



WASTE EDUCATION GUIDE FOR ADULT EDUCATORS AND TEACHERS

AUTHORS

1. ZUZANA PALKOVÁ, SUA
2. SIMON SRNKA, SUA
3. ERGUN DEMIR, BAUN
4. FATMAGUL TOLUN, BAUN
5. MARIA VENTURA, FUE-UJI
6. MARINA CODORNIU, SWIDEAS
7. JULIA MOREIRA, SWIDEAS
8. ILIJA VUCKOV, EMKICE
9. NURDAN ERDOGAN, IDU
10. OZGUR OAYCIL, KARESI

INDEX

1. INTRODUCTION	2
2. INTERACTIVE ACTIVITIES FOR TEACHERS	3
a. Waste management	3
b. Correct recycling	8
c. Recycling technologies	11
d. Entrepreneurship in Zero Waste Circular Economy	15
3. REFERENCES	19

INTRODUCTION

Within **ZERO WASTE** project, which focuses on training adults in the concepts of sustainability and the **circular economy**, the deliverable Waste Education Guide for Adult Educators and Teachers is presented. The development of this results is part of the final aim of the **ZERO WASTE** project to reduce the volume of non-recycled waste.

To achieve this, the project carries out a study that analyses the current situation in Europe and Turkey in terms of the Circular Economy and **Zero Waste** using different indicators and trains adults in the skills and knowledge needed to start implementing the principles of the Circular Economy through the Zero Waste methodology.

The Waste Education Guide for Adult Educators and Teachers is specifically aimed at adult educators and teachers who are looking to embed Waste Education into their teaching. This guide consists of interactive activities designed to help students explore the issues associated with waste, as well as the solutions.

The guide explores through practical exercises the following concepts: waste management, correct recycling, recycling Technologies and entrepreneurship in Zero waste circular economy.

All the partners integrating this project have participated in the development of this result Izmir Democracy University of Izmir (Turkey) as coordinator and six other entities from different countries: the University of Balikesir (Turkey), SWIDEAS (Sweden), the Slovak University of Agriculture V (Slovakia), EMKICE (Republic of North Macedonia), Fundació Universitat Jaume I-Empresa (Spain) and the locality of KARESI (Turkey).

ZERO WASTE is a European project funded under the Erasmus+ programme in the modality of Strategic Partnerships for Adult Education, implemented by the international consortium previously mentioned during 24 months. During this time the project works to reduce the volume of non-recycled waste through training and the creation of an innovative curriculum and therefore enhance entrepreneurship in these areas.

INTERACTIVE ACTIVITIES FOR TEACHERS

A. WASTE MANAGEMENT

a. Introduction to the concept

Increased waste volumes as a result of population increase, urbanization, industrialization, and changes in consumption habits represent a serious threat to the world's sustainability. Environmental pollutions such as air, water and soil caused by wastes have important effects on the life chain. It is also directly responsible for the emergence of global environmental problems such as climate crisis and biodiversity.

On the other hand, the current food, energy, and raw material crisis demonstrates that natural resources are finite, and there is a risk that future human requirements may not be met. This situation highlights the importance of resource management that is both efficient and effective.

The most significant component in overcoming the difficulties stated above is the management of wastes, of which a large portion can be used as a direct input into the economy. The Linear Economy method, which originated with the industrial revolution and is based on a one-way production and consumption model in the form of take-make-use-dispose, has culminated in current waste management approach. It is widely agreed, as stated for the first time in the 1972 report Limits of Growth, that the linear economy strategy should be replaced with another one that prioritizes environmental and resource management. The European Green Deal action plan, launched on December 11, 2019, aims to improve resource efficiency, restore biodiversity, and reduce pollution while guaranteeing society's quality of life by transitioning from the linear economy (LE) to the circular economy (CE). The EU's new growth strategy, which includes basic principles such as the world's first climate-neutral continent, where greenhouse gas emissions based on the circular economy are net zero, has been put forward with the Consensus, which foresees the transformation of life on a continental scale by 2050.

The goal of these waste management activities proposed within the Zero Waste project is to create a general waste culture among the adults who are the project's target group, to introduce the waste management hierarchy based on the circular economy, to raise awareness about how participants can apply these principles to their lives, and to evaluate the recently emerged business potentials.

b. Learning outcomes

- Awareness on waste concept
- Types of waste and their proportions
- The fundamentals of integrated waste management, *starting with source generation and ending with waste disposal in a system.*
- A proper understanding of the waste management hierarchy
- Relation between waste production and linear economy approach
- The fundamentals of adapting to a circular economy approach

c. Activity 1

Type of Activity	Warm-up debate
Duration	45 minutes
Key words	Waste – waste management – Waste Management hierarchy – linear economy – circular economy
Materials needed	None
Link to online resources, in case they are relevant	https://zerowasteurope.eu/resources/library/
	https://olc.worldbank.org/content/what-waste-20-learning-series
	https://learn.eartheasy.com/guides/zero-waste-a-beginners-guide/
	https://letsdoitfoundation.org/wp-content/uploads/2022/06/A1_Zero-waste-basics.pdf
Description of the activity	It is an open debate activity in which students are expected to discuss their thoughts on waste and waste management.
Guidelines for the teacher	<p>The educator should start with a debate activity to engage students. When they are seated, educator give information about the basics of waste, waste types and waste management. Then, a series of waste-related questions are asked students. Recommended questions:</p> <ol style="list-style-type: none"> 1. Do you produce waste? 2. What types of waste do you produce? 3. How do you collect these wastes? 4. Do you use approaches such as reduction, reuse or recycling? 5. Do you know what happens to the waste after it leaves you? <p>The suggested questions can be extended or replaced by others.</p> <p>If students do not answer, the educator could talk about personal (or friends) experiences.</p> <p>Teachers must check all links provided in this guide.</p>
Conclusions	With the questions posed, students obtain fundamental knowledge of waste management while also developing an awareness of the waste they produce in their own lives.

d. Activity 2

Type of Activity	Self-assessment activity (questionnaire)
Duration	30 min
Key words	Waste, waste types, questionnaire, daily life
Materials needed	Computer, screen, paper, pen
Link to online resources, in case they are relevant	https://www.sciencedirect.com/science/article/pii/S2211601X16000390 https://wasteaid.org/wp-content/uploads/2017/10/1-How-to-measure-your-waste-v1-mobile.pdf https://www.zerowastedesign.org/waste-calculator/
Description of the activity	It is a self-assessment activity that uses semi-structured questions to determine students' waste behaviors in their daily and business lives.
Guidelines for the teacher	<p>Students are questioned about whether they create the following wastes throughout their daily activities and at work. If they are producing these types of waste, they will be asked to record the information about the amount of waste they produce as a result of which activities. They are also required to mention any other waste kinds they produce in addition to the ones that are listed.</p> <p><u>Waste types</u></p> <ul style="list-style-type: none"> - Organic - Plastic - Paper - Glass - Metal - Electronic <p>Also, student are asked following recommend questions;</p> <ul style="list-style-type: none"> - How often do you separate waste into the proper categories before throwing it away in bins? - Have you ever thrown the liquid from a container away before throwing the container away? - During the past year, how often have you purchased environmentally friendly products, such as organic products, biodegradable detergents, and returnable containers? - How often do you use a cotton bag instead of plastic bags? - Have you ever done double-sided printing and used single-sided paper for writing notes? - Is it possible that you will be able to significantly change your behaviors into sustainable waste management? - Do you think a single person's actions can contribute to the improvement of environmental quality?
Conclusions	Students are expected to evaluate the types and amounts of waste they produce in their daily home and work lives. With the questionnaire conducted, students develop an awareness that they are an active member of waste management as a waste producer.

e. Activity 3

Type of Activity	Measuring
Duration	45 min
Key words	Environmental benefits, iWARM,
Materials needed	Computer and screen
Link to online resources, in case they are relevant	https://www.footprintnetwork.org/our-work/ecological-footprint/
	https://www.carbonfootprint.com/
	https://waterfootprint.org/en/resources/interactive-tools/personal-water-footprint-calculator/
	https://www.epa.gov/warm/individual-waste-reduction-model-iwarm-tool
Description of the activity	Students will be able to measure the environmental pressures generated by their lifestyles as well as the benefits achieved by modifying their waste behavior in this measurement assignment.
Guidelines for the teacher	<p>This activity is divided into two stages. Students will be requested to calculate their ecological, carbon, and water footprints in order to quantify the environmental impacts caused by their lifestyles and consumption habits in the first section, using the tools provided via the links above. Students are encouraged to analyze their own lifestyles and provide suggestions for improvement using this calculation results. The educator will provide general knowledge about the relationships between environmental effects and general linear economy principles in this session.</p> <p>In the second stage, the educator will first describe the waste management approach suggested by the circular economy concept in the second level. Following that, students are expected to calculate the environmental benefits they will receive if they recycle the waste, taking into account the activities and wastes listed in the previous activity, so that they can understand the importance of waste management in reducing their environmental footprint and calculate the environmental benefits they will receive. At this stage, the EPA-developed IWARM application will be employed. Students are expected to evaluate the rubbish they can recycle and their methods at the end of the project.</p>
Conclusions	Students are encouraged to develop proposals to minimize the effects on the environment as part of the assignment. They are expected to understand the significance of waste reduction, reuse, and recycling concepts. As a result, they are expected to be prepared for the approaches they will study in the next stages.

f. Activity 4

Type of Activity	Group Evaluation Activity
Duration	60 min
Key words	Life Cycle Assessment – Linear Economy – Circular Economy
Materials needed	Paper, pen,
	https://www.youtube.com/watch?time_continue=197&v=zCRKvDyyHml&feature=emb_title

Link to online resources, in case they are relevant	https://www.youtube.com/watch?v=6N95hM-owjU&feature=emb_logo
Description of the activity	Participants are expected to create a life cycle diagram of a waste they produce in their daily lives under linear economy conditions and then adapt this diagram to a cycle circular economy principles using an innovative approach.
Guidelines for the teacher	During the session, students will first learn about the waste management concepts of linear economy and circular economy approaches. The students are then divided into groups of 2-3 people. According to the linear economy, they are expected to map and analyze life cycle of a waste they produce in their daily and commercial lives. They will next be requested to adapt the life cycle in accordance with the principles of the circular economy, preferably using an innovative technique.
Conclusions	Understanding the contrasts between linear and circular economy techniques within the context of waste management will be provided, as will a general understanding of the application and advantages of circular economy ideas to individual life.

B. CORRECT RECYCLING

a. Introduction to the concept

Deciding to recycle items is just the first step. You also want to make sure the items are recycled correctly. Knowing basic recycling rules and putting them into practice will help you recycle more efficiently. And it will help to ensure everything that makes it into your bin finds a second life.

The condition of your donations will determine how your recycling efforts pay off. Even widely recycled materials like aluminium, steel, paper and plastic can easily become contaminated and end up in a landfill site.

To avoid wasting your time and good intentions, we present four questions on recycling correctly.

b. Learning outcomes

- Awareness on waste management daily actions
- Basic recycling notions
- Solutions for a proper waste management and recycling
- Identifying good practices on recycling

c. Activity 1

Type of Activity	Warm-up debate
Duration	15 min
Key words	recycling, plastic, carton, paper, batteries
Materials needed	None
Link to online resources, in case they are relevant	https://www.epa.gov/recycle/how-do-i-recycle-common-recyclables https://www.earthday.org/7-tips-to-recycle-better/ https://www.wm.com/us/en/recycle-right/recycling-101 https://www.clearancesolutionsltd.co.uk/reuse-and-recycling/how-to-recycle-more-effectively/
Description of the activity	The educator should start with a debate activity to engage students. When they are seated, the educator must do a series of questions related to recycling.
Guidelines for the teacher	<p>Recommended questions:</p> <ol style="list-style-type: none"> 1. Do you recycle? Why you don't? 2. Do we recycle correctly? 3. What is correct recycling? 4. Where do you deposit your tetra brick? And aluminium foil? And carton used for packaging foot (pizza box)? And napkins? 5. What do you do with the used batteries? And your technology products? <p>The suggested questions can be extended or replaced by others.</p>

	<p>If students do not answer, the educator could talk about personal (or friends) experiences.</p> <p>Teachers must check all links provided in this guide.</p>
Conclusions	<p>Awareness and interest are raised in the students. Some questions reflect myths; others are correct about recycling. Students must be aware that, contrary to what most of us believe, we all think that we are green and we recycle, but we are not doing it correctly in most cases.</p>

d. Activity 2

Type of Activity	Problem-solving in couples
Duration	30 min
Key words	citizens, city council, recycling
Materials needed	Paper and pen/pencil or computer/tablet
Link to online resources, in case they are relevant	https://smartcity.valencia.es/vlci/sustainable-development-goals/
Description of the activity	<p>The students work in couples (or groups of three) working on proposals to increase the citizens' recycling rate.</p> <p>Then, they briefly expose their proposals and other students orally, and the educator can propose improvements or raise questions to improve their final proposal.</p>
Guidelines for the teacher	<p>Case study: Valencia has doubled the recycling rate among citizens in 15 years (from 2009 to 2021). It is considered that there are enough recycling containers in the street at an appropriate maximum distance, but the recycling rate is not growing more. Some citizens are not recycling as they could be, not separating products.</p> <p>If they were the government, what could students propose to solve it?</p> <p>Students have 18 min to prepare the proposal. Students can do brainstorming on a paper sheet, or they can use a computer. They can also use the internet to base their proposal on available information.</p> <p>After each exposal, the educator must guide a short debate, max 1 min exposition + 2-3 debate. It is not required that all groups expose their proposal.</p>
Conclusions	Students can identify social barriers (that could be acceptable or not) to recycling.

e. Activity 3

Type of Activity	Applying recycling solutions in the room
Duration	15 min
Key words	recycling, office, classroom, workplace
Materials needed	<p>Labels, pen or marker.</p> <p>Computer and screen for presentation for the educator.</p>
Link to online resources, in case they are relevant	https://www.recycleacrossamerica.org/tips-to-recycle-right

Description of the activity	Students analyze the classroom/office to identify if that area is rightly prepared for recycling, following the link above.
Guidelines for the teacher	The teacher opens the resource on the screen and presents it to the students. All analyze if, in that area, the proposed tips are applied. When finishing the list, they can use some tips provided in the classroom/office/building. They can analyze if other measures are implemented in the classroom/office not included in the list.
Conclusions	An activity that is more dynamic than previous ones to involve students so they can apply it in their workplace or home.

f. Activity 4

Type of Activity	Recycling final questionnaire
Duration	10 min
Key words	recycling, questionnaire, paper, glass, plastic, carton
Materials needed	Computer, screen
Link to online resources, in case they are relevant	https://www.epa.gov/recycle/how-do-i-recycle-common-recyclables https://www.earthday.org/7-tips-to-recycle-better/ https://www.wm.com/us/en/recycle-right/recycling-101 https://www.clearancesolutionsltd.co.uk/reuse-and-recycling/how-to-recycle-more-effectively/
Description of the activity	The educator uses a few questions of the first link to check the educators' knowledge. The educator proposes these and other links to students. All links deal with proper recycling.
Guidelines for the teacher	Suggested questions, but others can be selected according to the available time. Use the first link of the list for the correct answers. <ul style="list-style-type: none"> • Can I recycle pizza boxes? • Can I recycle mail? • Can plastic bottles and caps be recycled? • Can I recycle broken glass? • Should aluminium cans be crushed before recycling them? • What should I do with old clothes and old shoes?
Conclusions	Students learn about proper recycling, deny recycling myths and correct typical mistakes in recycling.

C. RECYCLING TECHNOLOGIES

a. Introduction to the concept

Recycling technologies-Methods for reducing solid waste by reusing discarded materials. Recycling technologies use waste materials to make new products. They involve collecting recyclable materials, manufacturing or reprocessing them into new products, and purchasing products made from recycled materials. Recycling reduces the amount of waste sent to landfills, conserves natural resources, and saves energy, thereby reducing greenhouse-gas emissions. Various techniques have been developed to recycle plastics, glass, metals, paper, wood, and electronic waste.

b. Learning outcomes

- Recycling technologies for most common materials
- Each material has different type of recycling technology
- Comparison of individual technologies for each material
- Practical advantages or obstacles in using these technologies

c. Activity 1

Type of Activity	Debate-plastic recycling methods
Duration	15 min
Key words	Recycling, technologies, plastics
Materials needed	Pen, paper, computer
Link to online resources, in case they are relevant	https://plasticseurope.org/sustainability/circularity/recycling/recycling-technologies/ https://cdn.sanity.io/files/dyloixlh/production/49436667bddede386763c5d4f89b1d361364e9c4.pdf https://www.gao.gov/products/gao-21-105317 https://www.omv.com/en/blog/the-right-recycling-method-for-all-plastics
Description of the activity	Open debate between students, comparing plastics recycling technologies
Guidelines for the teacher	Read the information about different kinds of plastics recycling technologies from the first link to your students. Ask them to try to come up with some pros and cons for each method. Together then verify your conclusions using the last link
Conclusions	There is no universal best plastics recycling method, it depends on many factors (type of plastic, available resources and facilities, recycled material usage...)

d. Activity 2

Type of Activity	E-waste recycling, work in pairs
Duration	20 min
Key words	Electronic waste, steps of recycling process
Materials needed	Paper, pen, computer
Link to online resources, in case they are relevant	https://www.conserve-energy-future.com/e-waste-recycling-process.php https://www.rts.com/blog/the-complete-e-waste-recycling-process/ https://recycletechnologies.com/e-waste-recycling-2/ https://www.youtube.com/watch?v=wmtH7ypzdWM
Description of the activity	Step by step guide of electronic waste recycling technology, ideas for attracting more business owners to recycle E-waste
Guidelines for the teacher	Present required steps of electronic waste recycling technology found in the articles in the first and second link. After that, let them watch video in the last link about company providing E-waste recycling services. Divide students in pairs and let them come up with ideas (in a form of short advertisement) how to attract more business owners to start recycling their electronic waste.
Conclusions	Importance of electronic waste recycling as usage of new ICT technologies is growing everyday.

e. Activity 3

Type of Activity	Video, debate, museum gallery method, work in pairs.
Duration	50 to 60 min
Key words	Glass, recycling
Materials needed	computer/projector for playing the video, posters (prepared by the teacher beforehand), pens and paper (better if it is recycled paper!)
Link to online resources, in	https://www.youtube.com/watch?v=LR9FtWVjk2c&ab_channel=JerryRigEverything https://www.rts.com/blog/the-complete-glass-recycling-process/

case they are relevant	
Description of the activity	Glass recycling: How does it happen? Are all types of glass recyclable?
Guidelines for the teacher	<ol style="list-style-type: none"> 1. Explain to the learners that glass is a material that can be recycled infinitely. A bottle can always become a bottle again. Show them the video (first link) to see how the recycling of glass works. (13min) 2. After watching the video, ask participants to share their thoughts about it in form of group discussion. What caught their attention the most and why? (5-10min, depending on group size and engagement levels) 3. Then, raise the question: Can all types of glass be recycled in the way we just saw on the video? First, let the learners discuss the answer as a group. Once several points have been raised, the teacher can reveal that the correct answer is that not all types of glass can be recycled as some may be very contaminated or may have undergone different processes that makes them difficult to recycle. (5-10min, depending on group size and engagement levels) 4. After, invite the learners to stand up and walk around the room. Previous to this, the teacher will have hanged on the walls different informative posters, creating a “museum gallery”. The posters will describe the types of glass which cannot be recycled and why (for building the posters, use the second link. Specifically, use the section named “Is the recycling process of all glass the same?”). Each poster should contain only one type of material and the explanation for this material. An example can be a poster with the picture of light bulbs explaining that these need a special process to be recycled because they are not made exclusively from glass, but from a mix of materials. (10min) 5. To conclude, bring the learners together into small groups of 2-3 people to discuss the following questions. Ask them to collect their conclusions in a piece of paper. (10min) <ul style="list-style-type: none"> - How do you feel about recycling after this activity? - What are your 3 main take aways? - What is your opinion about glass recycling now? - What will you do to recycle more in your daily life? 6. Finally, encourage participants to share their main conclusions with the whole group. (5-10min)
Conclusions	Glass can be recycled infinitely and it is important that we contribute to this process as much as we can to avoid glass going to landfill and becoming unnecessary waste. Nevertheless, we need to be careful and know that there are some types of glass that are not that easy to recycle.

f. Activity 4

Type of Activity	Brainstorming, video, work in pairs
Duration	40 min (short version) or 55 min (long version with final extra filming)
Key words	Paper, recycling, environment, alternatives

Materials needed	computer/projector for playing the videos, flipchart or whiteboard, paper (better if recycled!) and pens, smartphones or cameras to film the final videos (if taking the long version)
Link to online resources, in case they are relevant	https://www.youtube.com/watch?v=Bx0ozMweqoU&ab_channel=HOWit%27sMADE https://www.youtube.com/watch?v=BS-gN6jiXw4&ab_channel=FuseSchool-GlobalEducation https://www.greenandhappymom.com/post/pros-and-cons-of-paper
Description of the activity	Paper recycling, its impact and possible alternatives.
Guidelines for the teacher	<ol style="list-style-type: none"> 1. Invite the learners to brainstorm on the question: what do you know about paper? The teacher might collect the main ideas on a flipchart or whiteboard. (5min) 2. Ask the learners if they have ever seen how paper/cardboard is recycled. Play the video on the first link to discover it. (5min) 3. Now, play the video on the second link to get some extra information about the paper recycling process and its environmental impact. (5min) 4. Bring the learners to work in pairs and discuss: (10min) <ul style="list-style-type: none"> - How do you feel after watching these videos? - What is the thing that caught your attention the most? - What are the pros and cons of using and recycling paper? 5. Still being in pairs, ask the learners to come up with solutions or alternatives to reduce the negative impact of paper on the environment. They can use the third link to get extra information and inspiration. (15min) <p style="margin-left: 40px;">*As an extra, if time allows, the learners may film themselves explaining the solutions/alternatives they came up with. Invite them to share their videos on social media to reach their communities and raise awareness on the paper consumption and recycling. (15min)</p>
Conclusions	<p>Paper can be recycled, but it can only be recycled a few times. Then it becomes waste and goes to landfill. Luckily, paper is biodegradable.</p> <p>To create paper, we need to cut trees, use lots of water... and that has negative repercussions on the environment. Recycling it is important.</p>

D. ENTREPRENEURSHIP IN ZERO WASTE CIRCULAR ECONOMY

a. Introduction to the concept

The Circular Economy (CE) is a sustainable economic model that eliminates all or most waste, or recycles it, thus reducing the use of virgin resources as well as reducing energy consumption, which in turn reduces the environmental impact of the consumer society. Circular economy business models, by design, keep products and materials in use for as long as possible to derive maximum value from them. Circular Economy Business Models (CBM) are business models that put circular economy principles into practice. The main circular business model principles are to obtain products and materials from the economy, not from ecological reserves, creating value for customers by adding value to existing products and materials and generating valuable input for businesses outside of your client. Zero waste entrepreneurs are the people who will be responsible for creating and nurturing a circular economy. They are essentially entrepreneurs who are able to provide/create products or services that lead to no waste whatsoever.

Deciding to entrepreneur in circular economy is just the first step. You also want to make sure the CE business models are useful to decrease waste. Knowing basic CE business models and putting them into practice will help you to be a volunteer entrepreneur. It also helps you to Learning about this CE entrepreneurship will contribute to the reuse of items you personally use by others, thereby reducing climate change.

Whether your non-use items are suitable for reuse or recycling will determine their use or disposal.

Not to waste your time and goodwill, we present four questions about entrepreneurship in the circular economy.

b. Learning outcomes

- Awareness on circular economy business models
- Basic entrepreneurship models for reuse items
- Solutions for a proper waste management by using CE business models and entrepreneurship
- Identifying good practices on entrepreneurship in CE

c. Activity 1

Type of Activity	Warm-up debate
Duration	15 min
Key words	Circular economy, reuse, circular economy business models, entrepreneurship in CE
Materials needed	None
Link to online resources, in case they are relevant	https://www.zerowastescotland.org.uk/ https://www.boardofinnovation.com/blog/circular-business-model-examples/ https://www.triodos-im.com/articles/2017/remodeling-circular-economy-business-models https://plasticsmartcities.org/products/reuse-models https://waste4change.com/blog/5-circular-economy-business-models/

	<p>https://www.interregeurope.eu/policylearning/good-practices/item/3152/re-use-box-new-collection-scheme-for-reusable-items/</p> <p>https://zerowasteurope.eu/library/the-story-of-repack-a-simple-solution-to-the-growing-problem-of-e-commerce-waste/</p>
Description of the activity	The educator should start with a debate activity to engage students. When they are seated, the educator must do a series of questions related to CE business models and entrepreneurship.
Guidelines for the teacher	<p>Recommended questions:</p> <ol style="list-style-type: none"> 1. Do you reuse items? Why you don't? 2. Do we know CE business models? 3. What are the principles of CE business models? 4. What are Reusable shipping containers? And Reusable packaging? And Refillable bottle programs? And Reuse centers and virtual shopping? 5. What do you do with the used E-Wastes? And your clothes? <p>The suggested questions can be extended or replaced by others.</p> <p>If students do not answer, the educator could talk about personal (or friends) experiences.</p> <p>Teachers must check all links provided in this guide.</p>
Conclusions	Awareness and interest are raised in the students. Some questions reflect myths; others about the CE business models, entrepreneurship for reusing items and best practices in CE business models. Students must be aware that, contrary to what most of us believe, we all think that we are reusing items to decrease climate changes and to be greener and we reuse, but we are not doing it correctly in most cases and throw them as waste.

d. Activity 2

Type of Activity	Problem-solving in couples
Duration	30 min
Key words	Individual, businesses, industry, supply chain, citizens, reuse
Materials needed	Paper and pen/pencil or computer/tablet
Link to online resources, in case they are relevant	<p>https://www.interregeurope.eu/policylearning/good-practices/item/3152/re-use-box-new-collection-scheme-for-reusable-items/</p> <p>https://www.youtube.com/watch?v=EWvAD8vFMYQ</p>
Description of the activity	<p>The students work in couples (or groups of three) working on proposals to increase the citizens' recycling rate.</p> <p>Then, they briefly expose their proposals and other students orally, and the educator can propose improvements or raise questions to improve their final proposal.</p>
Guidelines for the teacher	Case study: The Re-Use Box is a new collection system for reusable small goods which often end up in the residual waste containers or the material is only recycled. In the introductory phase, 500 tons of additional cage goods were collected. The system has established itself and has been used in numerous other regions of Austria, but also in Europe (Vicenza, Herford, Kempten). Due to the good information work, the proportion of residual waste is negligibly small and the quality of the goods is very good. The difficulties were very well

	<p>received by consumers. However, the folded box is too big to be carried home without problems and the filled box is difficult to carry. So most users transport it in their cars. Thus, Reuse Bag were created to increase the wearing comfort and to reach the delivery points on foot.</p> <p>If they were the entrepreneurs, what could students propose to solve it?</p> <p>Students have 18 min to prepare the proposal. Students can do brainstorming on a paper sheet, or they can use a computer. They can also use the internet to base their proposal on available information.</p> <p>After each exposal, the educator must guide a short debate, max 1 min exposition + 2-3 debate. It is not required that all groups expose their proposal.</p>
Conclusions	Students can identify difficulties encountered that could be acceptable or not to solve the reuse box problem.

e. Activity 3

Type of Activity	Applying solutions for reuse by using CE business models in the room
Duration	15 min
Key words	reuse, office, classroom, workplace
Materials needed	Labels, pen or marker. Computer and screen for presentation for the educator.
Link to online resources, in case they are relevant	https://www.boardofinnovation.com/blog/circular-business-model-examples/ https://plasticsmartcities.org/products/reuse-models
Description of the activity	Students analyze the classroom/office to identify if that area is rightly prepared for reuse and relevant business models, following the link above.
Guidelines for the teacher	The teacher opens the resource on the screen and presents it to the students. All analyze if, in that area, the proposed tips are applied. When finishing the list, they can use some tips provided in the classroom/office/building. They can analyze if other measures are implemented in the classroom/office not included in the list.
Conclusions	An activity that is more dynamic than previous ones to involve students so they can apply it in their workplace or home.

f. Activity 4

Type of Activity	CE business models and entrepreneurship final questionnaire
Duration	10 min
Key words	CE, CE business models, questionnaire, reuse
Materials needed	Computer, screen
	https://www.zerowastescotland.org.uk/

Link to online resources, in case they are relevant	https://www.boardofinnovation.com/blog/circular-business-model-examples/ https://www.triodos-im.com/articles/2017/remodeling-circular-economy-business-models https://plasticsmartcities.org/products/reuse-models https://waste4change.com/blog/5-circular-economy-business-models/ https://www.interregeurope.eu/policylearning/good-practices/item/3152/re-use-box-new-collection-scheme-for-reusable-items/ https://zerowasteurope.eu/library/the-story-of-repack-a-simple-solution-to-the-growing-problem-of-e-commerce-waste/
Description of the activity	<p>The educator uses a few questions of the first link to check the educators' knowledge. The educator proposes these and other links to students. All links deal with Entrepreneurship in CE.</p>
Guidelines for the teacher	<p>Suggested questions, but others can be selected according to the available time. Use the first link of the list for the correct answers.</p> <ul style="list-style-type: none"> • Can I create a “<i>sharing economy</i>” model in my business/office? • Can I reuse <i>shopping boxes</i>? • Can I reuse paper waste? • Can I reuse <i>E-Wastes</i>? • Can I open/run a <i>repair café</i>? • Can I eliminate plastic pollution with <i>reusable packaging</i>? • Can I send my old clothes and shoes to <i>secondhand stores</i>
Conclusions	<p>Students learn about CE entrepreneurship business models, reuse of individual old items and new trends in reuse CE business models.</p>

REFERENCES

- Clearance Solutions Ltd (2016). *How to recycle more effectively*. Available online at: <https://www.clearancesolutionsltd.co.uk/reuse-and-recycling/how-to-recycle-more-effectively/> (last access 4 May 2022).
- Earthday.org (2022). *7 tips to recycle better*. Available online at: <https://www.earthday.org/7-tips-to-recycle-better/> (last access 4 May 2022).
- Gillabel, J., Manshoven, S., Grossi, F., Mortensen, L.F. and Coscieme, L., 2021. *Business Models in a Circular Economy*. Eionet Report - ETC/WMGE 2021/2.
- Interreg Group, 2019. *A policy brief from the Policy Learning Platform March 2019*. <https://www.zerowastescotland.org.uk/>
- Recycle Across America (2022). *Tips to reduce it, refuse it, and reuse it*. Available online at: <https://www.recycleacrossamerica.org/tips-to-recycle-right> (last access 4 May 2022).
- Recycling technology, Article By: Swanson, R. Lawrence Available online at: <https://www.accessscience.com/content/757456>
- Smart City Office, Ayuntamiento de València (2022). *Sustainable Development Goals*. Available online at: <https://smartcity.valencia.es/vlci/sustainable-development-goals/> (last access 4 May 2022).
- United States Environmental Protection Agency (2021). *How Do I Recycle?: Common Recyclables*. Available online at: <https://www.epa.gov/recycle/how-do-i-recycle-common-recyclables> (last access 4 May 2022).
- WM Intellectual Property Holdings, L.L.C. (2022). *Recycling 101*. Available online at: <https://www.wm.com/us/en/recycle-right/recycling-101> (last access 4 May 2022).
- <https://plasticseurope.org/sustainability/circularity/recycling/recycling-technologies/>
- <https://cdn.sanity.io/files/dyloixlh/production/49436667bddede386763c5d4f89b1d361364e9c4.pdf>
- <https://www.gao.gov/products/gao-21-105317>
- <https://www.omv.com/en/blog/the-right-recycling-method-for-all-plastics>
- <https://www.conserve-energy-future.com/e-waste-recycling-process.php>
- <https://www.rts.com/blog/the-complete-e-waste-recycling-process/>
- <https://recycletechnologies.com/e-waste-recycling-2/>
- <https://www.youtube.com/watch?v=wmtH7ypzdWM>
- https://www.youtube.com/watch?v=LR9FtWVjk2c&ab_channel=JerryRigEverything
- <https://www.rts.com/blog/the-complete-glass-recycling-process/>
- https://www.youtube.com/watch?v=Bx0ozMwegoU&ab_channel=HOWit%27sMADE

https://www.youtube.com/watch?v=BS-gN6jiXw4&ab_channel=FuseSchool-GlobalEducation

<https://www.greenandhappymom.com/post/pros-and-cons-of-paper>

<https://zerowasteurope.eu/library/the-story-of-repack-a-simple-solution-to-the-growing-problem-of-e-commerce-waste/>

<https://waste4change.com/blog/5-circular-economy-business-models/>

<https://plasticsmartcities.org/products/reuse-models>

<https://www.triodos-im.com/articles/2017/remodeling-circular-economy-business-models>

<https://www.boardofinnovation.com/blog/circular-business-model-examples/>

<https://www.youtube.com/watch?v=EWvAD8vFMYQ>