

## The Digital Toolkit for Green Skills: apply it in your reality

Enhancing green skills, sustainability, and attractiveness of Maritime VET



## **CONSORTIUM DEVELOPING THE TOOLKIT:**

- 1. CENTRO TECNOLOGICO DEL MAR FUNDACION CETMAR (Spain, Vigo).
- 2. INOVA+ INNOVATION SERVICES, SA.
- 3. BERUFSBILDUNGSZENTRUM AM NORD-OSTSEE-KANAL (Germany).
- 4. LATVIJAS JURAS AKADEMIJA (Latvia, Riga).
- 5. Centro Integrado de Formación Profesional Coroso (Spain, Galizia).
- 6. Associação para o Desenvolvimento e Formação do Mar dos Açores ADFMA (Açores, Portugal).





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## R1: Digital Toolkit for Green Skills

## **Competences included** in **the toolkit**

Competences:

- 1. Impact of Litter in natural spaces
- 2. Alternative fishing gears
- 3. Microplastics in maritime areas
- 4. Raising awareness on sustainability
- 5. Impact of boat-building materials
- 6. Waste management at different workshops
- 7. Ocean literacy (seven principles)
- 8. How to reduce footprint in training and in real life: good practices

# The toolkit: class plans



#### **COMPONENTS:**

- Introduction to the competence/skill (1-3 pages)
- Age of the students: adults from 16
- Duration: 3 hours
- Learning outcomes
- Resources
- The steps and activities to carry out the class plan
- And some tips!





## **Project Green Diving**

## Module 1 : Impact of litter in natural spaces







## **1. Impact of Litter in natural spaces**

#### **LEARNING OUTCOMES:**

- Understand effects of different types of litter on specific aquatic ecosystems and the whole ocean system.
- Learn about the influence of consumers on the production of litter.

#### **ACTIVITY:**



### **1- Collect litter from natural space**

## **2- Classify litter**



Landesberufsschule für Fischwirte, BBZ am NOK, Rendsburg



## 3- Identify risks

- students get picture cards showing different animals, ecosystems and types of waste.
- tasks of the students:
  - make meaningful assignments in groupwork.
  - name and discuss effects of the respective type of waste on the ecosystem and/ or the animals.
- After this work phase, groups prepare short presentations.



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## **Project Green Diving**

## Module 2 : Alternative Fishing gear

## BBZ am NOK

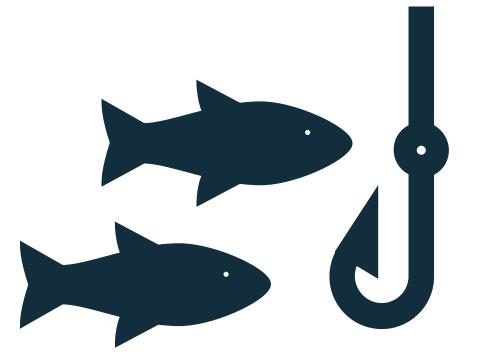


## **2.** Alternative Fishing gear

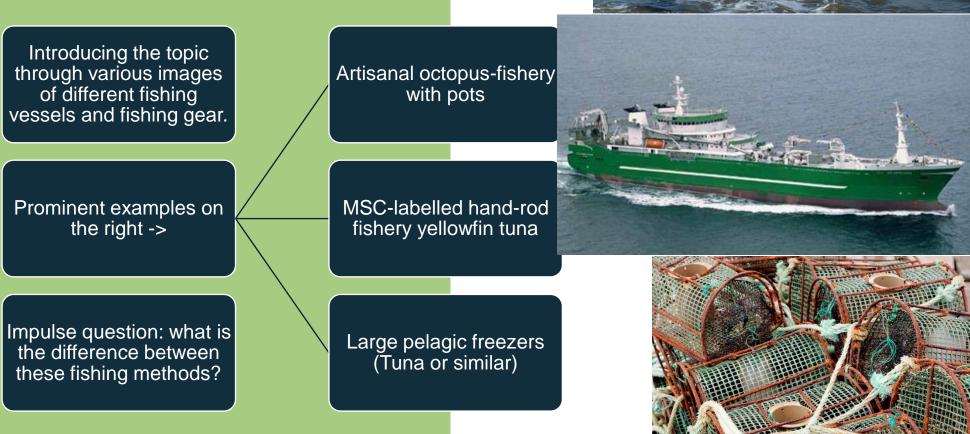
#### LEARNING OUTCOMES:

- Understand different effects of different fishing gear on
  - Specific marine ecosystems
  - Economical situation of fishermen
  - Pollution of the whole ocean system (plastics, etc.)
  - Sustainability of specific fisheries
- Learn about the influence of consumers on the sustainability of various fisheries.

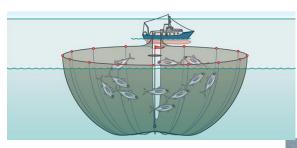
#### ACTIVITY:



## **Practical unit**

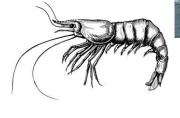


## **Practical unit**

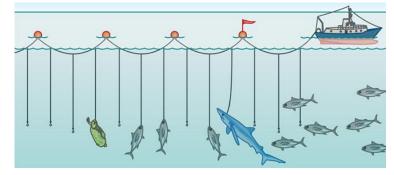




- students get a pile of cards with pictures showing different fishing methods, fishing gear, fishing vessels.
- on another pile, text cards with different advantages and disadvantages are provided
  - fuel consumption, bottom contact, ecological impact, costs, technical requirements in terms of vessel size and equipment, necessary manpower, selectivity/bycatch regarding species, size, shape, behaviour.











## **Practical unit**

- students' task is to make meaningful classifications in group-work.
- The effects of the respective fishing gear on the ecosystem as well as on the economic situation of the fishermen should be named.
- After this work phase, the respective groups prepare short presentations.
  - pictures, graphics, texts are provided.
  - Each group of students will focus on a different type of fishing gear.









## **Project Green Diving**

## Module 3. How to reduce footprint in training and real life: best practices

Ana Rita Rodrigues Escola do Mar dos Açores





## **Learning Objectives**



Understand the environmental impact that simple daily activities and choices can have in long term



Introduce simple changes in daily routine to reduce ecological footprint



Identify non-green skills





## How is the Ecological Footprint of a person calculated?

Activity

You have to determinate the impact of your food, home, goods, services and transportation on the planet by using a footprint calculator that you can find on the internet







## How is the Ecological Footprint of a person calculated?







### **Project Green Diving**

## Unit 6: MICROPLASTICS IN MARITIME AREAS

## Latvian Maritime Academy



Funded by the European Union

## **Learning Objectives**

To understand the definition and types of microplastics.

To identify the sources and conditions of microplastic pollution.

To explore the pathways and transport mechanisms of microplastics in marine ecosystems.

To understand the interactions between microplastics and marine organisms, including their uptake and bioaccumulation.

To identify and assess the impact of microplastics on the environment and human health.

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To understand the importance of public awareness and education campaigns in managing microplastic pollution.



## Activity: Preliminary discussion

- 1. What are our society's principal sources of plastic waste? Can you name some main sectors or industries that significantly contribute to plastic pollution?
- 2. What are the environmental effects of plastic trash on ecosystems on land and in water? Can you give particular examples of how plastic pollution has had a disastrous impact on wildlife and habitats?
- 3. What are the obstacles in managing and disposing of plastic waste? Are there any significant disparities in waste management strategies between areas or countries?
- 4. Could you describe the concept of the plastic waste hierarchy and its significance in the fight against plastic pollution? What are the most important phases in this hierarchy, and how do they help to reduce the impact of plastic waste?
- 5. How does plastic waste contribute to marine pollution? What are some of the pathways through which plastic waste enters marine environments, and what are the consequences for marine ecosystems?
- 6. What are some of the existing legislative and regulatory measures in place to combat microplastic pollution? How effective have these regulations been in reducing microplastics in different environments?
- 7. What are the different types and characteristics of microplastics found in various environment?



#### Activity 1

#### Sort OUT the Rubbish

**Group Setup:** Students form groups of four or five.

**Material Collection:** Gather various items (5-10 per group) for sorting, including recyclable and non-recyclable.

**Sorting Task:** Groups sort items into recyclable and non-recyclable categories. **Discussion and Reflection:** Students discuss

**Discussion and Reflection:** Students discuss what they observed and knew about recycling. **Guidance and Correction:** Provide guidance on recycling, share hints or a link about what can and cannot be recycled, and have students resort accordingly.



### Activity 2

#### **MICROPLASTICS HUNT**

The InsTructr will Give students a list of frequent microplastic items and invite them to look for them in the classroom or outside. Once discovered, students can discuss probable causes, consequences, and solutions to limit their consumption.

## Activity 3 microplastics simulation

instructor can Create a hands-on exercise in which students imitate the spread of microplastics in marine environment. To symbolize microplastics, the teahcer can use glitter or small plastic particles and invite students to observe how quickly they disperse and their possible influence on marine life.



## **Green Diving Project**

## UD4\_1: RAISING AWARENESS MICROPLASTICS.



Funded by the European Union



## **INDEX OF THE COURSE**

#### Learning objectives.

- What are micro plastics?.
  - Provenance.
  - Effects on health.
- Raise awareness of the damage that micro plastics can cause in the marine environment.
- Locate and identify micro plastics in their different forms and in the different media in which they can be found.
  - Assembly a paper microscope.
  - Identification of micro plastics

#### **Results of the Green Diving project**





Students carry out this practical activity in order to identify micro plastics in different media (sea water, area, exfoliating cream and in the intestines of fish).

## They start by assembling a Foldscope paper microscope.

- Activity guided by a teacher in which they participate with motivation and interest.
- Everyone sets up their paper microscope.
- "The Foldscope is a folding paper microscope that costs less than a dollar to make, but is durable and extraordinarily useful, according to inventor Manu Prakash of Stanford University."



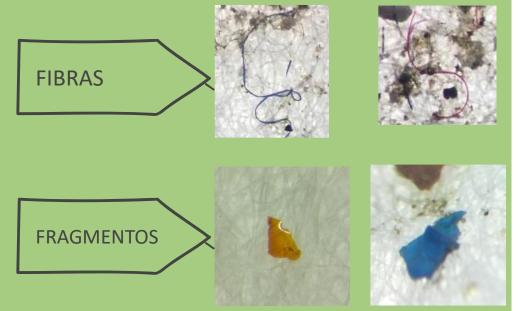


Once the Foldscope paper microscope is assembled, they perform different visualizations.

- The microscope can magnify objects up to 2000 times their actual size.
- The students carry out the activity with interest and are very motivated asking to repeat the experience.







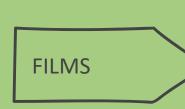
They learn to identify the most common forms in which microplastics can be found in the ocean.

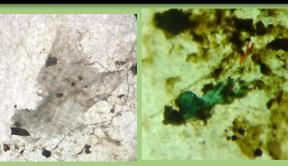
With the collaboration of the teaching staff and consulting on the internet, they reach the following conclusions. They decide which images and definitions are the most representative.

- **Fibers**: They look like brightly colored threads.
- **Fragments**: with irregular size and edges, in colors from white to striking blues and yellows.









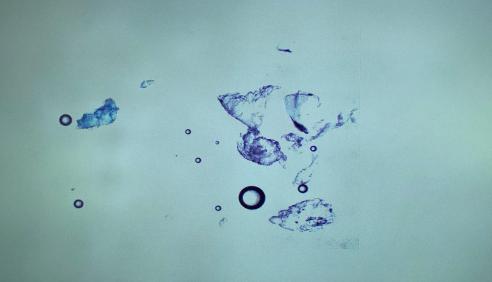




- **Film**: very thin and stretchy, mostly clear.
- **Sphere**: spherical particles, white, transparent or cream.
- Fragments predominate in water due to their buoyancy, followed by fibers, films and finally, less abundant, spheres.





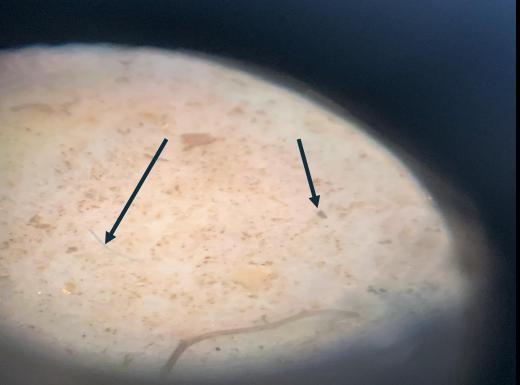


With the help of microscopes, they identify micro plastics from a sample of sea water, sand, from an exfoliating cream, and in the intestines of a fish.

• **Sea water**: the students appreciate the microplastics in the forms of film and spheres and fibers described in the previous sections.







- **Fish intestines:** previously all the organic matter in the intestines was degraded by means of acids and bases.
- Micro plastics can be seen in the form of fibers and fragments.
- The students declare that carrying out this activity was very valuable and that it helped them a lot to learn about the reality of micro plastics in our environment.



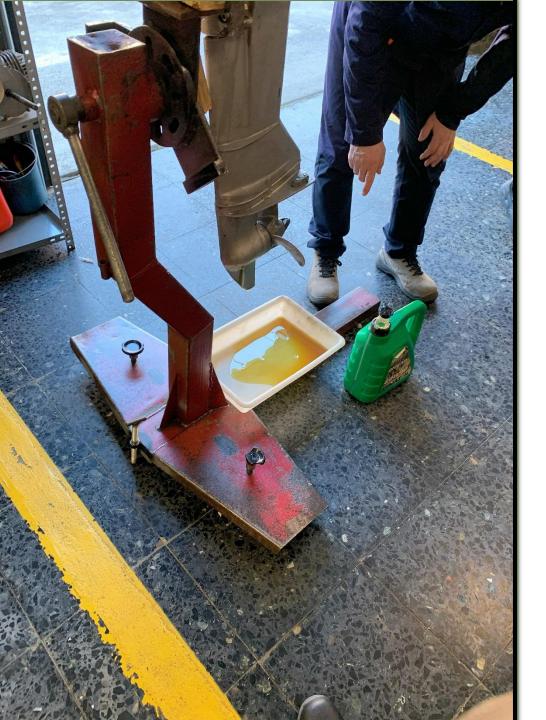


## **Green Diving Project**

## UD4\_2: RAISING AWARENESS OUTBOARD GEAR OIL CHANGE PROCESS.



Funded by the European Union



#### Learning objectives.

- Consequences of bad practices in the treatment of waste in engine maintenance processes.
- Process of changing the gear oil of an outboard with the students to learn and raise awareness about good practices in the treatment of waste from boat maintenance.





### GEAR OIL CHANGE PROCESS.

After the colloquium on good practices in the treatment of waste, we started the practice with the students of changing the tail oil in an outboard. Being clear about the next steps to follow.

- Prepare material and tools.
- Locate fill/drain plugs and level.
- Remove used oil.
- Filled with the clean oil.
- Proper treatment of waste.







### WASTE MANAGEMENT EXERCISE

- **Procedure.** Propose an exercise for:
  - Know the area of waste management
  - Identify the destination of each waste produced in this activity
- Materials
  - "Clean Point" (hazardous waste management area)
  - Hazardous waste generated in the activity
- Tools
  - H5p
  - Moodle
  - 360° camera.







H-9	OUTBOARD X	🖻 Tutorial 🗮 Example	🖲 Сору	🕅 Paste & Re
_		S Virtual Tour (360)		
D	Open H5P File			
+	New H5P file	i≡ Single Choice Set	Remove	Done
		If left blank no label will be displayed and we'll try to use the title field for screen readers		
		WHERE WOULD YOU THROW THE OIL CHANGE WASTE?		
		Label Settings		
		Title * Metadata		
		Used for searching, reports and copyright information		
		Untitled Single Choice Set		
		List of questions *	Textual	Default
		▼ WHERE WOULD YOU THROW USED OIL?		8
		Question *		
		WHERE WOULD YOU THROW USED OIL?		
		Alternatives - first alternative is the correct one. *		
		Alternatives - first alternative is the correct one. " Alternative		© Ĵ
				© ()

## WASTE MANAGEMENT EXERCISE

- Procedure detailed.
  - Take a picture of each label on each waste bin
  - Take a 360° photo of the waste room
  - Assemble all over H5P on Moodle or LUMI
  - Create a Q&A in H5P (in Moodle or Lumi).





## WASTE MANAGEMENT EXERCISE

- LUMI (to view without moodle)
  - https://app.lumi.education/
- H5P (to edit)
  - <u>https://h5p.org/</u>
- LINK TO THE ACTIVITY
  - <u>https://1drv.ms/u/s!AtKs2iNSqGQx</u> pNFPIHWYSc370IZN5Q?e=CGD <u>m5v</u>



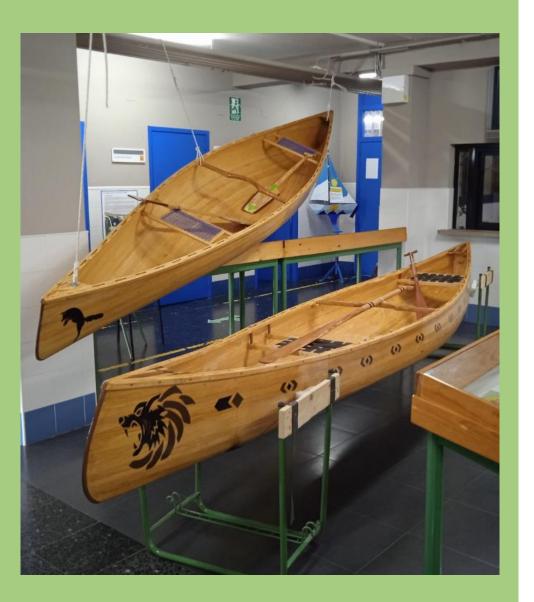


## **Green Diving Project**

# UD5: BUILDING TWO STRIP CANOE



Funded by the European Union



## **INDEX OF THE COURSE**

#### **IMPACT ON BUILDING MATERIALS**

#### UD3: BUILDING TWO STRIP CANADIAN CANOES.

- Learning objectives.
  - 1) USE A SUSTAINABLE BUILDING MATERIAL.
  - 2) USE AS MANY RECYCLABLE MATERIALS AS POSSIBLE.
  - 3) PRODUCE AS LITTLE WASTE AS POSSIBLE.
  - 4) MAKING THIS KNOWLEDGE AVAILABLE TO EVERYONE







#### **1. Presentation of the canoe project**

#### **Procedure:**

- Students are explained the different construction techniques. For the elaboration of the plans two methods are followed:
- The plans are projected with a barrel on a sheet to the required scale and copied with a label.
- They are compressed on paper (A1) at 1/1 scale

#### **Materials:**

Paper

#### **Tools:**

Projector cannon

Large format printers (A1)







# 2. Plans and transfer to the frames Procedure:

# • Once the forms are copied on paper, they are transferred to the wood to cut them

## **Materials:**

Melamine board

# **Tools:**

Marker







# **3. Cutting of frames** (shape) Procedure:

• Cut board to create the shape, they are cut two by two for being this canoe symmetrical

- Melamine board
- Tools:
- Marker
- Calar saw
- Vertical band saw





## 3. Cutting of frames (shape) Procedure:

• In the canoe that chose to print the plans, the paper was glued on a board and proceeded to cut it. This canoe unlike the previous one is not symmetry with what all the shapes had to be made. First one half of the form is made and then the other half is copied with the tupi

- Melamine board
- Tools:
- Calar saw
- Vertical band saw







## **3. Cutting of frames** (shape) Procedure:

• Copied from the form with the tupi and union of the two halves. Observe the vertical and horizontal line that were marked because this will allow us in later steps to rethink the shapes in vertical and horizontal position

- Melamine board
- Screws
- Tools:
- Tupi of artisan manufacture
- Electric screwdriver





# **4. Staking out and preparing bed** Procedure:

- Stakeout and preparation of the bed that will receive the forms.
- Realization of hole for the passage of the guide string for the alignment of the shapes

- Wooden board 5000x300x50
- Perpendicular slats of 300x30x30
- Screws 5x50
- Tools:
- Square, Screwdriver drill
- Column logger







# 5. Placing frames on bed

# **Procedure:**

• Placement of the shapes on the bed using a guide string for a correct alignment of the shapes

- 5x40mm screws
- Ø3mm thread
- Tools:
- Jaws
- Electric screwdriver
- Level





# 5. Placing frames on bed Procedure:

• Staking out and placing the shapes with a laser level, using the vertical and horizontal lines previously drawn in the shapes

# Materials:

• 5x40mm screws

- Jaws
- Electric screwdriver
- Laser level





# 6. "Bead and Cove" on the slats Procedure:

 Sta Preparation of the table for the realization of the "Bead and Cove" in the slats

# Materials:

• Wooden slats 5300x22x5mm

# • Tools:

• Tupi of artisan manufacture





# 6. "Bead and Cove" on the slats Procedure:

 Sta Preparation of the table for the realization of the "Bead and Cove" in the slats

# Materials:

• Wooden slats 5300x22x5mm

# • Tools:

• Tupi of artisan manufacture





## 7. Laying covering strips Procedure:

- Placement of the first strips of the covering.
- Very important the placement of the first strip of slats, it should be as horizontal as possible
- Materials:
- Wooden slats with "Bead and Cove"
- Wood glue (glue)
- Staples 14mm
- Tools:
- Manual stapler
- Handsaw (kataba)





# 7. Laying covering strips Procedure:

• Placing the first strips of the cover in the second canoe

- 5300x22x5mm wooden slats with "Bead and Cove"
- Wood glue (glue)
- Staples 14mm
- Tools:
- Manual stapler
- Handsaw (kataba)





# 7. Laying covering strips Procedure:

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- 5300x22x5mm wooden slats with "Bead and Cove"
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- Tools:
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- Handsaw (kataba)

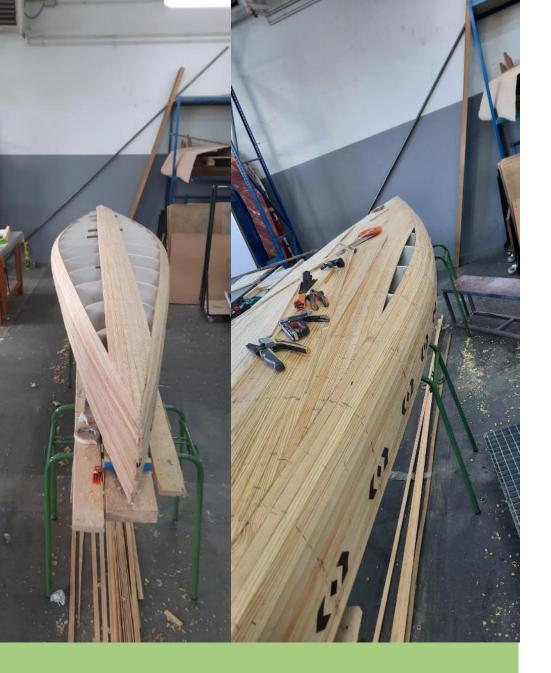




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- Handsaw (kataba)



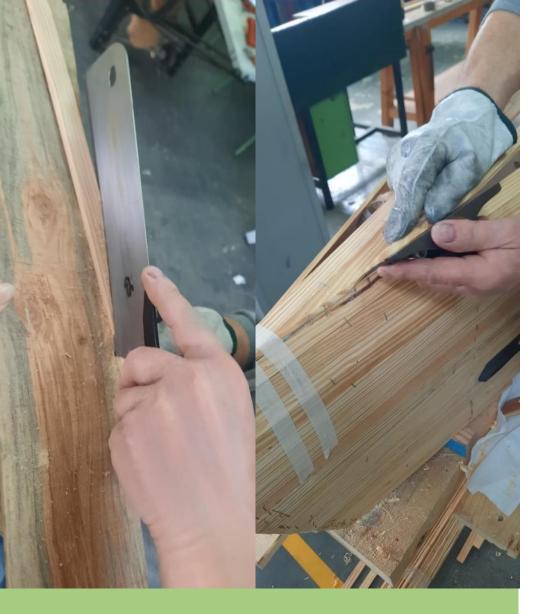


# 7. Laying covering strips Procedure:

Placing the first strips of the cover in the second canoe

- 5300x22x5mm wooden slats with "Bead and Cove"
- Wood glue (glue)
- Staples 14mm
- Tools:
- Manual stapler
- Jaws
- Handsaw (kataba)





# 7. Laying covering strips Procedure:

• Placing the last strip of the flat bottom

- 5300x22x5mm wooden slats with "Bead and Cove"
- Wood glue (glue)
- Staples 14mm
- Tools:
- Jaws
- Handsaw (kataba)
- Brushes





# **7. Laying covering strips** Procedure:

- Formation of a "V" bottom side
- Materials:
- 5300x22x5mm wooden slats with "Bead and Cove"
- Wood glue (glue)
- Staples 14mm
- Tools:
- Manual stapler
- Jaws
- Handsaw (kataba)
- Slings
- Draw lines







# **7. Laying covering strips** Procedure:

- Formation of the other side of the background in "V"
- Materials:
- 5300x22x5mm wooden slats with "Bead and Cove"
- Wood glue (glue)
- Staples 14mm
- Tools:
- Manual stapler
- Jaws
- Handsaw (kataba)
- Slings
- Draw lines





# **7. Laying covering strips** Procedure:

- Placement of the last piece of the background in "V"
- Materials:
- 5300x22x5mm wooden slats with "Bead and Cove"
- Wood glue (glue)
- Staples 14mm
- Tools:
- Manual stapler
- Jaws
- Handsaw (kataba)
- Slings
- Draw lines





8. Trimming ends and removing staples Procedure:

• Trimming ends and removing staples

- Handsaw (kataba)
- Staples Remover
- Pliers





# 8. Sanding and brushing Procedure:

 Sanding and planing of canoes for surface equalization and smooth finish

- Sandpaper cleats
- Sander "Rotoorbital"
- Brushes
- Planer





# **10. Application of epoxy resin** Procedure:

 Preparation of epoxy resin for application. Important to keep in mind the manufacturer's instructions

# Materials:

Epoxy resin

- Glass of paint to make the mixture
- Precision balance







# **10. Application of epoxy resin** Procedure:

- Imprimación con resina epoxi de la parte exterior de la canoa
- Materials:
- Epoxy resin
- Tools:
- Precision scale
- Paint cups
- Rollers
- Brushes





# **11. Placement fiberglass blanket Procedure:**

- Placement of the fiberglass blanket (110gr/m2) on the hull
- Materials:
- Fiberglass (110gr/m2)
- Tools:
- Paintbrush
- Tweezers clothes





# **11. Placement fiberglass blanket Procedure:**

- Application of epoxy resin to fiberglass blanket
- Materials:
- Epoxy resin
- Tools:
- Precision scale
- Paint cups
- Rollers
- Brushes





# 11. Placement fiberglass blanket Procedure:

- Placement of a second layer of fiberglass on the bottom and the bow and stern as reinforcement
- Materials:
- Epoxy resin
- Tools:
- Paintbrush
- Body tape to hold the fabric





## **12. Preparation canoe supports** Procedure:

- Preparation of the supports to place the hulls of the canoes once dry from the beds.
- Before removing the canoe gives bed it is important to mark where the boards will be placed, using as a reference the auction of the forms "

- old desks
- Pallet wood
- End-of-life car seat belts
- Tools:
- Electric taladro





# **12. Preparation canoe supports** Procedure:

 Removal of the canoe from its forms and placed on a support. Some of the shapes were kept so that the helmet did not lose its shape

# Materials:

Canoe shapes

# • Tools:

Slings





# 13. Sanding + resin + fiber inside Procedure:

 Lijado de la parte interior de la canoa y posterior aspirado y limpiado

- Sandpaper cleats
- Rotoorbital Sander
- Brushes
- Planer





# 13. Sanding + resin + fiber inside

#### **Procedure:**

- · Placement of fiber on the inside and application of epoxy resin
- Materials:
- Fiberglass fabric (110gr/m2)
- Epoxy resin
- Tools:
- Paintbrush
- Tweezers clothes
- Precision scale
- Paint cups
- Rollers



Brushes



# 13. Sanding + resin + fiber inside

#### **Procedure:**

- Placement of fiber on the inside and application of epoxy resin
- Materials:
- Fiberglass fabric (110gr/m2)
- Epoxy resin
- Tools:
- Paintbrush
- Tweezers clothes
- Precision scale
- Paint cups
- Rollers



Brushes





# 14. Stakeout for seating and yoke

#### **Procedure:**

- Stakeout of the inner edge, to locate the situation of the seats and the yoke
- Materials:
- Wooden batten 5300x22x10mm
- Epoxy resin
- 3x20mm screws
- Tools:
- Tape measure
- Milling machine, Paint cups
- Jaws Paintbrush
- Electric screwdriver
- Precision scale







#### **15. Embroidery laying** Procedure:

- Placement of inner embroidery
- Materials:
- Wooden batten 5300x22x10mm
- Epoxy resin
- 3x20mm screws
- Tools:
- Tape measure
- Milling machin, Jaws
- Paintbrush
- Electric screwdriver
- Precision scale, Paint cups





## **16. YOKE Procedure:**

Yoke design and subsequent varnishing

#### Materials:

• Wooden board 1000x300x30mm

#### • Tools:

- Marker
- Vertical band saw
- Orbital sander





## **17. Seats** Procedure:

Seat preparation

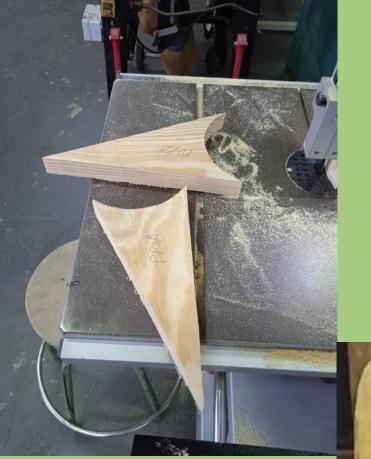
#### Materials:

- Wooden slats 800x25x25mm
- Stripping seat belt tape for braiding the seat

#### • Tools:

- Vertical band saw
- Column drill







# **18. Bow and stern** finials

- Procedure:
- Preparation of bow and stern finishes
- Materials:
- Wooden board
- Pallet board
- Epoxy resin
- Tools:
- Vertical band saw
- Paintbrush







## 19. Varnishing

#### Procedure:

Canoes in the paint booth for varnish application

## Materials:

Acrylic varnish

## • Tools:

- Paint booth
- Paint gun





# 20. We just finished

#### • Procedure:

Checking buoyancy

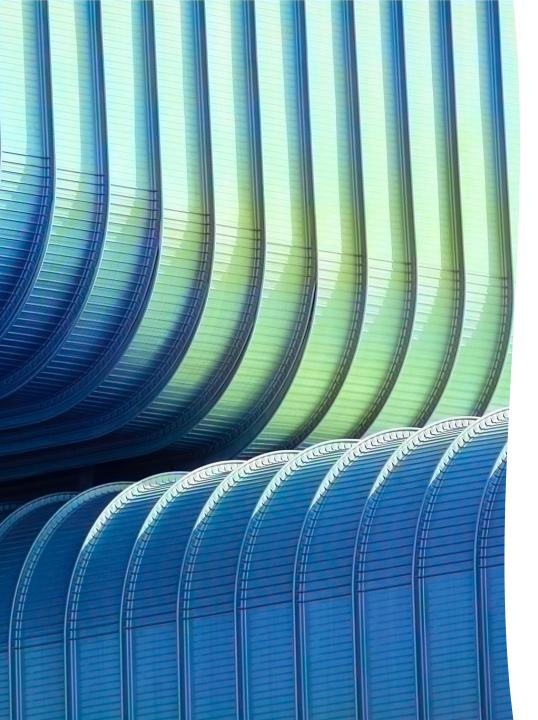




### Unit 6: Waste management at different workshops

Enhancing green skills, sustainability, and attractiveness of Maritime VET





# 1.1. Introduction to the competence

## In the class we do a revision of all this theory contents:

- What is waste?
- What is waste management?
- Different types of waste in general
- Hazardous waste
- Waste generated in the workshop
- Waste Management in our center



## 1.6. Activity 1

"Looking for My place"

The first step is to prepare a collaborative list of all the waste generated in the workshop.

Then create some stickers with the different types of waste identified and classify the waste into categories: hazard or not hazard. The ones that have a hazard should be red.

Divide the stickers among the students and place them in the workshop. Where? In the location where the waste should be deposited.

The stickers will remain in the workshop so that no one forgets where to sort through the trash.



## 1.6. Activity 1

"Looking for My place"

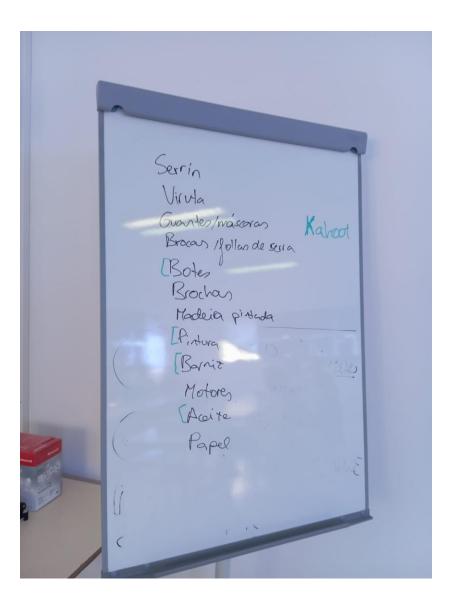
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Example of the list we create on the wood workshop:



. . . .

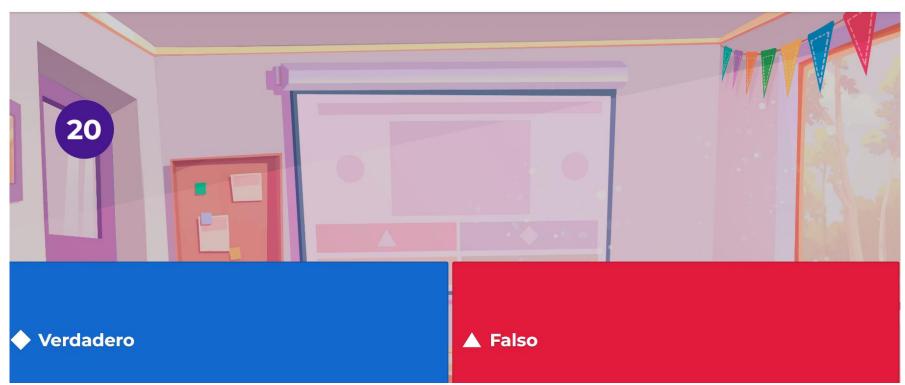


# 1.6. Activity 2

Try to guess the meaning of the pictograms game



#### En el taller de madera hai residuos peligrosos



#### Activity 3 (wood workshop)

Kahoot





GREENDIVING

THANK YOU!

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