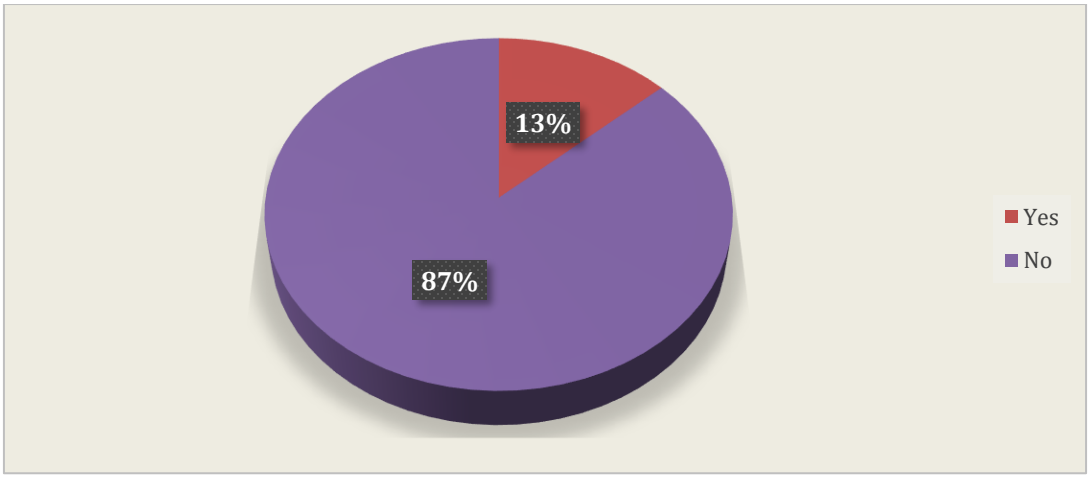
A small number of teachers consider leftovers from meals and expired products as waste food, but the majority of them include unused or leftover food that is thrown out from households or restaurants into this category.

5. Related to the previous question, how often, per month, do you waste food?



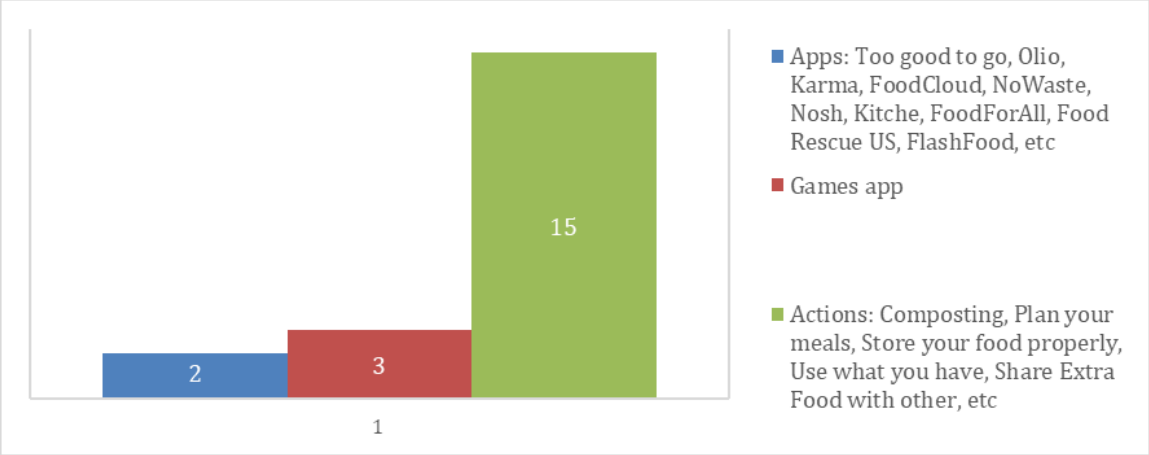
The highest percentage belongs to respondents who waste food more than twice a month, whereas the number of those who do this rarely is small.

6. Have you taken part in any training / activity related to Food Waste Management?



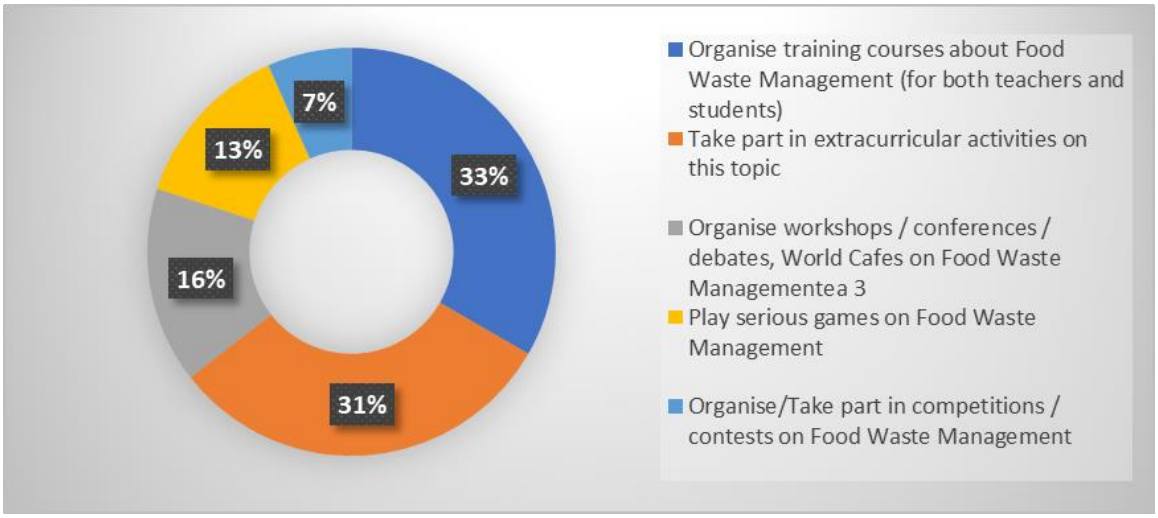
Most of the teachers taking part in the survey (13) have not attended any activity/training sessions related to Food waste management, only 2 of them have benefitted from such courses, **once only**.

7. Are you familiar with some of the following actions / games / apps regarding food waste management?



All participating teachers declared that they are familiar with actions that contribute to reducing food waste such as: Composting, Plan your meals, Store your food properly, Use what you have, Share Extra Food with others.

8. What could be done, in your country/community, to reduce /avoid food waste?



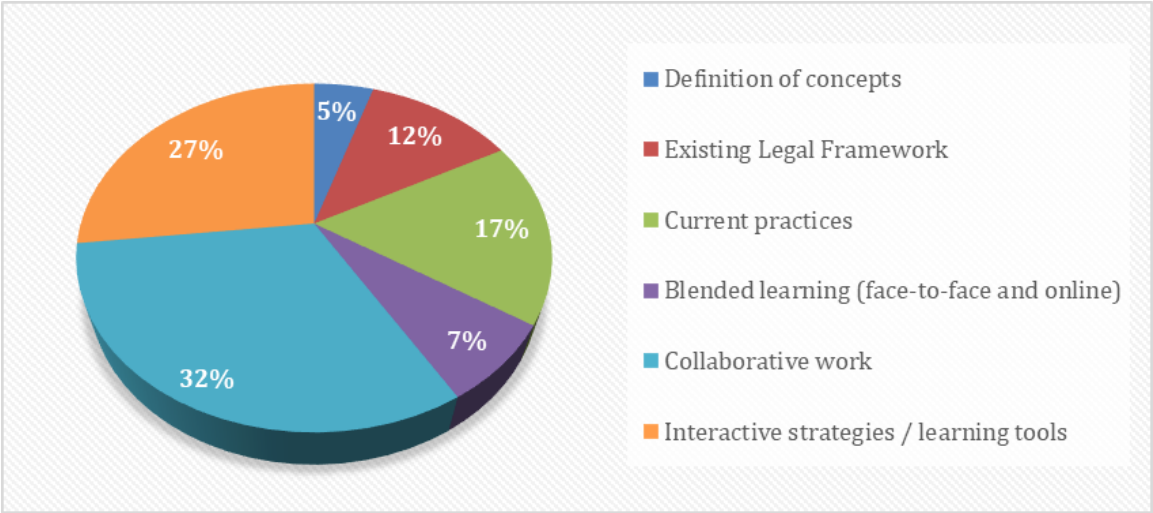
Teachers participating in the questionnaire consider the organization of training courses about Food Waste Management as well as of extracurricular activities equally important, as measures to combat food waste management. In teachers' opinion, the least effective way to avoid food waste is the organization / participation in contests on this topic.

9. Please mention your top 3 most important/stringent needs in the fight against Food Waste (for example, to know more about Food Waste Management or to get involved in activities aimed at raising awareness about Food Waste Management).

Here are some of the Romanian teacher's answers to this question:

- *the need to develop a conscious behavior of not buying more food products than is needed;*
- *donating excess products to people in need;*
- *involvement in activities to raise awareness of this phenomenon;*
- *information and popularization of the school population regarding the selective collection of waste;*
- *responsible purchase of food, use of biodegradable packaging, selection of waste;*
- *courses/ activities aimed at raising awareness, symposia on how to teach others, but also myself about food waste management.*

10. If you were taking part in a training course on Food Waste Management, please tick the options which you consider useful in terms of CONTENT and METHODOLOGY and Add ONE more option of your own.



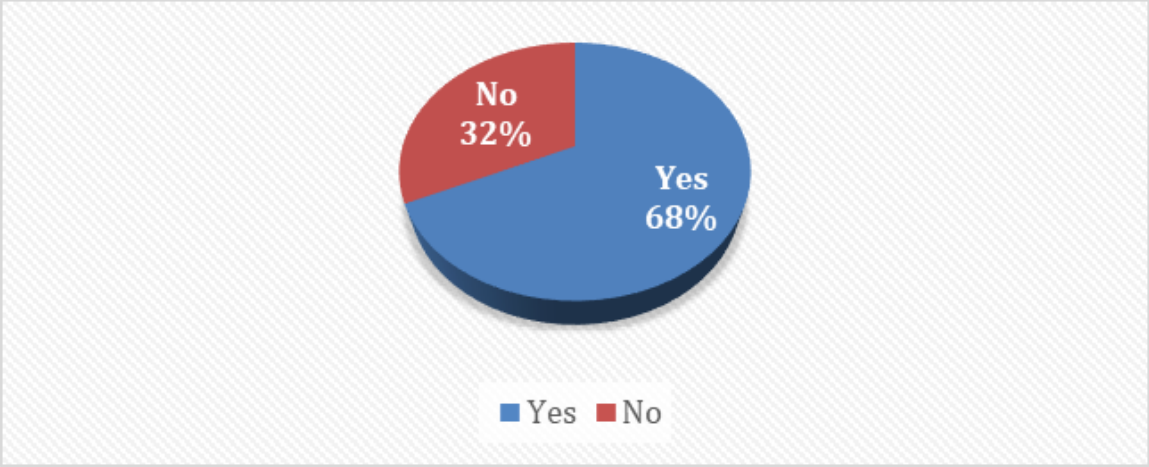
Regarding the organization of a specific training course on Food Waste Management, teachers in Romania prefer to receive information on current practices that have proven efficient in the fight against this problem, and they would appreciate training sessions in which the accent is placed on collaborative work.

As a conclusion, we can say that Romanian teachers have some information regarding Food Waste management; however, from their responses, it can be inferred that their knowledge regarding this issue is not solid or in-depth. At the same time, they do get involved in sporadic extracurricular

activities to raise awareness among students regarding the impact of food waste on our lives and on the environment; yet, they are willing to get involved in more organized and systematic initiatives aimed at maximizing the impact of their efforts and they are interested in receiving further training, especially if it includes collaborative, interactive activities.

3.2. Students' responses

1. Do you know what food waste management is?



According to the diagram, nearly two thirds of the students taking part in the survey are familiar with the issue of food waste management.

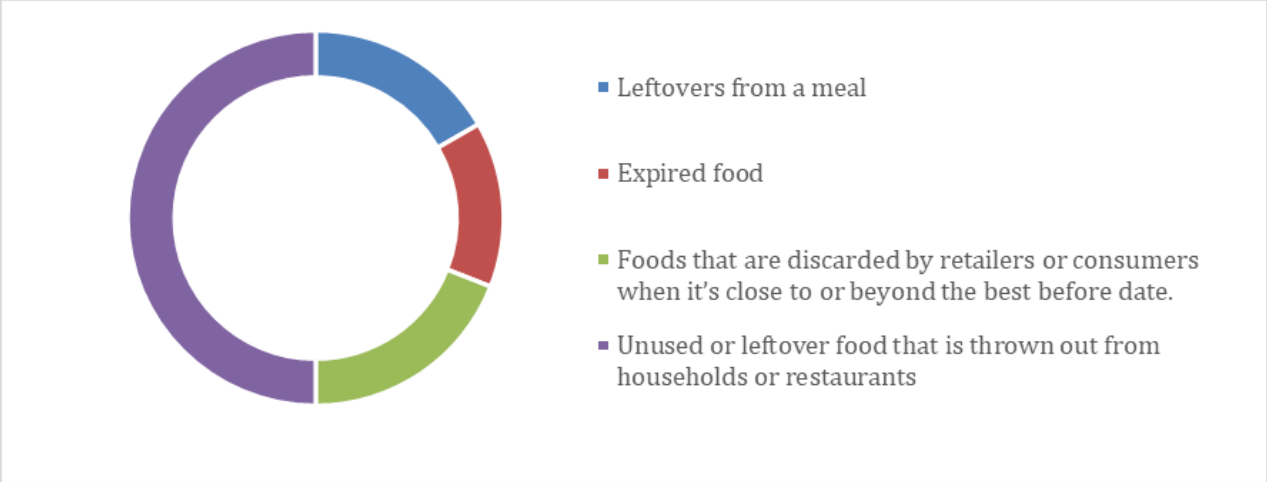
2. What do you understand by food waste management?

When we wanted to find out what they thought food waste management is, many of the answers referred to: *sorting household garbage, managing leftovers so as to avoid food waste, collecting, recycling and storage of food waste, proper disposal of wrapping materials, appropriate planning of food supplies, controlling food waste*.

3. How would you like to find out more about food waste management?

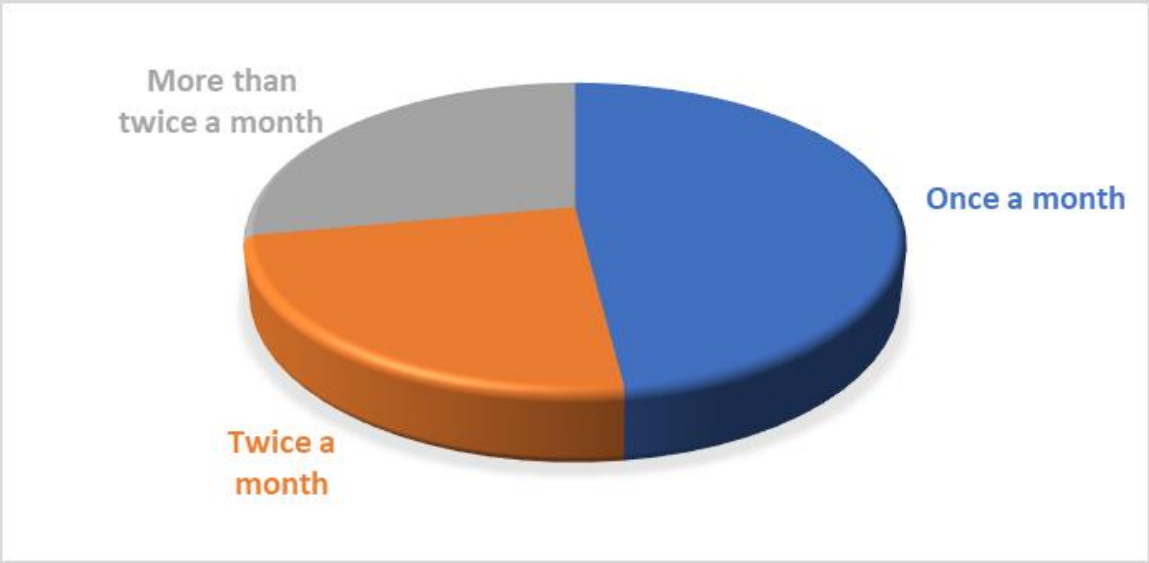
Just like in the teachers' case, students also prefer videos as a means to develop their knowledge in food waste management, but their second option is games, as opposed to the teachers' orientation towards training sessions.

4. Which of the ones below do you consider food waste?



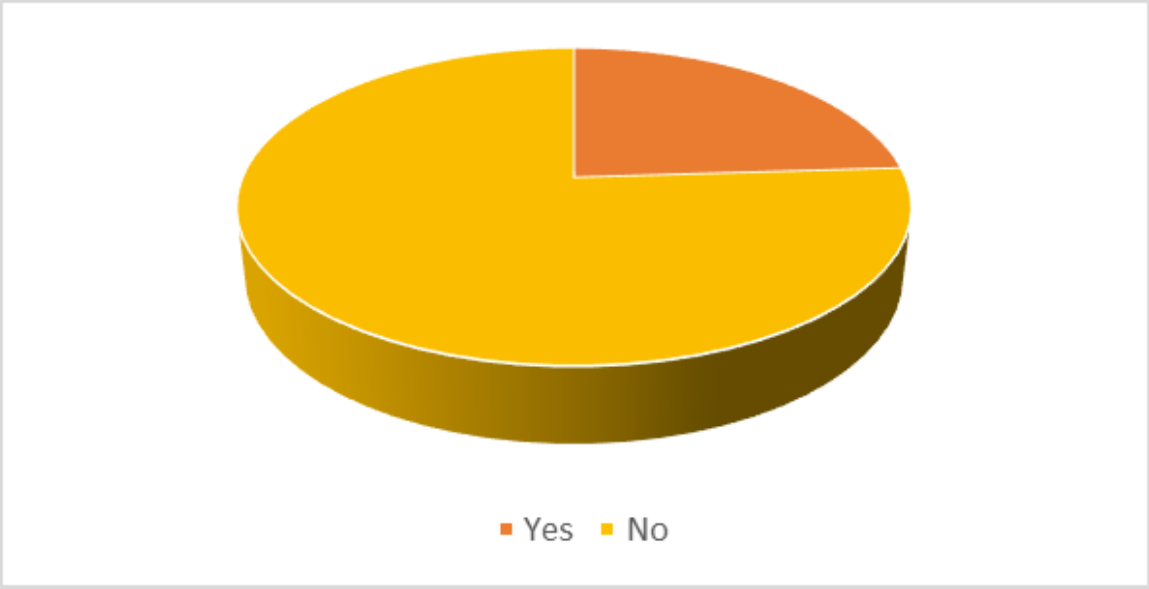
Again, the students' answers are similar to the teachers', when it comes to their perception of what can be considered food waste, more than half of them ranking unused or leftover food that is thrown out from households or restaurants into this category.

5. Related to the previous question, how often, per month, do you waste food?



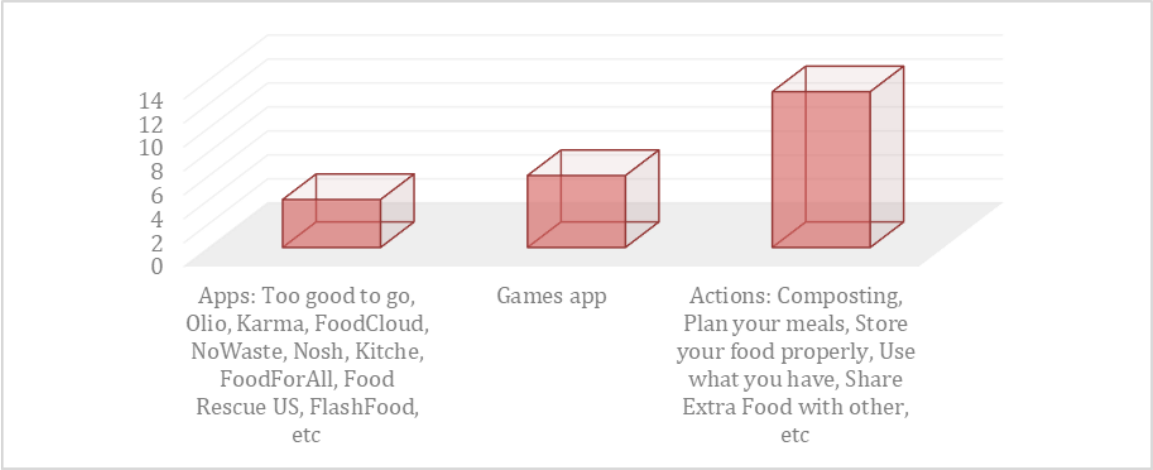
Unlike teachers, 12 students state that they throw away food once a month, which means that approximately half of the younger respondents throw food on more occasions.

6. Have you taken part in any training / activity related to Food Waste Management?



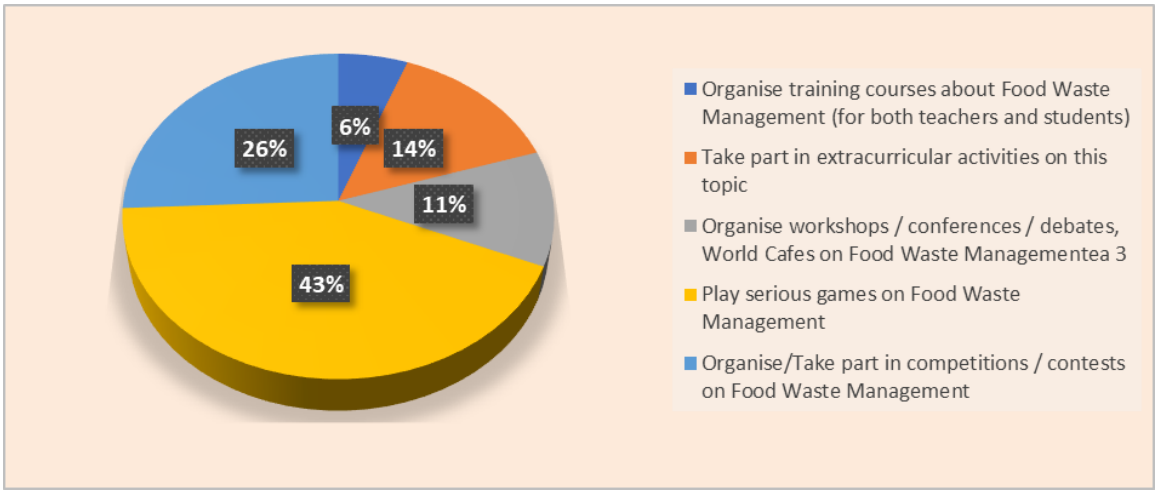
According to the diagram, only one third of the students admitted that they have been involved in some kind of activity aimed at reducing food waste.

7. Are you familiar with some of the following actions / games / apps regarding food waste management?



There is a similarity between the teachers' and the students' answers regarding actions that contribute to reducing food waste, namely they both are familiar with composting, planning their meals, storing food properly, using what they have, sharing Extra Food with others.

8. What could be done, in your country/community, to reduce /avoid food waste?

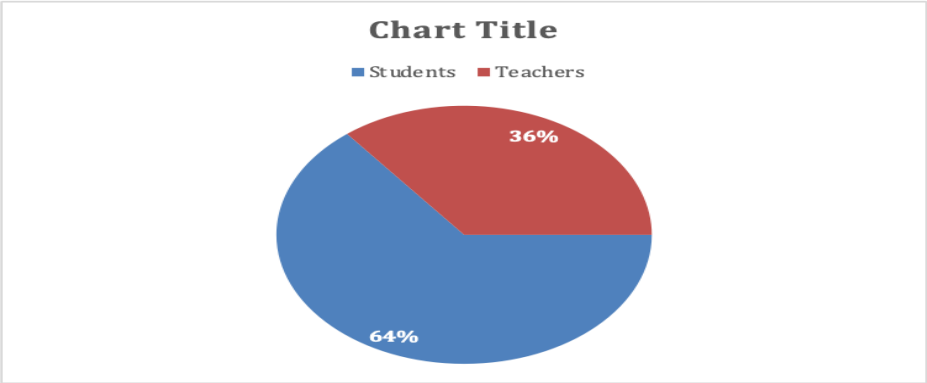


Based on the answers to this question, the young generation considers that serious, educational games are the best way to produce a change in the community in terms of food waste.

To conclude, not only teachers but also students in Romania express and manifest a wish to be involved in activities that will contribute, to a high extent, to the reduction of food waste. They are also aware that it is necessary for the whole community to show an attitude of respect towards natural resources and believe that non formal tools such as interactive games will have the expected impact.

GEINNOVA - Spain

In the context of the field research, 42 responses were gathered in total. All of the respondents live in Spain.

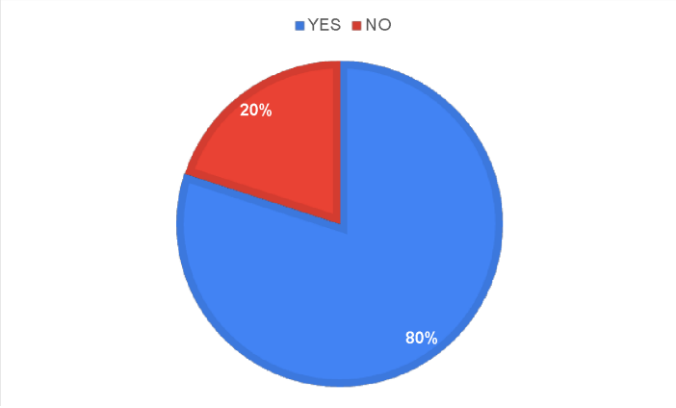


64% of the respondents were students and 36% of them were teachers.

More specifically, 27 students and 15 professors in Secondary Education answered the questionnaire submitted to investigate their conception and habits about food waste and food waste management.

3.1. Teachers' responses

1. Do you know what food waste management is?



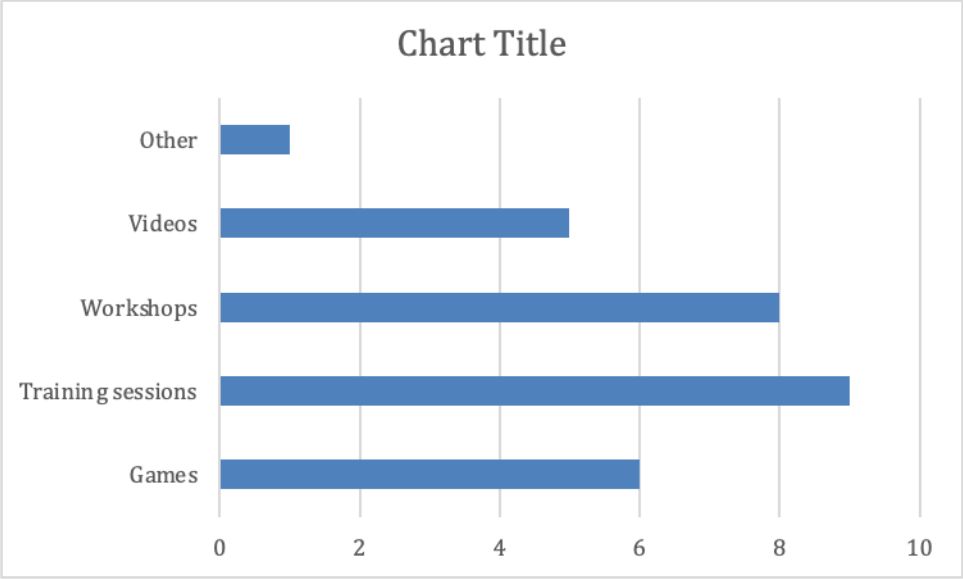
In this question, 12 teachers (80%) replied that they are familiar with the food waste management concept. 3 of them (20%) stated that they do not know what food waste management is.

2. What do you understand by food waste management?

To the question about what they mean when referring to "food waste management", just one of the respondents answered to not really know what it is, whereas the other respondents provided a definition. Despite this, not all definitions given are correct or exhaustive; some of them consider food waste management just referring to the production of food processes; others only include the reducing food waste in houses or restaurants. 3 definitions which presents some weaknesses but present relevant definitions are:

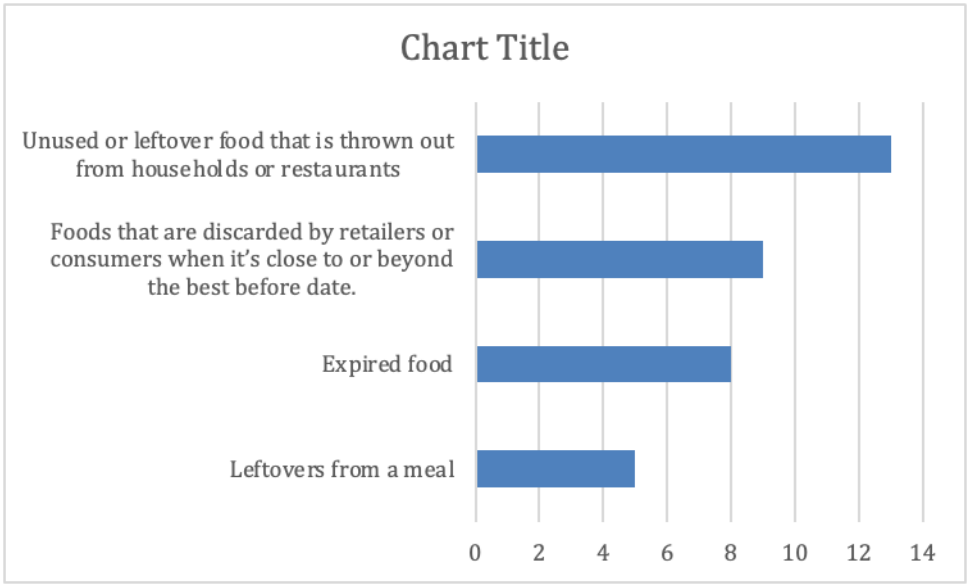
- *The treatment of organic waste from discarded food with the aim of transforming it and reducing its environmental impact by putting it to a new use, e.g. in industrial production.*
- *The correct environmental treatment of the process of production, marketing and consumption of primary sector products.*
- *Treatment of all waste generated in the food production process and after domestic use.*

3. **How would you like to find out more about food waste management?**



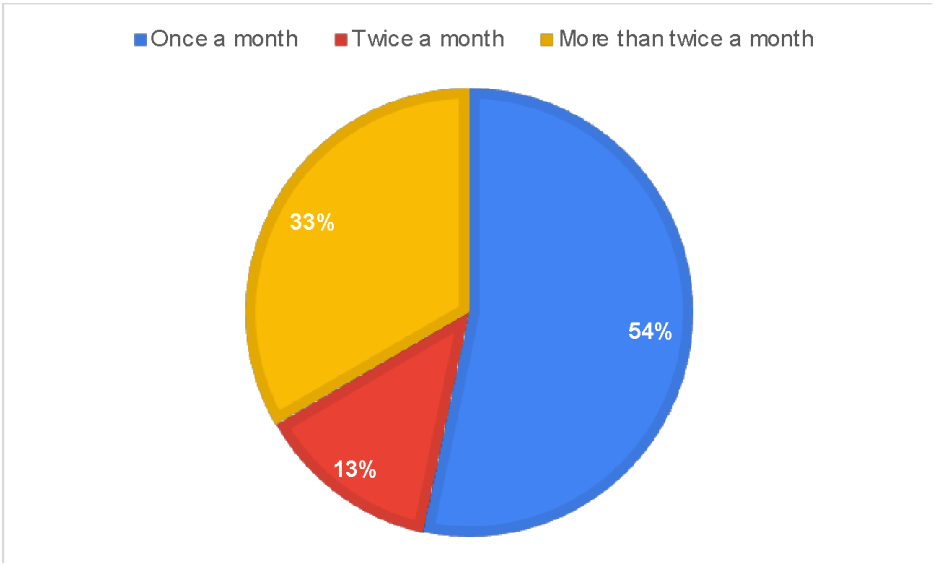
Regarding the modality or tools through which they would prefer to know more about food waste management, the favorite ones are Training sessions and Workshops whereas only 5 people opted for videos.

4. Which of the ones below do you consider food waste?



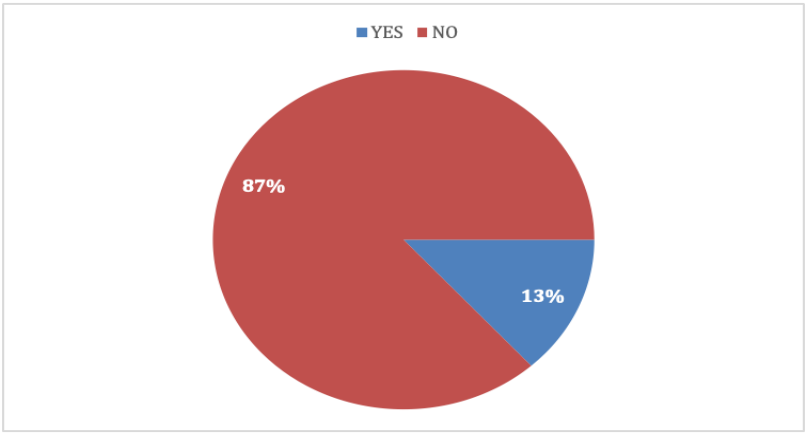
It is interesting to see that what from respondents is considered food waste is mostly "Unused or leftover food thrown away in households or restaurants" (13 teachers) and "Foods that are discarded by retailers or consumers when it's close to or beyond the best before date." (9 teachers), whereas "Leftovers from a meal" has been indicated just 5 times.

5. Related to the previous question, how often, per month, do you waste food?



54% of teachers waste food at least one per month. 5 teachers answered that they waste food more than two times per month, whereas just 2 indicated they waste food twice a month.

6. Have you taken part in any training / activity related to Food Waste Management?

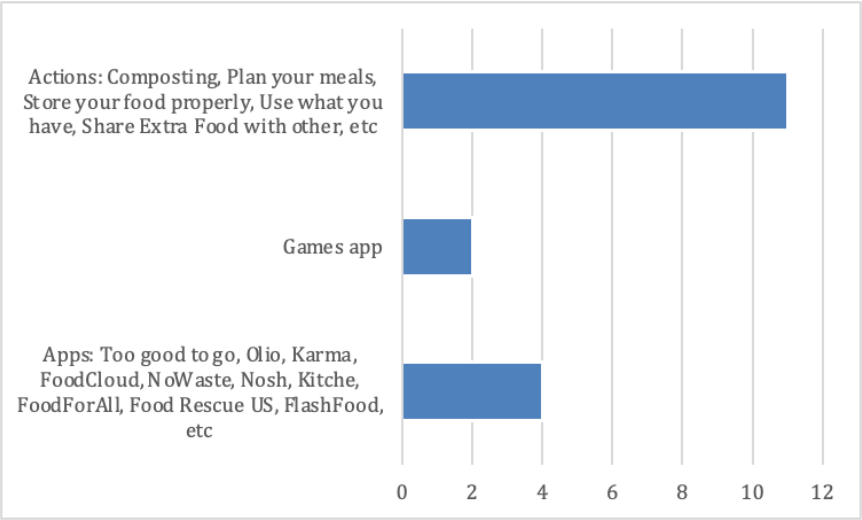


13 out of 15 respondents said they never took part in any training activity about food waste management

7. If the answer to the previous question was Yes, please explain how often: only once, on a regular basis (every month/semester)

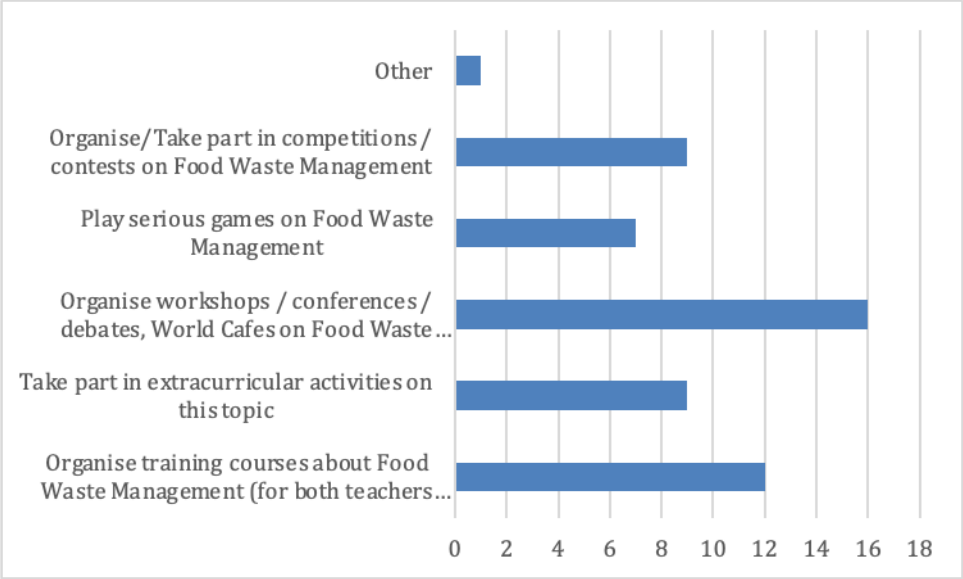
The two of them who answered they had the opportunity to join any training activity, they only got it very few times, just one or two times.

8. Are you familiar with some of the following actions / games / apps regarding food waste management?



11 of the teachers replied that they are familiar with actions regarding food waste management, 4 of them claimed that they are familiar with relevant apps, whereas just 2 of them are familiar with games app related to food waste management

9. What could be done, in your country/community, to reduce /avoid food waste?



The majority points out that training courses for both teachers and students would be the best concrete action to be implemented in Spain to reduce food waste. 6 of them chose workshops / conferences / debates or World Cafes on Food Waste Management. 4 of them answered that they would consider extracurricular activities as a helpful measure, while fewer were the ones that chose serious games on food waste management. One of them added another option which is: “Introduce the issue in the school curriculum as practical content”.

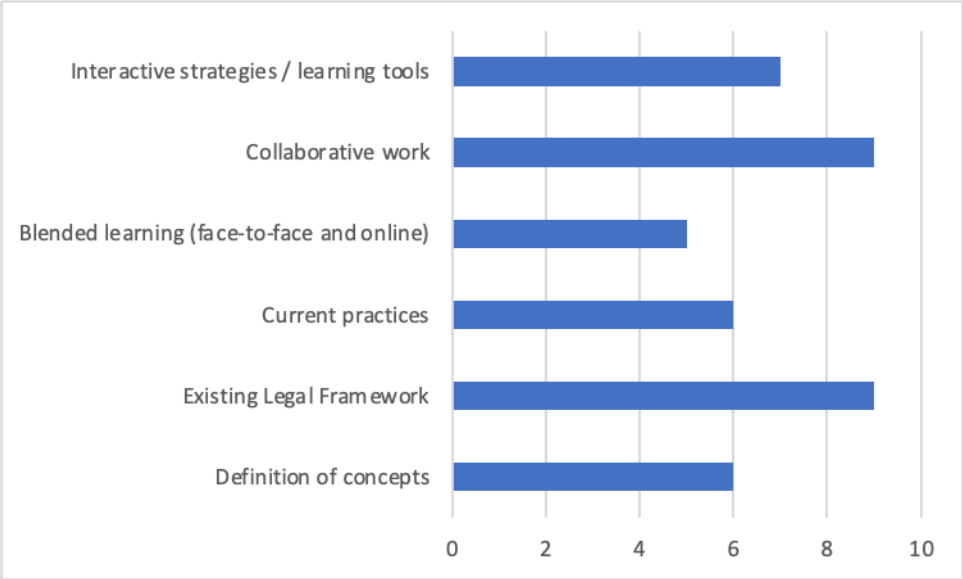
Please mention your top 3 most important/stringent needs in the fight against Food Waste (for example, to know more about Food Waste Management or to get involved in activities aimed at raising awareness about Food Waste Management).

Here are some of the Romanian teacher’s answers to this question:

- What to do with leftover food; Clear techniques to avoid leftovers; How to act in a restaurant to collaborate with the issue.
- Plan classroom activities to raise awareness of food waste management; Conduct awareness campaigns in the media; Promote local or nearby food production to avoid unnecessary transportation.
- Learn more about the topic; conduct workshops with students to raise awareness of the importance and encourage them to use apps such as Too Good To Go to avoid food waste in restaurants, greengrocers, etc.

- Exhaustively control the use and withdrawal of food by large supermarkets and food industries; promote the consumption of seasonal and regional products of vegetable origin (given their lower energy and fuel requirements for their production); encourage education and training in food and cooking from the lowest levels as part of the official curriculum.
- To know more about food management; Having material to share with students; To have a subject to talk about.

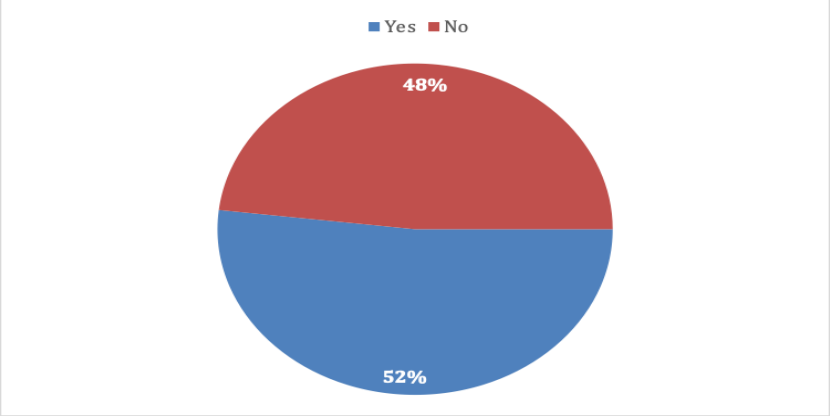
10. If you were taking part in a training course on Food Waste Management, please tick the options which you consider useful in terms of CONTENT and METHODOLOGY and Add ONE more option of your own



In terms of content and methodology for a training course on the matter, the most chosen options have been “Existing Legal Framework” and “Collaborative work”. “Interactive strategies / learning tools” option has been chosen by 7 people, “current practices” option by 6 and the least chosen was “Blended learning” (5 teachers).

3.2. Students’ responses

1. Do you know what food waste management is?



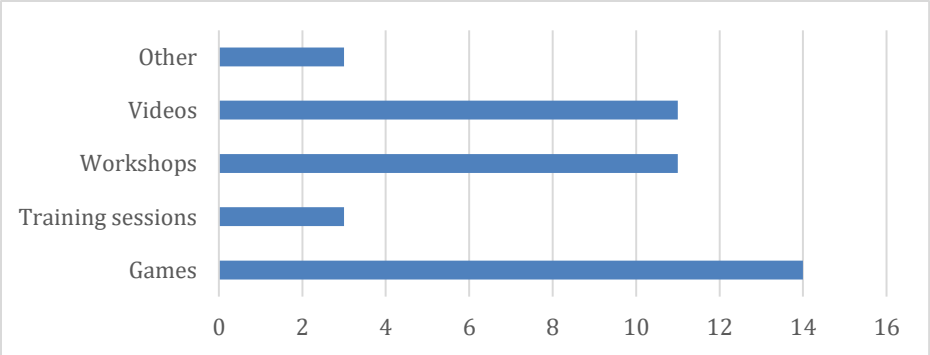
As seen in the pie chart above, 52% of the students (14 students) that completed the questionnaire stated that they are familiar with the food waste management concept. 13 of them (48%) stated that they do not know what food waste management is.

2. What do you understand by food waste management?

Some of the answers have been the following:

- *I understand this issue as the management of food waste worldwide.*
- *Leftover food in restaurants, canteens, etc... How they are managed*
- *What is done with food that can no longer be consumed.*
- *Manage the quantity of food waste and residue*

3. How would you like to find out more about food waste management?

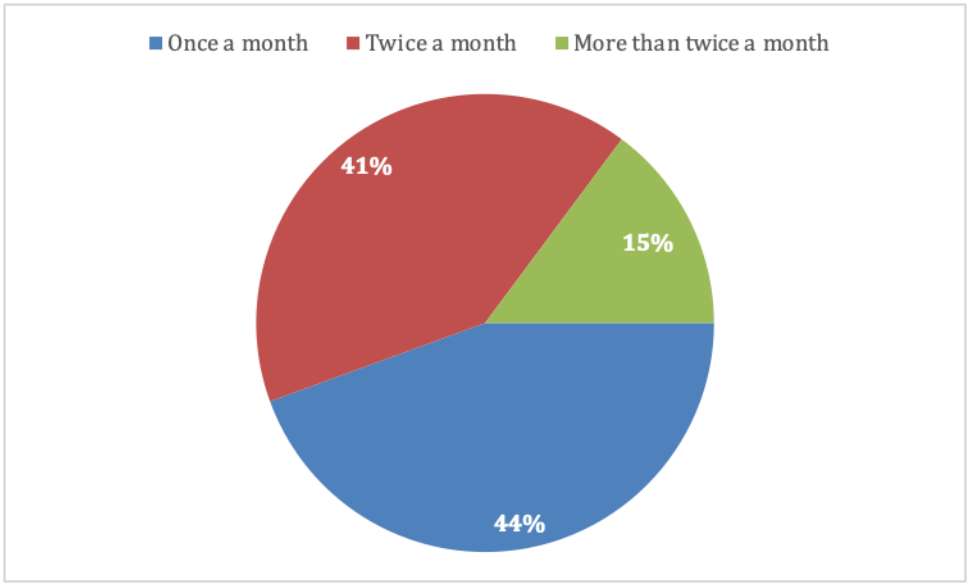


It can be noted that 14 students would like to know more about food waste management playing games related to the theme. The second two most chosen options are videos and workshops. Whereas just 3 of them opted for training sessions on food waste management or would like other options.

4. Which of the ones below do you consider food waste?

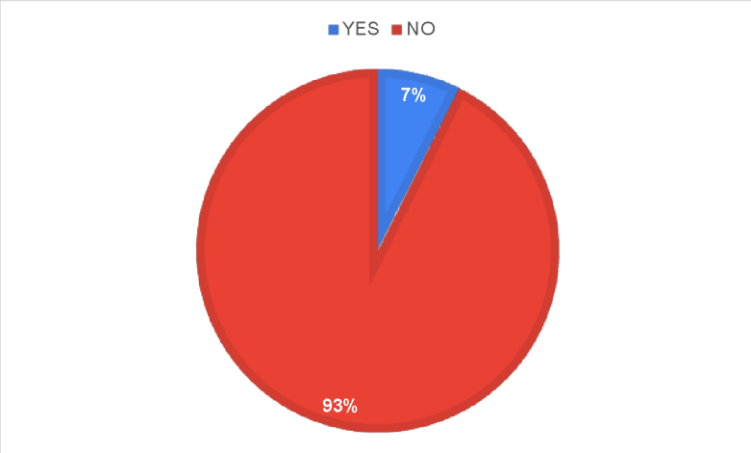
Food waste is mostly identified by students as unused or leftover food that is thrown away in households or restaurants (25 students). The second one considered food waste is food that is discarded when it's close to or beyond the best before date as food waste (13 of students). 11 of them indicated Leftovers from a meal, whereas just 7 of them opted for expired food as food waste.

5. Related to the previous question, how often, per month, do you waste food?



According to the responses that were gathered in this question, the majority of the students in Secondary Education (44%) wastes food more than once a month. 11 of them waste two times per month, whereas just 4 of them answered they waste more than twice a month.

6. Have you taken part in any training / activity related to Food Waste Management?

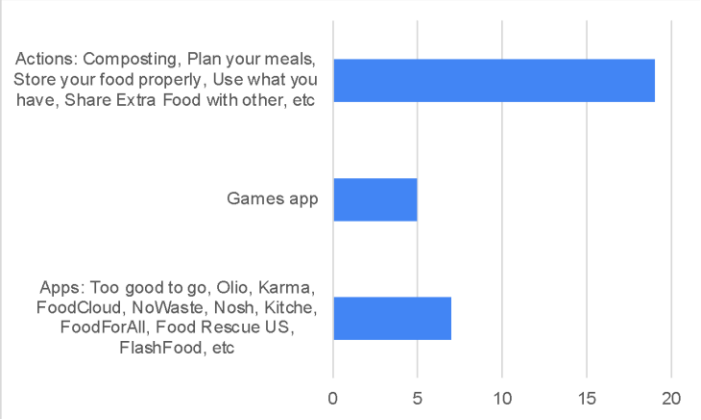


The above pie chart demonstrates that 93% of the students in Secondary Education have never participated in any training or activity related to food waste management. Only 7% (2 students) of them replied that have taken part in a relevant training or activity in the past.

7. If the answer to the previous question was Yes, please explain how often: only once, on a regular basis (every month/semester)

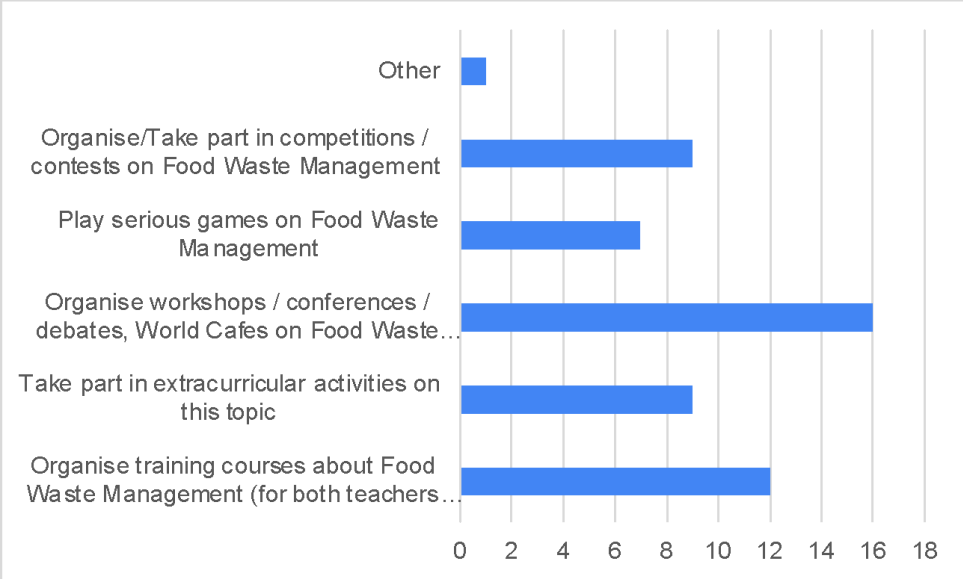
2 students who previously answered they took part in a training or activity related to food waste management replied they participated just once in their life.

8. Are you familiar with some of the following actions / games / apps regarding food waste management?



The majority of students are familiar with actions regarding food waste management (19). 7 of them are aware about apps related to the issue and 5 of them are familiar with games related to food waste management.

9. What could be done, in your country/community, to reduce /avoid food waste?



16 students would like to have workshops/conferences/debates on food waste management. 12 of them also chose for training courses. 9 students reported that also competitions or extracurricular activities may be a helpful measure to know more about the issue. Whereas just 7 students would like to play a serious game on food waste management. It has to be noted that one student suggested another option: the student considers food waste management as something about ethics, so when it's time to throw it in the trash, according to them, it would be useful to have a specific container for it, like the ones used by Caritas.

Geleceğin Eğitimi Derneği - GED - Turkiye

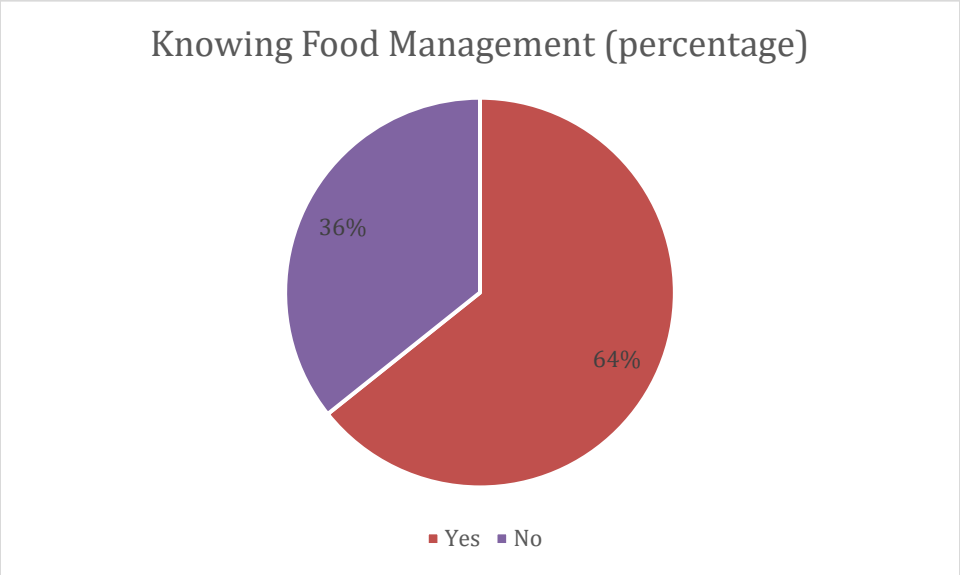
3.1. Teachers' responses

The survey with teachers were applied in May and June 2022 with the participation of 28 teachers from mostly secondary schools in Turkey. The number of schools responded to the questionnaires are 12. The participants were informed about the project aim and its results online through the Google Forms.

Part A. Current situation regarding Food Waste / Food Waste Management

Q1. Do you know what food waste management is?

The teachers who do not have any or have limited knowledge on food waste management is 10 out of 28 which clearly shows the importance of the Zero Waste Project.



Q2. What do you understand by food waste management?

The responds from the teachers are categorized into following topics;

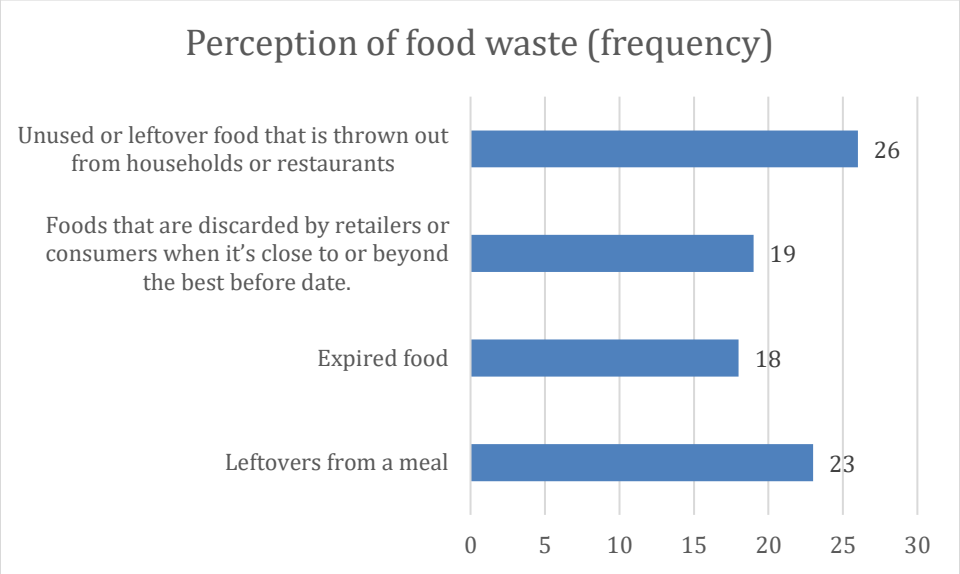
- Distinguishing between reusable waste and non-reusable waste.
- Decreasing the amount of food waste.
- Transforming decayed food or disposed food into valuable product.
- Disposing the wasted food.
- No idea on what food waste management is.

Q3. How would you like to find out more about food waste management?

41% of responders prefer learning more about food waste management via videos. Workshops are the second most preferred way of learning for the teachers.

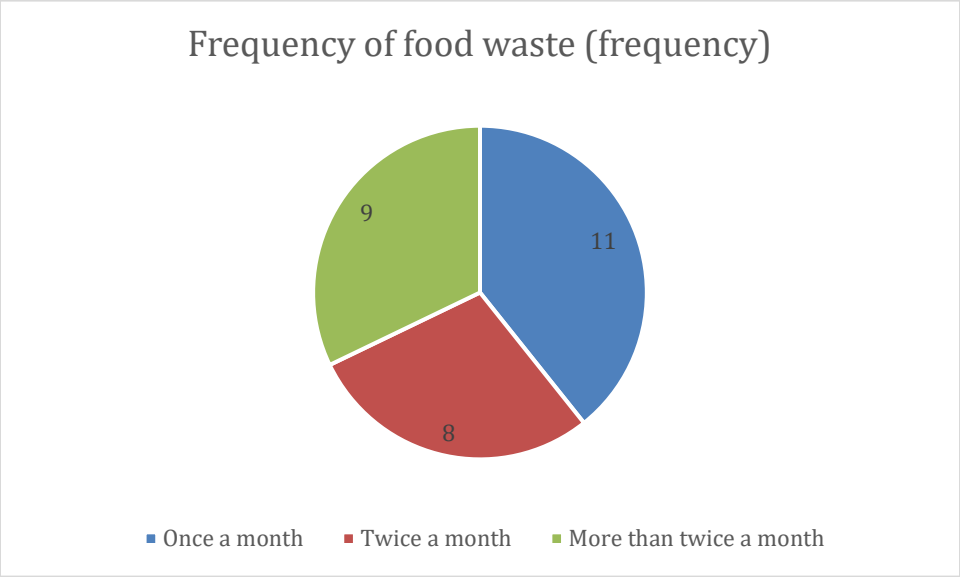
Q4. Which of the ones below do you consider food waste?

Leftovers from meals are regarded as the main food waste with 57%.



Q5. Related to the previous question, how often, per month, do you waste food?

The participants waste food once, twice or more than twice in a month equally.



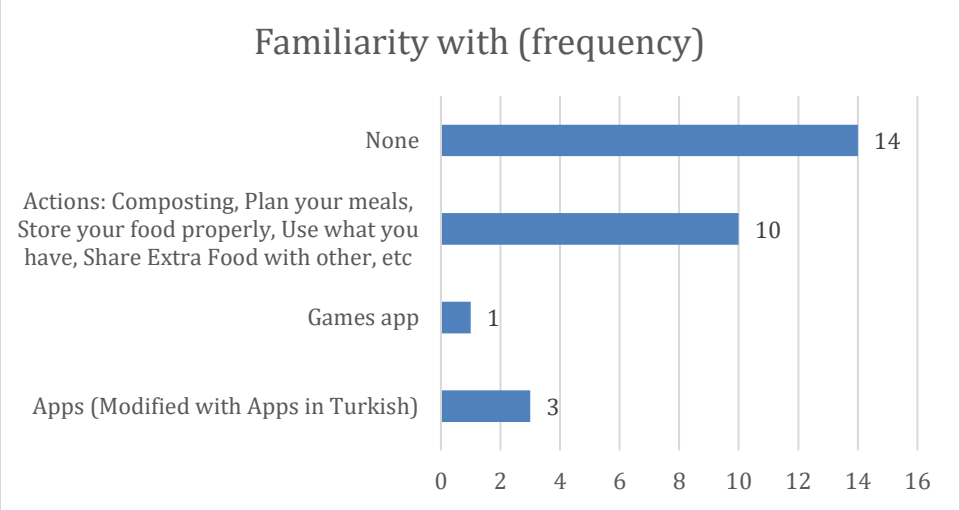
Q6a. Have you taken part in any training / activity related to Food Waste Management?

Only 11% of the teachers who responded in the survey previously took part in training activities before.

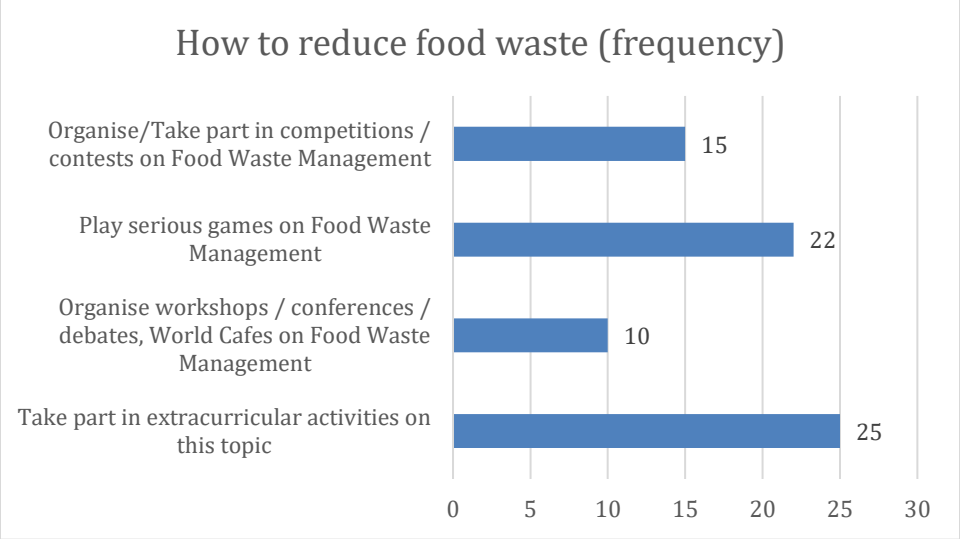
Q6b. If the answer to the previous question was Yes, please explain how often: only once, on a regular basis (every month/semester)

The 3 participants indicated that they took part in related training activities only once.

Q7. Are you familiar with some of the following actions / games / apps regarding food waste management?
Most of the participants are not familiar with actions, Apps or Games related with food waste management in Türkiye.



Q8. What could be done, in your country/community, to reduce /avoid ,food waste?



22 person voted for playing and learning through serious games which is one of the key element of Zero Waste Project.

Part B. Questions only for Teachers

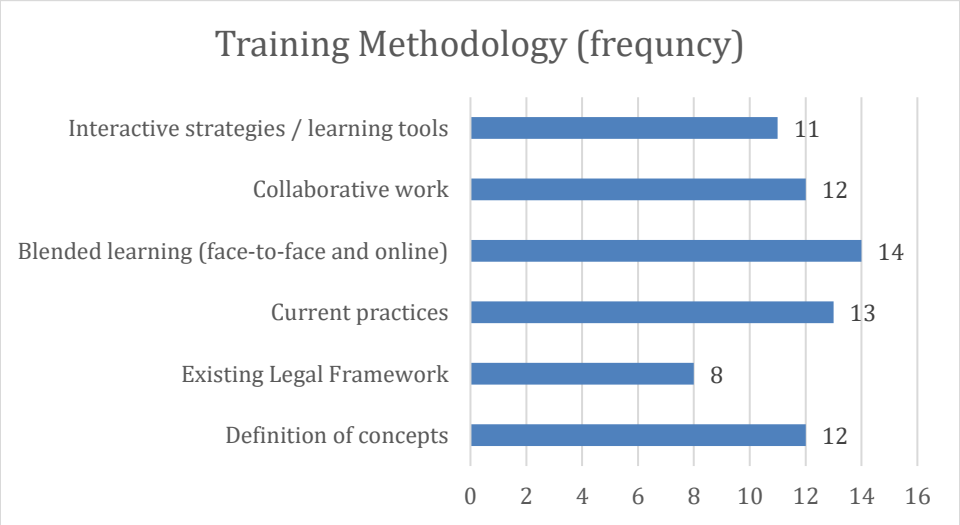
Q9. Please mention your top 3 most important/stringent needs in the fight against Food Waste (for example, to know more about Food Waste Management or to get involved in activities aimed at raising awareness about Food Waste Management)

The response from the teachers are categorized into following topics;

- Awareness raising.
- Obtaining information on food waste management.
- Upskilling against food waste.
- Participating in training events.
- Guidance for home and school application

Q10.If you were taking part in a training course on Food Waste Management, please tick the options which you consider useful in terms of CONTENT and METHODOLOGY and Add ONE more option of your own:

The methodologies that include collaborations and interactions are emphasized by the participants. Also Blended Learning options is highly rated among the participants.



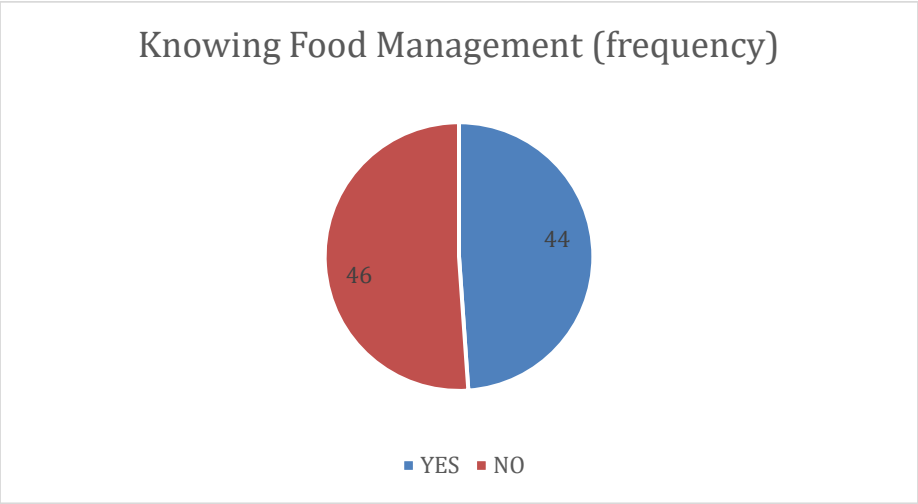
3.2. Students' responses

The survey with students were applied in May and June 2022 with the participation of 90 students from mostly secondary schools in Turkey. The number of schools responded to the questionnaires are 12. The participants were informed about the project aim and its results online through the Google Forms.

Part A. Current situation regarding Food Waste / Food Waste Management

Q1. Do you know what food waste management is?

Half of the students know about food management.



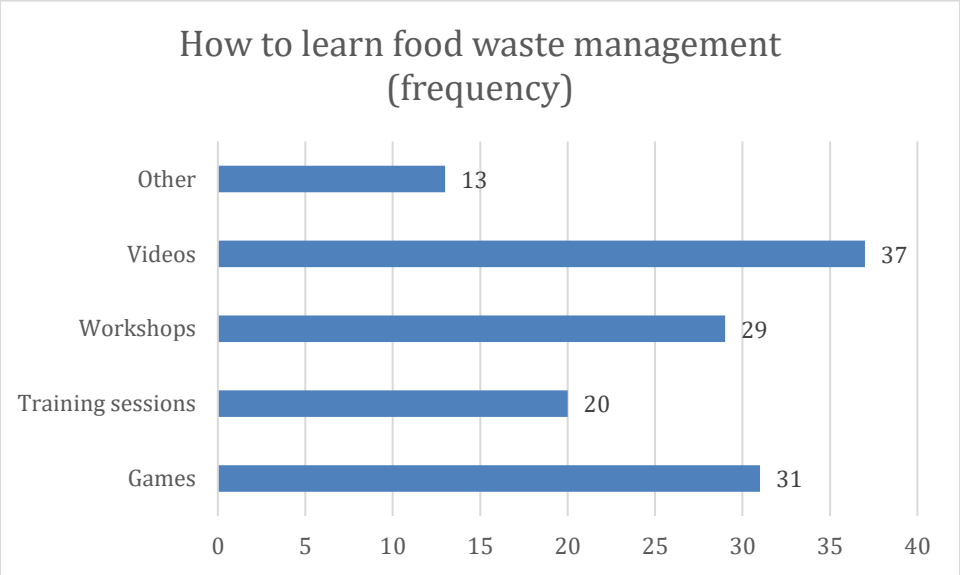
Q2. What do you understand by food waste management?

The response from the teachers are categorized into following topics;

-Distinguishing between reusable waste and non-reusable waste.
-Consuming appropriate food.
-Decreasing the amount of food waste.
-Transforming decayed food or disposed food into valuable products.
-Collecting wasted food.
-Disposing the wasted food.
-No idea on what food waste management is.

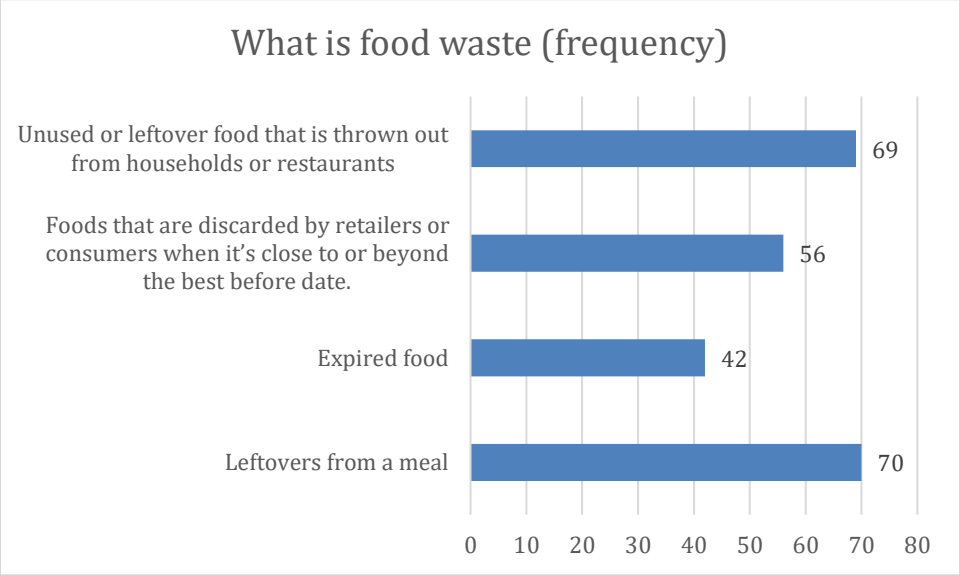
Q3. How would you like to find out more about food waste management?

Similar to the responses from teachers, students want to learn more about food waste management via videos.



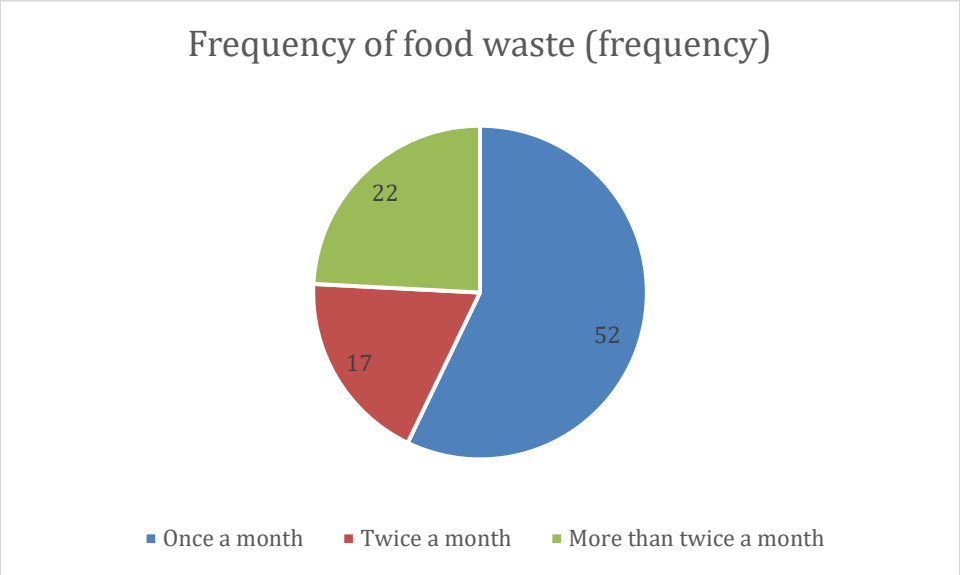
Q4. Which of the ones below do you consider food waste?

Similar to teachers, students think leftovers as food waste with more than 58%



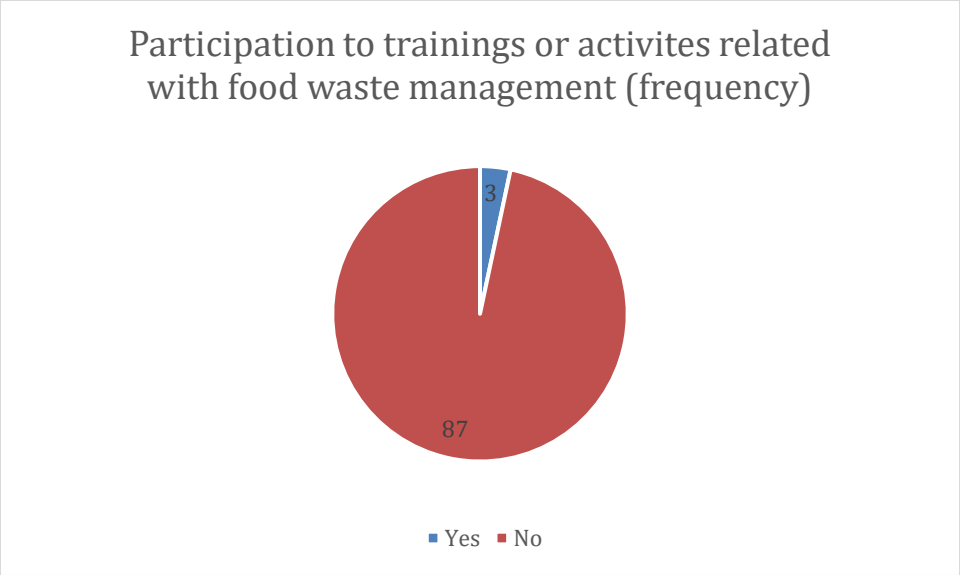
Q5. Related to the previous question, how often, per month, do you waste food?

Majority of responders indicate that they waste food once a month.



Q6a. Have you taken part in any training / activity related to Food Waste Management?

Almost none of the students attended trainings or activities related with food waste management.



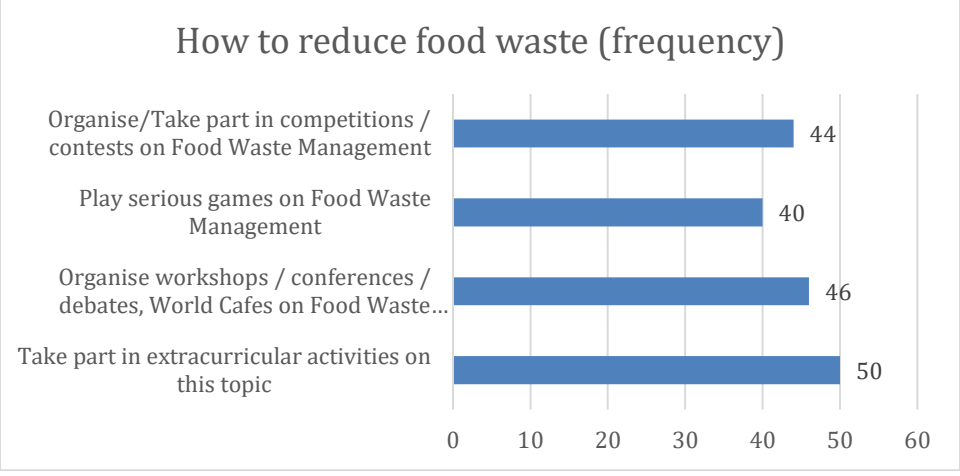
Q6b. If the answer to the previous question was Yes, please explain how often: only once, on a regular basis (every month/semester)

The 3 participants indicated that they all took part in related training activities only once.

Q7. Are you familiar with some of the following actions / games / apps regarding food waste management?

Almost 73% of the participating students are not familiar with any of the aforementioned ways to learn food waste management.

Q8. What could be done, in your country/community, to reduce /avoid food waste?



4. CONCLUSION

Balkan Bridge - Bulgaria

Analysis' startpoint: The observation shows an unsatisfying level of awareness of Food Waste Management as both teachers and students' responses demonstrate less than 50% positive answer to question number "1: Do you know what food waste management is?" as the respective percentage is 47.6% (students) and 46.7% (teachers). This conclusion directly resonates with the most preferable answer to the question "How often do you waste food?" is Once a month for students (52.9%) and twice or more for one month for teachers (53.4%).

Factors - promoting the issue along with its consequences. Raising awareness and taking active actions throughout policy recommendations for national strategies. Also, local authorities' engagement should be strengthened as the operational **objectives** of the national programme aim to:

- establish a national database for food waste data;
- support food production, processing and distribution facilities to prevent and reduce food waste;
- change consumer behavior and attitudes towards food;
- implement food loss and waste prevention measures at all stages of the food supply chain;
- improve the redistribution of surplus edible food for human consumption, to people in need.

Relevant actions - introducing activities (extracurricular and/or regular) promoting the applications saving the wasted food, popularizing through information campaigns and better engagement in training activities related to Food Waste Management. Supporting those challenges and needs that teachers and students in School Education face are the percentage of answers on question 6 "Have you taken part in any training / activity related to Food Waste Management?" As for students, the answer option NO is chosen from 85.2% and from teachers 86.7%.

Center for Social Innovation- Cyprus

According to statistics, there is an unmet need for reducing food waste in Cyprus. Even though there are several projects and volunteers that aim to raise awareness on food waste management and reduction, there is limited literature focusing specifically on food waste across all the sectors in Cyprus (e.g., household, hospitality, enterprises). Furthermore, it seems that there is currently no official educational program targeting school students that is sustainable and innovative. A holistic approach of food waste management should be a fundamental part of the educational vision and policy of all schools in Cyprus.

The results of the field research seem to be in agreement with those of the desk research. It was striking that half of the students reported that they are not aware of food waste management. In turn, 75% of teachers declared knowledge on food waste management, however, only a minor proportion of the overall participants (teachers and students) ever participated in any training/activity related to food waste management. Even though both showed high preference on educational programs, the field research specifically showed that being motivated or participating in non-formal education activities, such as games and competitions, is really important and attractive to students, whereas teachers prefer more traditional ways of learning; indeed, they both expressed high preference on participating in extracurricular activities.

Dot2Dot & Innovation Hive - Greece

Examining the information gathered during the desk research and the data collected from the field research that was conducted in Greece, one can easily notice that there is a significant knowledge gap regarding the food waste management issue and the characteristics of food waste in secondary education, with the awareness on food waste management depending on the initiatives school directors and teachers take to include relevant presentations or audio-visual material in their lesson plans, as there seems to be no official educational program dedicated to food waste and its prevention. It should also be noted that, while most EU countries have already officially integrated education on food waste management in their schools, in Greece there are only references on environmental protection and recycling in school books.

According to the teachers' and students' responses in the given questionnaire, there is the need to create resources for them to learn about food waste management, such as training sessions and workshops, as well as games and extracurricular activities. An interesting finding of the field

research was the fact that the vast majority of the respondents have never participated in any training or activity related to food waste management.

With the need to address the food waste issue being evident, educating, inspiring and encouraging the young generations to take action is crucial. At the same time, according to the findings of the research, it has been made clear that it is important to integrate the topic into the curriculum of secondary schools, while providing the appropriate training resources for the teachers, giving them access to information on the economic and environmental consequences of food waste, the ways to effectively reduce waste, as well as the available tools and existing good practices.

Petit Pas Aps - Italy

Following this analysis on the Italian territory as a result of the desk and field research combined, it emerged that at the moment there are initiatives and projects dedicated to the theme of food waste in schools but at the level of structured educational programs the training offered could be improved and implemented with additional resources.

Moreover, as per the data collected from teachers and students in the desk research survey, it is clear how the topic of food waste management needs to be addressed more specifically and both teachers and students expressed the need to have more resources to learn how to deal with food waste management issue, such as courses, workshops, events, given that almost all the participants in the survey stated that they never had the chance to take part in any training activity related to the project topic.

An essential element to achieve the goal of combating food waste at school, would be to ensure that the fight against food waste is integrated into the students' training curriculum as part of a real education in sustainability and respect for environment; providing also teachers with training resource to use in their lesson plans.

Liceul Teoretic “Marin Preda” - Romania

In this context of so many products being wasted, it is necessary for citizens to better understand the notions of food safety, food waste and its causes. According to a Eurobarometer survey, expiry date labels are not well understood. This confusion increases the rate of food waste. At the same time, almost six out of ten Europeans say they always check the “best before” labels.

Educating and informing consumers: The last ring of the supply chain – the final consumers in households represent the place where half of the food waste is generated; therefore, the actions

aimed at this segment will have the greatest impact in combating/reducing waste. Despite the recognition of this fact, consumer education efforts are completely marginal, undertaken by the private sector almost exclusively.

As far as schools are concerned, it is paramount that actions and projects are carried out so that teachers and students become aware of the impact food waste has upon the environment, upon the quality of our everyday life, but also upon economic and social development of today's society. Educators should motivate students to change their attitude towards the consumption of healthy food, should help them adopt a well-balanced diet, but, at the same time, they should develop in their students those practices that would reduce food waste and contribute to preserving natural resources.

Educational resources should be created, based on relevant research on the topic under discussion; however, it is extremely important that these resources are adapted to the needs and particularities of the target group. For example, the methodology used during different activities should be anchored in today's reality, taking advantage of the advances in technology, of the students' digital skills and interest in this fascinating world of the internet and social media communication. Educational games, online interactive platforms, apps that work on different smart devices must be available to both students and teachers if we want a larger, more efficient impact of programs/projects/campaigns that combat food waste.

GEINNOVA - Spain

Spain has the seventh highest level of food waste in the EU and the majority of the waste is produced by households. Almost half of the food waste produced in Spain could therefore be avoided. An issue lies in the fact that consumers are unaware of the amount of food they waste and highly underestimate their contribution to food waste. The solution focused on in the existing Spanish literature on food waste is to raise the awareness of consumers. Likewise, the Spanish government has developed awareness raising educational programmes for schools. The results from the literature review show that addressing the issue of food waste in schools can have very positive effects on children's attitudes about food, which highlights the value of continuing to educate future generations about the issue. It is therefore important to educate younger generations and to convince them of the goodness of saving products rather than carelessly throwing them away. The awareness campaign should also focus on sensitive themes such as starvation, pollution and the concept of sustainability, to give a better picture of the impact that food waste has on the entire society.
Through the analysis of data collected from desk research, results of this research show that about half of the pupils who were questioned did not know what food waste management is and the majority of both teachers, as well as pupils, had never participated in a training activity related to food waste management. The solution to the issue that was favoured by both teachers and

pupils was to focus on raising awareness of the issue through workshops, conferences, debates, world cafe's, and training courses for both teachers and pupils.

Geleceğin Eğitimi Derneği - GED - Turkiye

Türkiye ranks 3rd in the world in food waste per capita with an estimated 93 Kg per capita per year and nearly 2 million tons of food wasted every year. Despite these high numbers, there is still a need for legislation and laws especially in this field. Besides, a number of projects and initiatives are very limited. For this reason, the government is currently trying to become the most important example itself with the implementation of the Zero Waste Campaign in public areas. So far, there are few initiatives which are funded or supported by international organizations such as UNICEF and WWF.

As for food waste management in education in Turkey, there is only one special program which is supported by FAO and its application is very limited. The remaining ones in the curriculum only aim to raise food waste awareness. The implication of the survey within the Zero Waste Project in Türkiye revealed that 64% of teachers and 51% of students have knowledge of food waste management. Taking into consideration what has been provided in the school so far, these numbers are very satisfying. However, when the action is mentioned, 11% of teachers and 2% of students take part in training or activities related to Food Waste Management. Another point that the survey shows is that the majority of both students and teachers want to know more about food waste management via videos and games.

After combining both analyses in Türkiye, it is clearly understood that there is an urgent need for a ready-to-use program and training content on food waste management with a holistic approach that is designed attractively for the students.

5.CLOSING REMARKS

After the careful desk research carried out by every institution involved in our Erasmus+ project, and based on the findings of the structured questionnaire applied to more than 175 students and 105 teachers belonging to secondary education, we can clearly see a large number of similarities between the seven countries participating in the partnership. That is not to say that the situation is exactly the same in each European state, but there are far more resembling things which characterize the context we all come from rather than aspects which separate us.

Therefore, we would like to underline those elements that our countries have in common when we refer to food waste in general, and to food waste management in particular. One of the greatest similarities between ourselves is the existence of national documents and regulations which are meant to guide actions in the fight against Food waste. Moreover, we have all discovered that there is interest and preoccupation, especially from private companies and school institutions, to get involved in the fight against food waste. Another aspect which stood out from our research was the limited existing literature that focuses specifically on food waste across all domains of activity, as well as an increased need, from teachers and students alike, to have effective, attractive and interactive educational resources about how we can combat food waste.

One more thing which is similar in all partner countries is the lack of an official educational program dedicated to food waste and its prevention, with a holistic approach and designed attractively for the students. In all countries participating in the research, raising awareness regarding food waste and actions aimed at reducing it are limited to the initiatives of school directors and teachers. There is no compulsory subject in any national curriculum dedicated entirely and solely to the issue of food waste; however, from time to time, teachers include relevant presentations or audio-visual material in their lesson plans or organize extracurricular activities which envisage the topic of food waste and food waste management.

Consequently, based on our findings, we can undoubtedly state that there is plenty of space and need for more practical interventions, concrete actions and a better collaboration between all actors which have responsibilities in this domain. Educational resources should be created so that, not only teachers and students, but also parents should develop their knowledge about food waste management. The questionnaire revealed that the vast majority of the respondents have never participated in any training or activity related to food waste management, but they are willing to take part in training sessions and workshops, as well as in games and extracurricular activities.

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