

**Erasmus+ - project
Learning workshop „Sustainable
environmental protection”**



**Vocational field-specific learning workshop
for the vocational field
“industrial-technical professions”
(Harald Reichl)**

Developed by the Austrian partner

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Introduction

The European and national climate targets can only be achieved by environmental awareness, which is fixed in every vocational field. Though there are possibilities and necessities of environmentally conscious acting in any vocational field. But so far there is no concept developed, which fixes environmental and climate conscious acting already in apprenticeship and vocational education and enables a permanent focus on these targets.

Firstly, it is necessary to define the terms of *sustainable climate and environment protection* (scep). Scep is the goal to protect our planet's wellbeing by making sure that today's living and production standards are in balance with the earth's resources. Sustainability focuses on the long-term effect or a change which sustains over a longer period of time so our future generations may benefit from the same amount of the earth's resources.

In the professional world scep can be applied by any institution/organization, as it reaches from basic office supplies to chemicals being environmentally friendly handled. The biggest impact though is in the production sector where high amounts of energy, resources, chemicals and water are used.

In Austria strict regulatory systems have been implemented to manage scep for example in the fields of waste and resource management and environmental pollution. These systems are the foundation for greener jobs, a greener economy and in the best case a circular economy.

1. Initial situation and need for action for the learning workshop for industrial-technical professions

With the help of a desk research as well as interviews we got to know the initial situation and need for action for the learning workshop for industrial-technical professions. The topics identified by the desk research were confirmed by the interviews. In particular, it became apparent that the focus on environmental protection and sustainability is already continuously integrated into teaching. However, certain topics (renewable energies, energy efficiency or energy saving, careful treatment and disposal of residual materials) that cover essential aspects of corporate environmental protection dominate, while the complete integration of all aspects of a sustainable circular economy is missing.

The topic of scep just came up in recent years of their 20 years of teaching in trainers everyday professional life. Nevertheless, environmental protection is always an issue in Electrical engineering and mechatronics, especially regarding waste management. This is also reflected in the answers to the relevant legal framework conditions: Regulations on waste treatment and disposal dominate here, e.g., Wastewater Ordinance, Waste Framework Directive, Waste from Electrical and Electronic Equipment (WEEE) Directive. It is noticeable that students in particular raise the awareness to scep for example in their diploma thesis. The differentiation between environmental or climate protection or sustainability is not clear to everyone, yet.



2. General objectives of the learning workshop

The general objectives of the learning workshop are quite complex and aim for a deeper understanding of scep. Furthermore, with the help of the target group specific learning workshops targets towards self-experiences as a sustainable way of learning. By letting the trainees learn about cascadic usage of utilities and review their own ideas they will develop a toolkit to practice circular economy.

The following list pins down the general objectives of the learning workshop:

- Understand the meaning of sustainable climate and environmental protection
- Understand the benefits of a circular versus a linear economy
- Understand the importance of resource conservation in a circular economy.
- Understand the facilitating and hindering factors for resource conservation.
- Identify possibilities for resource conservation in the concrete working situation
- Identify the potential of energy saving in the company
- Understand the effects of the selected measures
- Understand that these topics are connected to circular economy
- Identify the potential of appropriate waste treatment in the company

3. Target group and the assignment of the learning workshop as qualification

3.1 Trainees / apprentices

Trainees as well as apprentices could benefit from the learning workshop tremendously. On the one hand they will start into their professional careers with a full “Toolbox” of in-depth knowledge on how to implement aspects of circular economy into an existing structure, this is also helpful for their professional orientation in general (regarding to the topic of green jobs for example). On the other hand, in addition to self-motivation, information on what scep means is becoming increasingly relevant and therefore increases the value of the trainees on the job market.

3.2 Skilled workers

Skilled workers who take part in the learning workshop will be seen as multipliers. They can help raising and sharpening awareness of scep in the workplace. They will gain additional qualification as well as arouse interest in further qualifications. Possible next steps could be further training to become waste officer or energy consultant for example.

3.3 Interested people in general

Interested people in general have a high self-motivation regarding the topic. It is possible, that they are also quite experienced and have dealt with the topic of scep before. Nevertheless, they will gain additional qualification as well as arouse interest in further qualifications. Furthermore, in addition to self-motivation, information on what scep means is becoming increasingly relevant and therefore increases the value of the trainees on the job market. They will be more aware of their opportunities regarding a job career (green jobs).



4. Requirements for people involved in the learning workshop

4.1 Requirements for the participating target groups

The most important requirement for the participating group is a basic understanding of electromechanics and -technic. Moreover, the trainees need to have time resources to be part of the workshop. For companies it is important to have a look at the group size and the social structure of the co-workers.

4.2 Requirements for the specialists carrying out the learning workshop

There are quite a few requirements for the specialists carrying out the learning workshop due to the professional as well as social complexity of the workshop:

- Background in the repair and maintenance of large household appliances and small electrical appliances
- Experience in the WEEE Guidelines, Circular Economy Strategy
- Trainer licence, Training in electromechanics /-technic and practical experience
- University degree environmental management (or similar) (not mandatory)
- Practical Expertise:
 - Environmental conservation
 - Circular Design
 - Energy efficiency and energy saving
 - Group Dynamics
- Especially:
 - Waste management hierarchy
 - Cascadic utilisation
- Exemplary curricula/ courses finalised or fields of employment/ professional expertise:
 - Mechatronic
 - Electrical engineering
 - Circular Economy & Design
 - Environmental Management

5. Frame conditions

5.1 Description of the learning environment

A learning workshop is a permanently furnished room with a variety of tools, materials and everyday objects. It is set up in such a way that children, young people or even adults are encouraged to wonder, ask questions, try things out and discover, and can learn through research.

A learning workshop should include:

- a clear structure (even if it defines only the breaks),
- room to create individual schedules,
- orientation on whom to ask what
- and focus on the given topic/field for the participants

5.2 Needed and recommended materials

First of all, for this learning workshop different spaces and materials are needed. A conference room with flipcharts or whiteboards and pencils is required as well as a well-equipped workshop where the group can disassemble a washing machine. The trainees need internet access for research purposes, for example in a computer room. Also, different Power Point Presentations (PPP) on the topics: Circular Economy, Energy efficiency and the Carbon Footprint. Furthermore, work clothing, including protective gloves, and a variety of tools are needed, such as:

- Screwdrivers
- Pipe wrench
- Pliers
- Drill
- Hammer

5.3 Used and recommended teaching methods

There are various skills and teaching methods recommended for the trainer teaching this specific learning workshop. Firstly, it is important to differentiate between basic skills and method skills.

Basic Trainer skills are considered a skill set which hold the room for discourses and a positive learning experience: ability of building and maintenance of useful networks, an interactive, motivating and engaging way of teaching, process orientated, conflict and moderation skills, guidance of groups and teamwork.

A trainer with a various set of method skills gives inputs on how to approach different topics or different presentation types: Elevator Pitches, World Cafés.

6. Structure of the learning workshop

6.1 Content overview – learning topics

Various learning topics were defined as part of the "industrial-technical professions" learning workshop. The focus of the learning workshop relates to the title "From the line to the circle" and thus refers to the topic of the circular economy, which plays a central role in environmental and climate protection.

Over the course of the two days, the participants are first introduced to the topics of environmental and climate protection, the waste hierarchy is presented to them and an example, the washing machine, is used to show them exactly what is meant by "cascading utilisation" as a key element of circular economy. Finally, they are asked to apply their newly acquired knowledge to a material/object of their choice in group work.



6.2 Rough concept

Day I

Introduction & getting to know each other	Where do the trainees stand, knowledge survey on: Circular economy, definition of sustainable climate and environmental protection, presentation of the key elements of the circular economy for this workshop (Reduce, Rethink, Reuse, Repurpose, Repair, Recycle - "Rs")
Transition to the task of the day & group formation	Change of room to the workshop, presentation of the topic: cascading use (related to Rethink and Repurpose), groups are formed
Phase I	An experienced technician disassembles a washing machine (WM), naming the components & their task in plenary, participants help with disassembly under supervision
Phase II	Task: "As a group, choose a component (drum, side wall, porthole, etc.) and think together about the possibilities for using this component further (does it need to be treated? Can you do it now?...). Which of the "Rs" do your suggestions belong to?"
Phase III	What difference does the carbon footprint of a new WM have compared to a repaired WM?
Phase IV	Present your results in plenary. Are there any other ideas? Other calculation figures?

Day II

Start the day	Welcome, presentation of today's program
Transition to the task of the day & group formation	Change of room to the workshop, presentation of the topic: "Efficiency first - reduce energy use at your own workplace" (related to Reduce and Rethink), groups are formed
Phase I	In teams of 2, find as many examples as possible of ways to increase energy efficiency in the company (1st analysis). Then choose a concrete example from everyday working life where you can take a specific measure --> e.g. switching the lighting to LED
Phase II	What difference does the carbon footprint of this measure make?
Phase III: Presentation & discussion	Present your results in plenary. Are there any other ideas? Other calculation figures?

6.3 Fine concept – daily planning and detailed working tasks

Day I: From Line to Loop

Time from	Duration	Titel	Content	Material	Methods
9:00	15'	Welcome and Introduction	<ul style="list-style-type: none"> • Welcoming the participants • Brief presentation of the Learning Workshop 	PPP, Screen	Presentation Group Discussion
9:15	10'	Getting to know each other	knowledge survey on: Circular Economy	PPP	Presentation Group Discussion
9:25	10'	Defining scep	knowledge survey on definition of sustainable climate and environmental protection	PPP	Presentation Group Discussion
9:35	15'	Introduction of the key elements of the circular economy for this workshop - the "Rs"	Introduction of the key elements of the circular economy for this workshop (Reduce, Rethink, Reuse, Repurpose, Repair, Recycle - "Rs") and Waste Hierarchy	Flipchart	Lecture
9:50	15'	Transition to the task of the day & group formation	Change of room to the workshop, presentation of the topic: cascading use, groups are formed		
10:05	65'	Phase I	An experienced technician disassembles a washing machine (WM), naming the components & their task in plenary, participants help	Washing machine, Tools, 3 D Washing machine model	

			with disassembly under supervision		
11:10	20'	Break	Break	Coffee machine	
11:30	60'	Phase II Task	Task: "As a group, choose a component (drum, side wall, porthole, etc.) and think together about what possibilities there are for using this component further (does it need to be treated? Can you do it now?...). Which of the "Rs" do your suggestions belong to?"	Washing machine component Flip chart Internet access	Group Discussion (internet research if necessary)
12:30	45'	Phase III	What difference does the carbon footprint of a new WM have compared to a repaired WM?	Computers/ Laptops with internet access	Internet Research
13:15	45'	Break			
14:00	60'	Phase IV: Presentation & discussion	Present your results in plenary. Are there any other ideas? Other calculation figures?	Flipchart	Group Discussions, World Café
15:00	15'	End of Day I	Wrap up, Feedback (5 Finger Feedback)	Flipchart	

Day II: From Line to Loop

Time from	Duration	Titel	Content	Material	Methods
9:00	15'	Welcome back	<ul style="list-style-type: none"> • Welcoming the participants • Recap of Day I • presentation of today's program 		Group Discussion
9:15	10'	Transition to the task of the day & group formation	Change of room to the workshop, presentation of the topic: implementing energy efficiency measures at your own workplace, groups are formed		
9:25	120'	Phase I	In the group, collect concrete examples (1st analysis) from your everyday work where you can introduce a specific energy efficiency measure --> e.g. conversion of lamps to LED Present and discuss examples, complete with examples from PPP	Flipcharts PPP	Group Discussion
11:25	45'	Break			
12:10	45'	Phase II: Carbon Footprint	Select a specific energy efficiency measure: What difference does the carbon footprint of this measure make?	Computers/ Laptops Flipchart	Research
12:55	120'	Phase III: Presentation & discussion	Present your results in plenary. Are there any other ideas? Feedback to the measures. What would be the	Flipchart	Presentations & Group Discussions

			next steps, e.g. in an employee suggestion system, towards implementing this measure?		
14:55	15'	End of Day II	Wrap up, Feedback (5 Finger Feedback)	Flipchart	

7. Organization and implementation of the learning workshop

The learning workshop was tested as part of the "ReTech" project. The project is a training course to become a repair technician for jobseekers who are registered with the AMS (Public Employment Service) in Austria. The training course is aimed at people with basic knowledge of electrical engineering and an interest in repair of electric devices. This made them the perfect test group for the learning workshop, as they represent all three target groups. The six participants were a heterogeneous group: two people were trained electrical engineers (skilled workers), two people were trained in other technical professions and were undergoing further training (trainees) and the other two came from other fields but were very interested in the topic (interested people in general).

As part of this training, parts of the learning workshop were tested at various times. Three different people acted as trainers for the learning workshop: a trained electrical engineer with expertise in repairing large household appliances, in particular washing machines; a trained electrical engineer with expertise in repairing small electrical appliances and completed trainer training; and a circular economy and energy efficiency expert.

The circular economy and energy efficiency expert provided theoretical input on the circular economy, sustainable climate and environmental protection and energy efficiency. For the majority of the trainees, it was their first in-depth exploration of the topic and therefore led to many questions and exciting discussions.

The trained electrical engineer with expertise in repairing large household appliances worked with the trainees to dismantle a washing machine. This was not a new exercise, as they had already unscrewed various appliances to repair them as part of the training programme. Depending on the group, you have to allow more time for this part. Things got unusual when it came to thinking up new uses for individual components. After some initial irritation, the trainees enjoyed the creative task and came up with lots of exciting suggestions.

Calculating the CO₂ footprint was no easy task, as they came across a wide range of different figures.

The second day of the learning workshop was challenging, the main focus here being on reaching agreement within the group on a topic/object under consideration. Thanks to the extensive expertise of the trainer with expertise in repairing small electrical appliances, very good examples were found in each case. The calculation of the economic and environmental effects of energy efficiency measures followed by a lively discussion on the selection of measures provided the trainees with extensive insights and enabled them to self-reflect on their own behaviour in the company.

The five-finger feedback method has established itself in this group and provided a good and important framework. The flipchart on which a hand was drawn could be reused. Post-it notes were distributed to the trainees. Everyone could now give feedback on the individual fingers:

Thumb - what was good

Index finger - what should be emphasised

Middle finger - what was bad

Ring finger - what to take away

Little finger - what came up short

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